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Ref. No. .....
Date .....

MESSAGE

I would like to begin with a hope and desire that all our healthcare providers are safe in this unexpected battle against COVID-19 pandemic which has gripped the world and has cost so much in life & resources.

First of all, I would like to congratulate the Chief and associated Editors, Advisory Board comprising of Professors from various distinguished institutions, other faculty members and contributors, patrons and our beloved stundets and researchers associated with the Journal of Oral and Dental Health. It gives me tremendous delight to see this journal bringing up yet another issue. I want to specially congretulate **Mithila Minority Dental College & Institution** for its brilliant effort and statesmanship for making the Journal of Oral and Dental Health the official publication of L.N. Mithila University, Darbhang.

It gives me immense pleasure to see the Journal in widespread circulation and benefitting numerous researchers and academicians in their quest for scientific temper and knowledge. This Journal and its issues are greatly benefitting Dental professionals and practitioners associated with the field of Dentistry and its allied post-graduate branches, thereby providing an overall enlightenment.

Today, Dentistry has evolved much since its inception and humble beginnings. The skeletal and aesthetic treatment & satisfaction of a patient often involves an inter-disciplinary approach. As such, the Journal of Oral Dental Health through its collection of brilliant researches from all across the country, Epidemiological studies and data presented in its various issues boost a lot of confidence in young surgeons and Dentists alike.

I would conclude by wishing lots of success to the Editorial and Advisory Board in its present and future endeavours.

Best wishes & regards,

Surendra Pratap Singh

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MESSAGE FROM THE MANAGING DIRECTOR

"It is the supreme art of the teacher to awaken joy in creative expression and knowledge."

Albert Einstein

I am extremely happy and proud that a new issue of our esteemed Journal is being published. Our editorial team is continuously working hard to upgrade the quality of the publications. I am sure that these articles will be of extreme help to upgrade the knowledge of dental education.

Our faculties and post graduate students are getting an opportunity to publish their work which I am very happy about. And I came to know that even authors from many other Dental Colleges are contributing their articles. This I believe will be an excellent platform for sharing scientific thoughts.

With more and more original articles pouring in, I am sure that Journal of Oral & Dental Health will be one of the premium Journals in the field of Dentistry.

Wishing success and best wishes to the Editorial team.

Imbesat Shaukat

Managing Director
Mithila Minority Dental College &Hospital,
Darbhanga, Bihar

MESSAGE FROM THE EDITOR IN CHIEF

Dear Readers,

I am honored to have been chosen as the new editor-in-chief of "The Journal of Oral and Dental Health" and am thrilled to share my vision for the future of our illustrious journal. The journal will continue to publish high quality clinical and epidemiological research in material and dental disease in later life. Original research articles form the bulk of the content, with systematic reviews an important sub-section. The methodological quality of such publications has improved dramatically over the last few years

Every individual is equipped with talent. Nobody is born to be idle. A person will succeed in life only when he identifies the dormat talents within himself when it happens, there will be a change in the attitude followed by a paradigm shift in behaviour. However even the best clinical research publications, subjected to close scrutiny by peer review, often have weaknesses. Here editorials and commentaries play a key role in exploring more contentious issues in a balanced way, allowing the reader to make an informed decision on how or whether their clinical practice should be altered.

It is important we have a good balance of different article type within the journal. I am keen to encourage publication of high-quality evidence-based guidelines in dental practice. Such articles are widely read (and downloaded), can have major impact on clinical practice, and also tend to be highly cited to the benefit of our Impact Factor. The journal also has the potential to (re-) shape thinking on important concepts in clinical care, and here 'new horizons' articles have a particular role.

Every obstacle that we come across gives us an opportunity to improve our circumstances, and while the lazy complain, others are creating opportunities through their kind hearts,generosity, and willingness to get things done

Lastly I should thank all our submitting authors, who have toiled in the production of their work, and have chosen Age and Ageing as the journal they would like to publish in. Those that do have their work accepted should be proud of their achievement.

Dr. Rohit Miglani, MDS
Editor in Chief
Journal of Oral & Dental Health

Dean (Dental Faculty)
Lalit Narayan Mithila University,
Darbhanga (Bihar)

Principal
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Journal of Oral and Dental Health • Vol 6 • Issue 1 • 2020

MESSAGE FROM THE EDITOR

“Student: Dr. Einstein, Aren't these the same questions as last year's [physics] final exam?

Dr. Einstein: Yes; But this year the answers are different.”
— **Albert Einstein**

The quantum of knowledge that we are acquiring everyday is in fact enormous. Dental field is no exceptional. How to implement this knowledge is the onus on us. To carry forward the science and pave future paths for coming generation of aspiring researchers. Journal of Oral and Dental Health , the official publication of L.N.Mithila University has till now tried to maintain its standard in publishing remarkable works in the field of Dentistry. Our endeavour and focus is on making this journal relevant and contemporary with a higher impact and greater significance. Articles from all fields of dentistry from various colleges of the country are incorporated not only get a diversified view but to maximise chances of citations. We scrutinize all articles, get it reviewed by experts following plagiarism checks to deliver authenthic works.

Finally , I would like to thank the management of MMDCH to provide all possible help and continuous support in regular uninterrupted publishing of the Journal. I would like to thank the authors, readers, reviewers for their great help and support and cooperation.

I wish the Journal will reach newer heights in future.

Prof (Dr) Dipto De

Executive Editor
Journal of Oral and Dental Health

MESSAGE FROM THE CO-EDITOR

"***Research is the creation of new knowledge***"
- Neil Armstrong

Greetings to one & all!

It gives me immense pleasure to welcome all avid readers to this inaugural edition of the Journal of Oral and Dental Health. This Journal is an official publication of the Mithila Minority Dental College & Hospital, Darbhanga (Bihar) affiliated to the State run Lalit Narayan Mithila University, Darbhanga, Bihar State (India) established and administered by the State Govt. of Bihar State and holds abundant potential to provide a platform for budding research professionals in Dental Sciences across the country and the South East Asian region.

In today's era of constant need of advanced technologies in every discipline, it has become imperative for young professionals and academicians alike to keep themselves updated with the latest scientific innovations & break through. This is only possible through a constant review of scientific literature and adopting a temperament of scientific research.

Every scientific break through has been made possible only by inculcating a scientific temperament which promotes scientific curiosity & research in individuals. Research is a constant and dynamic pursuit of an idea and developing into an hypothesis, testing it through various methodologies which finally culminates into publishing it through various platforms.

A publication signifies the efforts of various individuals associated with an idea and the results and thus a scientific journal is a worthy platform which helps in showcasing these efforts. This journal, a culmination of efforts from stalwarts of various disciplines, will definitely prove to be wonderful opportunity for academicians as well budding professionals

My gratitude to the Founder Chairman of Mithila Minority Dental College & Hospital and the leadership of this journal, the Chief Patron – Acharya Shaukat Khail for his invaluable guidance. I thank the Patron of the Journal as well as Managing Director of MMDCH Mr. Imbesat Shaukat for getting me on board with this wonderful initiative. I thank the Editor in Chief, Dr. Rohit Miglani and the rest of the Editorial Board for their support.

I also take this opportunity to invite faculties in various dental institutes, clinicians, students, etc. to contribute to this journal by sending in their scientific studies and help enhance the scientific content of our discipline of dentistry.

Lastly I congratulate the authors of the articles of this inaugural edition for successful publication of research.

Thank You.

Regards

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Ex- Chairman Board of Studies
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Hon. Gen. Secretary
Indian Association of Public Health Dentistry – Maharashra Chapter

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Journal of Oral and Dental Health

A KEY TO GOOD ORAL HEALTH IS HIDDEN IN NATURE: A CLINICAL TRIAL

Abstract

Aim: The aim of this microbiological study is to evaluate and compare the efficacy of commercially available herbal mouthwash i.e. HiOra (manufactured by The Himalaya Drug Company, Bengaluru, Karnataka, India) and 0.12% chlorhexidine mouthwash i.e. Hexidine. (manufactured by IPCA Health Product Ltd.) in reducing the Streptococcus mutans counts. Material Methods : A randomized study was carried out on 30 healthy children who have dental caries. Out of which 15 subjects were given herbal mouthwash i.e. HiOra to rinse twice a day for five days. The other 15 subjects were given 0.12% chlorhexidine mouthwash to rinse twice a day for five days. Saliva sample were collected prior to the use of mouth wash and after five days and Sreptococcusmutans count was done in terms of colony forming units per ml (CFU/ml). Results: Reduction of S. mutans 4.3% higher in HiOra(97.5%) as compared to Hexidine (93.2%) mouthwash. Conclusion: HiOra mouthrinse was efficacious than hexidine mouth rinse and can be used effectively for the reduction of oral microbial load.

Keywords: Streptococcus mutans, Hiora mouthrinse Hexidine mouthrinse , Plaque.

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Dr. Manoj Yadav[1], Dr. Md Imran[2], Dr. Afzal Ahamd[3], Dr. Ajla khan[4], Dr Pranav[5], Dr. Rahul kumar singh[6]

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INTRODUCTION

Oral hygiene is the perform protecting the mouth clean and healthy by brushing and flossing to inhibit tooth decay and gingival disease. The purpose of oral hygiene is to prevent buildup of plaque, sticky film of bacteria and food that forms on the teeth. Plaque also irritates gums and can lead to gum disease and tooth loss. Tooth brushing and flossing remove plaque from teeth, and antiseptic mouth washes kill some of the bacteria that forms plaque. Plaques plays an important role in development of gingivitis when in contact with the gingival tissues and, therefore, plaque control represents the cornerstone of good oral hygiene practice. Despite the availability of various oral hygiene devices even the most meticulous technique will not always completely remove all plaque. Therefore, a chemical plaque control in the form of mouthrinse is desirable to deal with the potential deficiencies of daily self- performed oral hygiene. Chlorhexidine is a gold standard anti plaque agent due to its proven efficiency[1].Though effective, it has certain side effects like staining on teeth, oral mucosal erosions and bitter taste. Hence, there is a need of an alternative mouthrinse that could negate all the side effects of chlorhexidine but, effective equivalent to it. Natural herbs such as triphala, tulsipatra, neem, clove oil, pudina, ajwain, and many more used either alone or in combination have been scientifically proven to be safe and effective against various oral health problems such as bleeding gums, halitosis, mouth ulcers, and tooth decay. Herbal mouth rinses do not contain alcohol and sugar found in most of the other counter products. Thus, herbal mouthrinse promote better oral hygiene and health[2].Mouthwashes are solutions or liquids used to rinse the mouth for a number of purposes :(a) to remove or destroy bacteria(b) performs as an astringent (c) to disinfect and (d) therapeutic effect by relieving infection and preventing dental caries. The aim of this microbiological study is to evaluate and compare the efficacy of commercially available herbal mouthwash i.e. ***HiOra*** (manufactured by The Himalaya Drug Company, Bengaluru, Karnataka, India) and 0.12% chlorhexidine mouthwash i.e. ***Hexidine (****manufactured by IPCA Health Product Ltd.)* in reducing the *Streptococcus mutans* counts**.**

MATERIAL AND METHODS

The study was conducted on 30 healthy children with age range of 8 to 15 years attending the outpatient department of Paedodontics and Preventive Dentistry.

INCLUSION CRITERIA:

• Healthy children without any known systemic illness.

• Children who have dental Caries.

EXCLUSION CRITERIA:

• Children with known history of allergy to any commercial mouthwash.

• Children have any other oral hygiene aids other than routine teeth brushing

• No recent history of use of antimicrobial agents or any other drugs (within 4 weeks)

The subjects were divided into 2 experimental groups depending on the type of mouthrinses used, having 15 samples each, as shown in Table 1.

Table 1 showing distribution of samples

Groups	Number of sample. N	Mouthrinse
Group A	n=15	Chlorhexidine mouth rinse (CHX) 0.12%
Group B	n=15	*HiOra* mouth rinse

Unstimulated saliva was collected by draining method prior to the procedure**.** Patient sitting quietly, with the head bent down and mouth open to allow the saliva to drip from the lower lip and saliva was collected with help of new disposable syringes**.** As soon as the samples are collected they are sent to the laboratory to check for *streptococcus mutans* level by culture method. Out of which only 15 subjects were given 0.12% chlorhexidine mouthwash (Group A) to rinse twice a day for five days. The other set of subjects were given herbal mouthwash i.e. *HiOra* (Group
B) to rinse twice a day for five days. After five days again saliva samples were collected with help of new disposable syringes by draining method and they were sent to the laboratory to check for *streptococcus mutans* level by culture method. Finally the mutans level were compared and tabulate

RESULTS

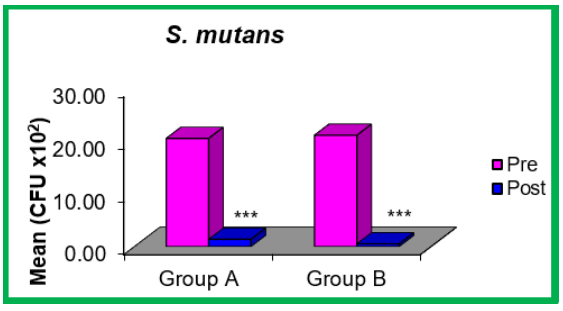

Fig.1 *Hexidine* and *HiOra* shows significant (p<0.001) reduction in mean (± SE) colony count of *S. mutans* at post treatment as compared to pre treatment (CHX: 20.53 ± 2.31 vs. 1.40 ± 0.25, p<0.001; Hiora: 21.13 ± 2.68 vs. 0.53 ± 0.19, p<0.001). However, at post treatment the mean change (reduction) in colony count was statistically similar between the two groups(p=0.709).

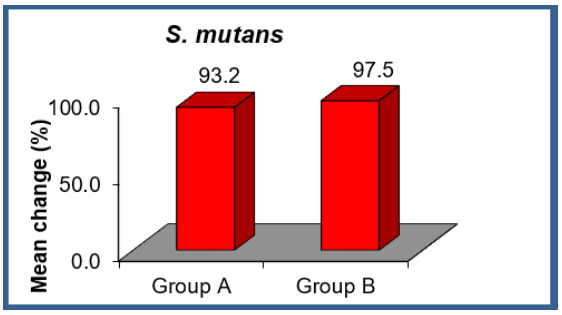

Fig 2. shows reduction of *S. mutans* 4.3% higher in *HiOra*(97.5%) as compared to *Hexidine* (93.2%) mouthwash.

DISCUSSION

The role of bacteria in initiation of dental caries and periodontal diseases is well established[3]. *S. mutans* plays a major role in plaque formation. Chemical agent in a mouth rinse should be effective at modifying the microbiota by selectively eliminating pathogens without negatively impacting the normal flora that may result an overgrowth of pathogenic organisms[8]. Both *Hexidine* and *HiOra* were significantly effective in reducing the *S. Mutans* count , but *HiOra* was more effective , although both were statistically similar (p= 0.709).According to *T. Nandhini et al*, (2015) the herbal mouthwash can cause inhibition of bacterial growth and was less potent than *Hexidine*[4]. Whereas, *Sanjukta Bagchi et al* (2015) reported both *Hiora* and *Hexidine* to be effectve in reducing plaque scores, however CHX was the best[5]. The efficacy of *Hexidine* is attributed to its bactericidal properties by rupturing the bacterial cell membrane resulting in cell death and inhibiting pellicle formation and plaque colonization[6]. Also is related to its substantivity which lasts for 8-12 hours .This study indicated that *HiOra* can cause inhibition of bacterial growth . This could be due to its preparation which is the combination of natural herbs with beneficial properties of anti-cariogenic, anti- plaque, antimicrobial and anti inflammatory due to the presence of 5mg Pilu, 10mg[7] Bibhitaka,, 10mg[8] Nagavalli, 1.2mg Gandhapurataila, and Yavanisatva 0.4mg[9]. The present study results, showed that herbal mouthwash can cause inhibition of bacterial growth. The use of mouth washes as disinfectants can help mechanical methods to reduce plaques [10].According to many studies that have been conducted on the effects of mouthwashes on oral microorganism the Chlorhexidine mouth wash is the most superior among all mouthwashes. Chlorhexidine mouthwash is more effective in reducing *S.mutans* in plaques, indicates the high anti microbial activity of chlorhexidine mouthwashes. In the present study herbal mouth wash i.e.*HiOra* was checked for is antibacterial activity in comparison with Chlorhexidine mouth wash and results showed that herbal mouth wash is more potent than Chlorhexidine mouth wash and none of the subjects in either groups had any allergic reaction following the use of mouth rinses.

CONCLUSION

Natural herbs are promotive and herbal mouth washes are gaining popularity as they contain naturally occurring phytonurients and are more appealing because they work without alcohol. artificial flavours and colors *HiOra* mouthrinse was efficacious than hexidine mouth rinse and can be used effectively for the reduction of oral microbial load. Researches using *HiOra* mouthwash having larger sample size and longer periods should be promoted to enlighten its advantages and disadvantages.

REFERENCE

1) Carranza FA Jr: Glickman's Clinical Periodontology. 7 th Asian ed, WB Saunders 1990. p. 342-372, 648-711.

2) Malhotra R, Grover V, Kapoor A, Saxena D. Comparison of the effectiveness of a commercially available herbal mouthrinse with chlorhexidinegluconate at the clinical and patient level. J Indian Soc Periodontol 2011;15:349-52.

3) Carranza FA Jr: Glickman's Clinical Periodontology. 7 th Asian ed, WB Saunders 1990. p. 342-372, 648-711

4) T. Nandhini ,R.VGeetha J. Pharm. Sci. &Res. Vol. 7(8), 2015, 595-597

5) SanjuktaBagchi, SabyasachiSaha, G. V. Jagannath, Vamsi Krishna Reddy, PoojaSinha Journal of Indian Association of Public Health Dentistry Vol. 13, Issue 3, | July-September 2015

6) Southern EN, McCombs GB, Tolle SL, MarinakK.. The Comparative Effects of 0.12% Chlorhexidine and Herbal Oral Rinse on Dental Plaque–Induced Gingivitis. J Dent Hyg. 2006;80(1):1–3.

7) Liu WR, Qiao WL, Liu ZZ, Wang XH, Jiang R, Li SY, et al. Gaultheria: Phytochemical and pharmacological characteristics. Molecules 2013;18:12071-108 .

8) Vaish S, Ahuja S, Dodwad V, Parkash H. Comparative evaluation of 0.2% chlorhexidine versus herbal oral rinse on plaque induced gingivitis. J Indian Assoc Public Health Dent 2012;2012:55-62.

9) Sharma R. Cardamom comfort. Dent Res J (Isfahan) 2012;9:23

10)Chitsazi M , Shirmohammadi A , Balayi E . Effect of herbal and chemical mouth rinse on periodontal indices;comparison of matrica , persica and chlorhexidine.J Dent Shiraz Univ Med Sci . 2008;8(4):54-60

AN EVALUATION OF THE KNOWLEDGE OF AND ATTITUDE TOWARDS ORAL HEALTH CARE OF PRESCHOOL CHILDREN AMONG PARENTS OF MEWAR REGION

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Abstract

Aim: The aim of the present study is to assess the parental knowledge of and attitude towards oral health care of pre-school children of Mewar region. Materials and Methods: A total of 500 parents accompanying children seeking dental treatment at the Department of Pedodontics, Pacific Dental College Hospital, Udaipur, from July 2016 to June 2017. It is a descriptive, questionnaire study based upon Raphael and Gregory's study designed for parents accompanying children, seeking different types of dental treatment. Results thus obtained were statistically analyzed using Chi-square test. Results: The mean age of the participants was 31.12±3.8 years in which 59% (n=295) were males and 41 % (n=205) were females. Most of the parents used tooth brush and tooth paste for their children and dental floss was least to be used. Almost 79% of children brushed their teeth themselves while 21% need assistance. Large number of parents (65%) never heard about the fluoride tooth paste, while 22.2% of the participants were aware of it. Large number of children used medium bristles brush (28.2%) while around 20% of children utilized soft bristles. Majority of parents (40.2%) instructed their child rinse mouth thoroughly with water after every meal, while still 25% of the parents had failed to answer that question. Almost half of the participants were not aware of various oral diseases which can create problems in kid's mouth. Conclusions: The fact that education improved the overall ability of the parent to deal with dental trauma was a significant observation in our study. Parent education could help allow them to make first aid decisions that could greatly reduce the morbidity associated with traumatic dental injuries. Apart from other factors, to improve the knowledge of caregivers towards emergency management of dental avulsion educational campaigns and preventive program on dental trauma plays a role

Keywords: Attitude, Knowledge, Oral Habits, Parents..

INTRODUCTION

The American Academy of Paediatric Dentistry (AAPD) recognizes that an infant's, children, or adolescent's well-being can be affected by oral health creating a need for effective individual management of the same. [1] Oral health is an important aspect of general health in infants and children and impacts the quality of life and health outcomes. It is an integral component of preschool health and well-being. Poor oral health in early childhood is one of the most serious and costly health conditions in young children. [2] Maintenance of child's oral hygiene practice mainly affects parents' awareness about oral hygiene measures.[3]

A common misconception that milk teeth of children will exfoliate and there is a less need to seek expert dental advice may lead to various dental problems.[4] The relation between knowledge and behavior has weak existence. Earlier it has been said that knowledge and oral health is directly proportional. There are reports that there is an association between increased knowledge and better oral health. It is the primary concern of oral health educators to impart a positive oral health knowledge and behaviour among people.[5]

A concept of health care, viz., self-care, refers to those activities undertaken by the person themselves in promoting their own health, preventing diseases and illness. [6] Motivation of the population in regard to maintenance of good hygiene should be emphasized. The paucity of studies on the subject necessitates an assessment of the prevalence of such habits and education of the common masses.[2, 7]

Developed countries have recorded a significant decline in the severity and prevalence of oral diseases among their populations over the last five decades of the twentieth-century[1]. The credit goes to the education promotional programs regarding oral hygiene, diet and feeding practices and programs that encourage early access to professional preventive dental care. Unfortunately developing countries, such as India face many challenges in rendering oral health needs of preschool children, especially in rural populations.[8]

According to different researches parent prior knowledge, attitude and practices can affect the oral health status of the children.[9] Oral health has an important role in general well-being of individuals. The oral health behaviours can affect the oral and general health thus, an attempt to construct good oral health can affect the well being of an individuals. [10, 11] So the adoption of good oral health habits in childhood often takes place with parents especially with mothers. Being the primary social force parents during the early childhood years influence child development, so the interventions which targets parent oral health and practice proves beneficial for interventions targeting parental oral health beliefs and practices play beneficial roles in the intervention of oral health problems such as dental caries.[12]

Oral health of the preschool children is affected by parental dental knowledge, attitudes, cultural beliefs and awareness about infant diet and feeding practices, oral hygiene habits, preventive regular dental visits, care of primary teeth and concern for oral health. Knowledge and awareness are necessary prerequisites for changes in behaviour, including behaviour related to health and disease prevention. [13, 14] Parents' knowledge and attitudes have a significant positive influence on their children's dental caries and gingival health. Parental knowledge regarding oral health showed to influence their children's oral health. Also, the number of decayed teeth in children is greatly affected by their parents' oral health. Parental oral health related knowledge, beliefs, and attitudes were found to influence the tooth-brushing behaviour of their children.[15, 16]

There is a paucity of literature available regarding parental knowledge, attitudes and cultural beliefs regarding oral health of their children in developing countries such as India. Moreover, most of those surveys reported in the literature are targeted at school age children due to easy accessibility, which is not possible in preschool children.[17] Moreover, considering parents' central role in ensuring the well-being of young children, it is important to explore their perceptions about their children's oral health. These perceptions can affect the preventive dental care that the children might receive at home and the use of professional dental services.

A study done in Kuwait few years ago revealed that the main source of dental health information among children are their parents (74%); followed by dentists (45%) and school teachers (33%). Thus, parents are essential for health communication.[18] Consequently, this study is designed to investigate how the oral health attitudes, knowledge and cultural beliefs of parents affect the oral health of their preschool children in Mewar region of Rajasthan state.

AIMS AND OBJECTIVES

The aim of the present study was to assess the parental knowledge of and attitude towards oral health care of preschool children of Mewar region in Rajasthan State.

1. To evaluate the parental knowledge of oral health care of preschool children of Mewar region.

2. To evaluate the parental attitude towards oral health care of preschool children of Mewar region.

3. To evaluate the influence of gender, education, economic status, geographic location etc. on their responses.

MATERIALS AND METHODS

The present study is a descriptive, questionnaire survey. Questionnaires based upon Raphael and Gregory's study were designed for parents accompanying children, seeking different types of dental treatment in the Department of Paediatric Dentistry, Pacific Dental College and Hospital, Udaipur, to assess the parental knowledge of and attitude towards oral health care of preschool children of Mewar region in Rajasthan State. An ethical clearance to conduct the study was obtained from institutional research committee. An informed consent was also obtained from each participant before the commencement of the study. Children accompanied by one or both parents independent of colour, race, or ethnic background were included in the study. Parents were not willing to participate were excluded from the study. A ten point questionnaire composing different objective type questions for the assessment of parental knowledge of and attitude towards oral health care of preschool children was handed to 500 parents attending the paediatric department from July 2016 to June 2017. It covers three sections: demographic information of participants, views on dental health of children, and views on dental care for young children. The parents were interviewed and the questionnaire filled. Results thus were expressed in frequency distribution. Data analysis was done using the Statistical Package for Social Sciences (SPSS) software. Chi-square test was used to influence the different variables such as age sex, level of education etc. on knowledge and attitude of the participants.

RESULTS

The parents participated in the study were aged 31.12±3.8 years in which 59% (n=295) were males and 41 % (n=205) were females. Most of the parents had primary education (28.2%) followed by literate and high school. Metric or High School was done by 104 (20.8%) number of participants, while 14% and 16% of population had graduation and post-graduation education. A majority of the study population were working in private set up (26.2%), followed by self-employed and government service. Most of the parents have 2 children (53.4%), while only 3.6% parents have more than 3 children.

Most of the parents used tooth brush and tooth paste but unfortunately dental floss was hardly used. It was reported that 49.4% children brushed their teeth once while 39.8% of children brush twice a day. A large number of children (79%) brushed their teeth themselves while 21% of the need assistance (Table 1). Thirty nine percent of children covered half head of tooth brush with tooth paste while around 25% brush full head of the tooth brush pasted. Mostly (65%) of parents have never heard about the fluoride tooth paste while, 22.2% of the participants were aware of it (Table 2). Majority of the parents gained dental awareness from their dentist (36%), while around 23% of parents have learnt from oral health education programme. Large number of children used medium bristles (28.2%) while around 20% of children utilized soft bristles. Half of parents did not know that it is necessary to clean the child's teeth after every meal. Only 32% parents had sufficient knowledge of cleaning their child's teeth after every meal. Large numbers of parents (42.4%) were unaware about the fact and they were not particular about changing the tooth brush, while around 158 number of parent changed their child's tooth brush (Table 3). Majority of parents (40.2%) instructed their child rinse mouth thoroughly with water after every meal intake still only 11% of children used to rinse their mouth after every meal and around 21% of the participants rinsed their mouth occasionally. Around 30% of the parents believed that they should start brushing of child's teeth after first tooth erupted into oral cavity.

A large number of parents (40.6%) believed that junk food should be avoided, while around 37% also believed that chocolate should also be avoided by the kids. To a surprise 11% of the parents believed that fruit should also avoided by children. Around 36% of the total sample answered that sugary food should be eaten with meals, while around 20% gave preference to eat before going to bed (Table 4). More than half study population (53%) agreed that a good oral health leads to a good general health (Table 5). Majority of the parents (39.6%) disagreed that healthy primary teeth are essential for proper mastication while, 33% were uncertain about it. Only 37% of the study participants were certain on taking good care of primary dentition whereas 42% replied that it is going to fall anyway. Astonishingly, 49% of the participants were not aware of various oral diseases which can

create problems in kid's mouth, while around 28% study population did not even knew such conditions do exist. Only 30.8% parents revealed that they will response immediately to their child dental problem. .

Table 1: Do they brush by themselves?

Answer	Number	Percentage
a) Self	395	79%
b) Assisted	105	21%
Total	500	100%

Table 2: Have you heard about fluoride toothpaste?

Answer	Number	Percentage
a) Yes	111	22.2%
b) No	325	65%
c) Do not know	64	12.8%
Total	500	100%

Table 3: How often do you change your child's tooth brush?

Answer	Number	Percentage
a) Once in 15 days	87	17.4%
b) Once in a month	98	19.6%
c) Once the bristles fray out	103	20.6%
d) Not particular about it	212	`42.4%
Total	500	100%

Table 4 : At what time do you give the sugary food items to your child?

Answer	Number	Percentage
a) With meals	179	35.8%
b) In between meals	109	21.8%
c) Before going to bed	98	19.6%
a) Not particular	114	22.8%
Total	500	100%

Table 5: Good oral health is related to the good general health. Do you agree?

Answer	Number	Percentage
a) Agree	265	53%
b) Disagree	147	29.4%
c) Uncertain	88	17.6%
Total	500	100%

DISCUSSION

The present study aimed at evaluating the current oral health knowledge and attitudes of parents of children in Mewar region. Over-reporting was assumed in all the points attributed to respondent's desire to give socially acceptable answers. Despite changing roles and areas of responsibility within the family, the mother still seems to play the key role in the child's oral health-related life-style.[19] but this difference is not statistically significant. However, females seem to have better knowledge and attitudes regarding their children's oral health.[20]

A vast majority of the respondents knew that primary teeth are important. And most of them correctly identified that problems in primary teeth can affect the permanent ones. However, more than third reported that they visited the dentist only when the child experienced pain. It has been proven that regular visits to the dentist are very/fairly important for preventing dental caries and periodontal disease. [19] Few subjects are using tooth brush with water for cleaning their children's teeth. When asked about the frequency of tooth brushing, parents reported that their child brush only once a day (49.4%), while large numbers (39.8%) of children brush twice a day which is a good sign. Unfortunately, less than 10% of the respondents ask their children to use dental floss. Studies show that regular and meticulous flossing can drastically reduce the incidence of inter proximal caries risk in young children with poor tooth brushing habits and low fluoride exposure. Better tooth brushing and/or enhanced topical fluoride exposure may attenuate or eliminate this flossing effect.[21]

Thirty nine percentages of children covered half head of tooth brush with tooth paste while 25% used full head pasted tooth brush. A large number of parents (65%) never heard about the fluoride tooth paste, while 22.2% of the participants knew about fluoride tooth paste. Majority of the parents have heard from their dentist (36%), while around 23% of parents have learnt from oral health education programme. When asked about the relation between, good oral health and good general health. More than half study population (53%) were agreed that good oral health is related to the good general health.

The rationale of this study is to improve and motivate the parents and children regarding the child's oral health and treatment needs. The oral health knowledge of the parents establishes the oral health and related habits of the children during infancy and this is maintained throughout the preschool years. Parents play an important role for their children in this aspect. [22] This study provides important data on knowledge of parents toward oral hygiene of children aged 3 months to 10 years. The survey shows that the parents were relatively knowledgeable regarding their children's oral health. The literacy level of the parents is considered important for assessing oral health status, as it relates to the level of information known by a parent about the importance of the oral health of children in the society. It is generally assumed that a well-educated person is generally more aware of overall health. This shows that parents became aware of their children's oral health as the age of the child increases.[23] Role of education in improving parents' knowledge of both first aid and dental first aid has been previously documented. The observation in our study that education improved overall ability of the parent to deal with dental trauma proved a significant fact. Collaborations between oral health care providers and social service community programs and general health providers could make a difference in the level of information about oral health promotion that parents and

guardians have. [24] In an ideal world, all parents and guardians would, of course, receive a comprehensive education about promoting their children's oral and general health early on in their child's life, and subsequently as the child grows up. However, even in a country as affluent as the United States, certain segments of the population are less likely to receive oral health care and thus do not have the benefits of interactions with health care providers that could result in education about oral health issues. [25] It therefore seems crucial to consider what information should be targeted at specific groups of parents and guardians.

CONCLUSION

Most of the parents were willing to receive complete knowledge of emergency management of dental traumatic injuries in children irrespective of age, education, socioeconomic status, occupation and place. The study emphasizes the need to initiate more oral health education programs for parents and their children at the preschool and school setups so as to spread the oral health awareness. Medical professionals are the first to be in contact with the expecting or new mother, should give proper, appropriate and accurate information regarding oral health care of infants and children and guide parents to dentists for regular oral health examination.

REFERENCE

1. Marrs J-A, Trumbley S, Malik G. Early childhood caries: determining the risk factors and assessing the prevention strategies for Nursing intervention. Pediatr Nurs 2011;37:1:9-15.

2. Hegde AM, Xavier AM. Childhood Habits: Ignorance is not Bliss—A Prevalence Study. Int J Clin Pediatr Dent. 2009;2:26-29.

3. Patrick DL, Lee RSY, Nucci M, Grembowski D, Jolles CZ, Milgrom P. Reducing oral health disparities: a focus on social and cultural determinants. BMC Oral Health 2006;6:51-4.

4. Kaur B. Evaluation of oral health awareness in parents of preschool children. Indian J Dent Res. 2009:20:4:463-65. 5. Kaira LS, Srivastava V, Giri P, Chopra D. Oral health-related knowledge, attitude and practice among nursing students of Rohilkhand Medical College and Hospital. J Orof Res. 2012;2:20-3.

6. Organization WH. Self-care in the context of primary health care. 2009.

7. Shah K, Parikh U. Assessment of Parental Knowledge in Relation to the Oral Habits in the Children in Ahmedabad City, Gujarat. J Advan Med Dent Scie Res. 2017;5:34-7.

8. Perry HB, Zulliger R, Rogers MM. Community health workers in low-, middle-, and high-income countries: an overview of their history, recent evolution, and current effectiveness. Annu Rev Public Health. 2014;35:399- 421.

9. Jose B, King NM. Early childhood caries lesions in preschool children in Kerala, India. Pedia Dent. 2003;25:6:594-600.

10. Bozorgmehr E, Hajizamani A, Malek Mohammadi T. Oral health behavior of parents as a predictor of oral health status of their children. ISRN dentistry, 2013, 5 Pages.

11. Singh A, Gambhir RS, Singh S, Kapoor V, Singh J. Oral health: How much do you know?–A study on knowledge, attitude and practices of patients visiting a North Indian dental school. Euro J Dent 2014;8:63-7.

12. Mitchell GL, Farrow C, Haycraft E, Meyer C. Parental influences on children's eating behaviour and characteristics of successful parent-focussed interventions. Appetite 2013;60:85-94.

13. Amin MS, Harrison RL. Understanding parents' oral health behaviors for their young children. Qual Health Res 2009;19:116-27.

14. Lawrence H, Romanetz M, Rutherford L, Cappel L, Binguis D, Rogers JB. Oral health of aboriginal preschool children in Northern Ontario. Probe 2004;38:172-90.

15. Saied-Moallemi Z, Virtanen J, Ghofranipour F, Murtomaa H. Influence of mothers' oral health knowledge and attitudes on their children's dental health. Eur Arch Paediatr Dent. 2008;9:79-83.

16. Okada M, Kawamura M, Kaihara Y, Matsuzaki Y, Kuwahara S, Ishidori H, Miura K. Influence of parents' oral health behaviour on oral health status of their school children: an exploratory study employing a causal modelling technique. Inter J Paedia Dent 2002;12:101-8.

17. Chhabra N, Chhabra A. Parental knowledge, attitudes and cultural beliefs regarding oral health and dental care of preschool. Eur Arch Paedia Dent. 2012;13:76-82.

18. Suvarna R, Rai K, Hegde AM. Knowledge and oral health attitudes among parents of children with congenital heart disease. Int J Clini Pedia Dent. 2011;4:25-8.

19. Al-Yahya L. Knowledge and Oral Health Attitudes among Parents in Kuwait Elective Project Study Course No. 703 Kuwait University Faculty of Dentistry 2013.

20. Lapouse R, Monk MA. An epidemiologic study of behavior characteristics in children. American J Pub Health Nations Health 1958;48:1134-44.

21. Sambunjak D, Nickerson JW, Poklepovic T, Johnson TM, Imai P, Tugwell P, Worthington HV. Flossing for the management of periodontal diseases and dental caries in adults. The Cochrane Database Syst Rev,2011,7:12:cdo8829.

22. Suresh B, Ravishankar T, Chaitra T, Mohapatra A, Gupta V. Mother's knowledge about pre-school child's oral health. J Indian Soc Pedo Prev Dent. 2010;28:4:282-87.

23. Moon RY, Cheng TL, Patel KM, Baumhaft K, Scheidt PC. Parental literacy level and understanding of medical information. Pediatrics 1998;102:2:e25- e27.

24. Young ID. Guidelines for school health programs to promote lifelong healthy eating. J Sch Health 1997;67:1:9-26.

25. Kaplan WA. Can the ubiquitous power of mobile phones be used to improve health outcomes in developing countries? Global Health 2006:2:2-9.

ASSESSMENT OF IOTN AMONGST THE NORTH INDIAN POPULATION

Abstract

Introduction: Malocclusion comprising the esthetics is the prime concern both for the patients and orthodontists. There are various indices to assess the severity of malocclusion, but Index of Orthodontic Treatment Need (IOTN) is the most commonly used worldwide both for clinical and epidemiological studies.

Aim: The aim of this study was to assess the severity of malocclusion and treatment need in subjects undergoing orthodontic treatment.

Materials & Method: The study sample of this prospective study consisted of pre-treatment study models and photographs of 207 (m=71, f= 136) prospective orthodontic patients. The dental component and Aesthetic component of IOTN was assessed using study models and intraoral frontal photograph respectively.

Result: The study result of Dental component showed, highest percentage (46.9%) of subjects was found to be for severe treatment need followed by 24.2% for moderate need, 18.8% for extreme need, and 9.7% for mild/little need. The numbers of subjects were least (0.5%) in no treatment need. Similarly, the number of subjects were highest in grade 8 followed by 5, 4, 6, 2 & 7, 9, 3 and 10. This was least in grade 1.

Conclusion: A majority subjects in severe treatment need with a few in no treatment need shows the urge for availability of orthodontic services to the population.

Keywords: Index of Orthodontic Treatment Need, malocclusion, orthodontic treatment, severity.

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INTRODUCTION

Malocclusion today is the commonest concern after caries in the dento-skeletal component. These malocclusion can be at the dental or skeletal level. The dental / skeletal element of malocclusion causes various esthetic and functional disturbances including prone to trauma and psychological component. Malocclusion has a very elevated prevalence. [1]

The need for correction of this malocclusion can be assessed using various indices.[2-6] These indices recognizes the site and severity of malocclusion and helps in identifying need for orthodontic treatment and planning. Index of Orthodontic Treatment Need (IOTN) was advocated by Peter Brook and William Shaw is the most commonly used index for clinical and epidemiological purposes. [7]
Malocclusion having an ethnic and racial component urged the need for assessing prevalence of malocclusion and its severity in different populations. [8-14] To our knowledge, the severity of malocclusion in subjects undergoing orthodontic treatment has not been conducted so far. Therefore, the aim of this study was to assess the severity of malocclusion and treatment need in subjects undergoing orthodontic treatment.

.

MATERIALS AND METHOD

The study was conducted at Vardhman Institute of Medical Sciences, Pawapuri. The study was approved by committee for research program of the institute.

The study sample consisted of study models and pre-treatment photographs of prospective orthodontic patients. A total of 207 records of the subjects were included in this study for assessment of IOTN.

Inclusion Criteria:

1. Subjects with full complement of teeth till second molar.
2. Good quality radiographs with clarity of image.
3. Good quality Photographs.

4. Models without missing / broaken tooth.

5. Subjects with no craniofacial anomalies.

Exclusion criteria:

1. Subjects with missing/ Impacted tooth.

2. Subjects with Craniofacial anomalies.

3. Artifacts in radiographs

4. Study models with broaken/missing tooth.

The records were assessed for the two components of IOTN

1. Dental Health Component (DHC) and

2. Aesthetic component (AC)

DHC was classified into five categories using study models -

Grade 1- No treatment need;

Grade 2- Mild/little treatment need;

Grade 3- Moderate/borderline treatment need;

Grade 4- Severe treatment need;

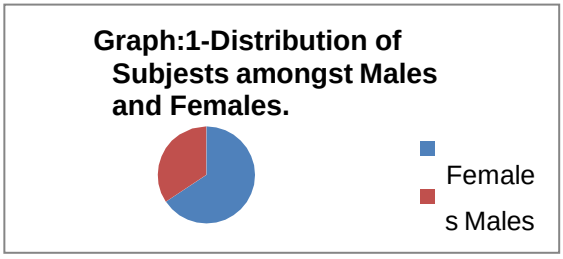
Grade 5- Extreme treatment need.

AC was evaluated using intraoral and frontal photograph for dental attractiveness.

The records of 50 patients were reassessed after 2 weeks to check Intra-examiner reliability. The Intra-examiner reliability was assessed by kappa statistics. The Kappa value of intra-examiner reliability was found to be 0.70 and 0.76 for AC and DHC respectively. This (Kappa value) showed a substantial agreement between the examiners. The data was subjected to statistical analysis using Statistical Package for social science software (SPSS, Version 10).

RESULT

The current study evaluated the severity of malocclusion and treatment need in subjects undergoing orthodontic treatment. A total of 207 records of selected patients were evaluated. The demographic evaluation showed the number of male and female subjects were being 71 and 136 respectively. (Graph-1)



The DHC score for Grade 1,2,3,4, and 5 was found to be 1, 20, 50, 97, and 39 subjects respectively. The maximum number subjects were in Grade 4 followed by Grade 3, 5 and 2. Only 1 subject was found in Grade 1. (Table 1).

Table 1: Distribution of DHC among male and female.

	IOTN - Dental Health Component					Total
	Grade 1 No need	Grade 2 Littl e need	Grade 3 Modera te need	Grade 4 Seve re need	Grade 5 Extre me need	
Fema le	1	12	36	60	27	136
Male	0	8	14	37	12	71
Total	1	20	50	97	39	207

The esthetic Component was showed highest number of subjects were in Grade 8, and least in Grade 1. The distribution of subjects was found to be Grade 8> 5>4>6>2=7>3>1. (Table 2).

Table 2: Distribution of AC among male and female

	IOTN - Dental Health Component										Total
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	
Female	5	15	7	20	24	19	11	20	7	8	136
Male	2	3	6	12	10	6	7	15	8	2	71
Total	7	18	13	32	34	25	18	35	15	10	207

Table 3 shows the comparison between DHC and AC grades amongst gender. Females were more than males in each grade. A significant positive correlation was found between between DHC and AC Grades.

Table 3: Correlation of IOTN with Gender .

	Pearson Correlation	Sig 2-tailed
DHC and AC in male	0.475	0.000*
DHC and AC in female	0.468	0.000*
DHC and AC in total	0.469	0.000*
		*Signifcant at p<0.05

DISCUSSION

The prevalence of malocclusion varies with specific population.[15-19] The prevalence of malocclusion in India varies from 73% to 90.4%.[1,20-21] Orthodontic treatment planning requires statistics concerning malocclusion and its severity of the population group. There are various studies pertaining to severity of malocclusion in specific population.[13,22-24] Studies enlightening similar data between orthodontic center are inadequate. [14,31]

The current study was undertaken to evaluate the severity of malocclusion among the orthodontic patients. A survey in United Kingdom comprising of 2050 subjects showed, 45% of adults

being unhappy with their teeth, with only 20% would like to undergo orthodontic treatment[25]

Patients and parents satisfaction score for orthodontic treatment has also been reported.[26-27] Subjects having malocclusion may not like to go for orthodontic treatment due to various reasons including finances and the duration of treatment. [28]

The orthodontic triad is the prime concern for orthodontist, but at the patients level only esthetics is the reason for seeking the treatment in majority.[29] Esthetics being subjective characteristics is described as huge need / no need by the subjects. [30] This personal perception is the reason for the patients being treated in the orthodontic clinic.

The data comparison of previous studies concerning the severity of malocclusion shows a vast difference in ranking community people and those at orthodontic clinic. The ratio of subjects reporting for orthodontic treatment is vis-a-vis same at each grade of DHC (Table 4).

Table 4: Comparison of IOTN Data .

Study	Grade I	Grade II	Grade III	Grade IV	Grade V
Prevalence in population [21]	15.02 %	14.7 %	24.07 %	24.67 %	21.59 %
Presented to the hospital[31]	1%	8.9%	28.1%	47%	15%
Undergoing treatment (present study)	0.5%	9.7%	24.2%	46.9%	18.8%

The percentage subjects with great need of orthodontic treatment are increasingly high. The sparse availability of specialist orthodontist in our country poses a challenge towards providing orthodontic care.[32-33] The high cost of orthodontic treatment and non-availability of orthodontist at rural areas are amongst the other challenges for the subjects seeking orthodontic treatment.

CONCLUSION

The current study found a severe need for orthodontic treatment amongst majority of subjects. There needs a hand towards availability of orthodontic services to the overlooked population.

REFERENCE

1. Shrestha BK, Yadav R, Gyawali R, Gupta S. Prevalence of malocclusion among medical students in Institute of Medicine, Nepal: A Preliminary report. Orthod J Nep. 2013; 1(1):24-7.

2. Draker HL. Handicapping labio-lingual deviations: A proposed index for public health purposes. Am J Orthod. 1960; 46(4):295-305.

3. Linder-Aronson S. Orthodontics in the Swedish public dental health service. Trans Euro Orthod Soc. 1974:233.

4. Cons NC, Jenny J, Kohout FJ. DAI--the Dental Aesthetic Index: College of Dentistry, University of Iowa, Iowa City; 1986.

5. Brook PH, Shaw WC. The development of an index of orthodontic treatment priority. Euro J Orthod. 1989; 11(3):309-20.

6. Daniels C, Richmond S. The development of the index of complexity, outcome and need (ICON). J Orthod. 2000; 27(2):149-62.

7. Al Yami EA, Kuijpers-Jagtman AM, Van't Hof MA. Assessment of dental and facial aesthetics in adolescents. Euro J Orthod. 1998; 20(4):399-405.

8. Behbehani F, Årtun J, Al-Jame B, Kerosuo H. Prevalence and severity of malocclusion in adolescent Kuwaitis. Med Principles and Practice. 2005;14(6):390-5.

9. Hill P. The prevalence and severity of malocclusion and the need for orthodontic treatment in 9-, 12-, and 15-year-old Glasgow schoolchildren. Br J Orthod. 1992; 19(2):87-96.

10. Steigman S, Kawar M, Zilberman Y. Prevalence and severity of malocclusion in Israeli Arab urban children 13 to 15 years of age. Am J Orthodontics. 1983; 84(4):337-43.

11. Baca-Garcia A, Bravo M, Baca P, Baca A, Junco P. Malocclusions and orthodontic treatment needs in a group of Spanish adolescents using the Dental Aesthetic Index. Int Dent J. 2004; 54(3):138-42.

12. Mills LF. Epidemiologic studies of occlusion IV. The prevalence of malocclusion in a population of 1,455 school children. J Dent Res. 1966; 45(2):332-6.

13. Alhaija ESA, Al-Nimri KS, Al-Khateeb SN. Orthodontic treatment need and demand in 12–14-year-old north Jordanian school children. Euro J Orthod. 2004; 26(3):261-3.

14. Shrestha S, Shrestha RM. Index of Orthodontic Treatment Need in Referred Nepalese Population. Orthod J Nep. 2013; 2(1):9-15.

15. Helm S. Malocclusion in Danish children with adolescent dentition: An epidemiologic study. Am J Orthod. 1968; 54(5):352-66.

16. Massler M, Frankel JM. Prevalence of malocclusion in children aged 14 to 18 years. Am J Orthod. 1951; 37(10):751-68.

17. Silva RG, Kang DS. Prevalence of malocclusion among Latino adolescents. Am J Orthod Dentofac Orthop. 2001; 119(3):313-5.

18. Thilander B, Pena L, Infante C, Parada SS, de Mayorga C. Prevalence of malocclusion and orthodontic treatment need in children and adolescents in Bogota, Colombia. An epidemiological study related to different stages of dental development. Euro J Orthod. 2001; 23(2):153-68.

19. Tausche E, Luck O, Harzer W. Prevalence of malocclusions in the early mixed dentition and orthodontic treatment need. Euro J Orthod. 2004; 26(3):237-44.

20. Shrestha BK, Yadav R, Basel P. Prevalence of malocclusion among high school students in Kathmandu valley. Orthod J Nep. 2012;2:1.

21. Singh VP, Sharma A. Epidemiology of Malocclusion and Assessment of Orthodontic Treatment Need for Nepalese Children. International Scholarly Research Notices. 2014; 2014.

22. Markazi Moghadam M, Moghimbeigi A, Jafari F. Evaluation of Orthodontic Treatment Needs in a population of Iranian Schoolchildren using the IOTN in 2010.

23. Hedayati Z, Fattahi H, Jahromi S. The use of Index of Orthodontic Treatment Need in an Iranian population. J Ind Soc Pedod Prev Dent. 2007; 25(1):10.

24. Manzanera D, Almerich-Silla JM, Gandía JL. Orthodontic treatment need in Spanish schoolchildren: An epidemiological study using the Index of Orthodontic Treatment Need. Euro J Orthod. 2009; 31(2):180-3.

25. BOS. Picture perfect for NOW launch. Dental Tribune United Kingdom Ed. March 29 - April 4, 2010.

26. Oliver R, Knapman Y. Attitudes to orthodontic treatment. Br J Orthod. 1985; 12(4):179-88.

27. Keles F, Bos A. Satisfaction with orthodontic treatment. Angle Orthod. 2012; 83(3):507-11.

28. Tickle M, Kay EJ, Bearn D. Socio-economic status and orthodontic treatment need. Comm Dent Oral Epidemio. 1999; 27(6):413-8.

29. Gosney M. An investigation into some of the factors infuencing the desire for orthodontic treatment. Br J Orthod. 1986; 13(2):87-94.

30. Shaw W. Factors infuencing the desire for orthodontic treatment. Euro J Orthod. 1981; 3(3):151-62.

31. Sharma JN. Epidemiology of malocclusions and assessment of orthodontic treatment need for the population of eastern Nepal. World J Orthod. 2008; 10(4):311-6.

32. Shrestha RM. Orthodontic Scenario of Nepal. Orthod J Nep. 2013; 3(1):5-6.

33. Nepal Demographic Health Survey. Census. Ramshah Path, Kathmandu: Central Bureau of Statistics; 2011

Journal of Oral and Dental Health

PROSPECTIVE STUDY OF IMMEDIATE PLACEMENT OF IMPLANTS INTO INFECTED DEBRIDED SOCKET

Abstract

Aims & objective: - The aim of this study was to check the clinical outcome of the Survival of Immediate placement of dental implants into debrided infected dentoalveolar socket.

Methods and patients: All patients reporting to the outdoor patient department were evaluated for implant insertion. The study comprised of 20 patients (aged from 20 to 54 years were selected for implant placement. Armamenterium is used for implant placement is surgical guide drill, surgical twisted drill, depth Gauge, phisiodispenser with handpiece speed reduction, Hex ratchet and standard equipment for diagnosis and simple surgery.

Results: The present study was done to evaluate the placement of implants in infected Debrided socket. Observation were made postoperatively on 1st day, 1st week, 4th week, and 12th week for pre-designed factors which are Pain and Swelling. After the integration period of 4-6 months, the stage surgery was performed and at this level (baseline), another observation were made at3, 6 and 9 week interval from the baseline

Conclusion: - This can be drawn from this study that the implants placed into Infected debrided extraction sites will heal predictably and there are reductions in the number of surgical interventions and in the treatment time required.

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INTRODUCTION

For a thousand years, the impossible idea of replacing missing teeth with artificial analogs was a part of dentistry. Conventional rehabilitation of partial or complete loss of the tooth has limitations for many people and these tools can cause eating disorders, psychological problems and esthetic problems, retention and stability of prosthesis. Because of these complications, patients frequently suffer decreased self-confidence and psychological problems.

Treatment of tooth loss in the anterior maxilla may involve difficult functional, esthetic, and psychological problems, particularly in otherwise good dentitioned young patients. The prosthetic treatments that have been used i.e. Removable partial dentures, fixed partial dentures, or composite retained only partial dentures, in addition to the risk of complications, most of these treatments include the sacrifice of healthy tooth substance of the adjacent teeth.

Implants came into being to solve the issues associated with modern prosthesis. Throughout history many clinicians have attempted to use dental implants as a solution to complete and partial edentulism. The quality of osseointegrated implants has revolutionized dental practice.There has never been a greater opportunity to permanently replace missing teeth with a function and appearance similar to that of natural dentition.With over 3 decades of evidence supporting the clinical use of osseointegrated dental implants, it is possible to overcome with certainty that implants are reliable and provide patients

This is a tremendous accomplishment, taking into account the many obstacles and pressures that the oral climate and mastication powers pose for dental implants. Dental implant success has turned dentistry into a radically different treatment method, compared to just 20 years ago

MATERIAL & METHODS

The Present study was conducted in the postgraduate clinic of the Department of Oral & Maxillofacial Surgery to clinically evaluate the alveolar crest bone level following the placement of Implant in a Debrided Infected Dentoalveolar Socket. At the time of implant placement (Baseline), at 3 months, 6 month following clinical parameters were recorded:

IOPA radiographs were taken using the Parallel cone technique and assessed at the time of implant placement, at 3 month and 6 months.

Implant performance concept was based upon the following clinical and radiological criteria:

1) Absence of clinically detectable implant mobility

2)Absence of pain or any subjective sensation

3)Absence of continuous radiolucency around the implant.

METHODS

All patients reporting to the outdoor patient department were evaluated for implant insertion. The study comprised of 15 patients (aged from 20 to 54 years were selected for implant placement. Patients were accepted into the study based on the following:

INCLUSION CRITERIA

1) 18 years or older

2) Presence of a failing tooth by trauma caries, root resorption, endodontic or periodontic failure and with the presence of adjacent dentition.

3) Retained primary teeth (in case of agenesis), as well as patients with tooth loss because of extensive caries

4) Good oral hygiene.

5) Appropriate marginal gingival to underlying bone dimension at the facial aspect (about 4 to 6 mm) of the immediate adjacent teeth as ascertained by bone sounding technique.

6) Sufficient alveolar bone architecture to allow primary bone stability.

EXCLUSION CRITERIA

1) The presence of uncontrolled diabetes, immune disease or contraindicating Systemic conditions.

2) Chemotherapy in the 12 month period prior to proposed therapy.

3) Uncontrolled periodontal disease or patient unwillingness to undergo needed periodontal therapy around remaining teeth.

4) An active sinus infection or history of persistent infections.

5) A reluctance to commit to a long-term post therapy maintenance programme

6) A smoking habit of 1 packet of cigarettes per day or greater.

7) Alcohol abuse

8) Unrealistic expectations and psychological problems. The baseline clinical examination consisted of a thorough medical and dental history, general and oral health status, assessment of future implant site. The available vertical, mesiodistal and labiolingual bone dimension were determined by palpation and radiograph. Intraoral periapical radiographs were done to evaluate the volume of remaining bone. In order to prevent infection all surgical procedures were performed under strict aseptic conditions with greatest attention paid for preservation of implant bed. The dental unit, instrument tray, patient, operating assistants were covered with sterile drapes. Sterile surgeon gowns face masks, gloves and instruments were indispensable. The surgical armamentarium including the tool kit was autoclaved.

The written and informed consent was taken from the all subjects prior to the start of the procedure.

The surgical planning was made according to normal protocols

Amoxicillin (1 g) and dexamethasone (8 mg) were administered 1 hour prior to surgery. Following administration of local anesthesia (2% xylocaine with 1: 80,000 adrenaline), sulcular incisions were made on the buccal and palatal aspects of teeth to be extracted and gingival collar was removed. Teeth were carefully luxated and removed with forceps. Care was taken not to fracture the labial plate of bone and to retain gingival tissue attachment at the mesial and distal crestal bone.

Extraction sockets were debridged and prepared for implantation with hand instruments to remove the granulation tissue. The socket depth was measured with the probe and was confirmed with the extracted root. The apical area was prepared for the placement of implant. Bone drilling was performed at Branemark suggested groundbreaking levels i.e. 1000-1500 rpm. Drilling was done at low speed to reduce damage to the bone, the region was abundantly irrigated with chilled saline solution, to prevent overheating, and thus alveolar bone necrosis and sharp instruments were used in increasing diameters. he depth and angulations was checked continuously with the help of depth gauge paralleling pins which has depth markings of 8 to 16 mm. After completion of implant socket preparation Titanium implants were then placed with the collar of the implant at the level of the bone crest on the labial aspect. All implants were mounted with primary stability and in the extraction socket were fully housed. After completion, a large bolus of moist gauze was applied over the surgical site for compression. This helped in providing hemostasis and thus reducing the possibility of formation of hematoma. Patients were then advised to obey normal post-operative orders, including ice packs, a soft high nutrient diet, post-operative medicines consisting of sufficient antibiotics (amoxicillin 500 mg), analgesics (ibuprofen 800 mg, every 4 to 6 hours as needed for pain). Patients were instructed not to brush the surgical site, but rather to rinse with 0.12% chlorhexidine gluconate.

The patient was called for the post-operative checkup after 24 hours. After the procedure the sutures were extracted seven days later. The patient was called for the post-operative checkup after 24 hours. After the procedure the sutures were extracted seven days later. The patients were then followed-up post-operatively at 1st day, 1st week, 4th week and up to 12th week and thereon any other required investigation was done whenever needed.

After completion of the requisite period of 4 to 6 months for bone implant integration, the implant had to be localized and exposed to remove the cover screw and for the placement of abutment head to carry out suitable prosthodontic rehabilitation. Under local anesthesia a small incision was made over the implant parallel to the alveolar ridge, the cover screw was exposed. By using the screw driver the cover screw was removed, area irrigated and the healing cap was placed on the implant and was slowly screwed till it made firm contact with the implant surface. After a lapse of two weeks the healing cap is removed and impression p o s t is placed to take the impression . At 2nd stage surgery crestal bone level was determined with periapical radiograph perpendicular to the implant with mm measurements made from the occlusal surface of the implant.

RESULTS

The present study was done to evaluate the placement of implants in to Debrided infected dentoalveloar socket. The stage I surgery was performed and fourteen implants were placed in 15 patients (12 male and 3 female) who report to the Postgraduate Clinic of Oral and Maxillofacial Surgery. Observation were made postoperatively on 1st day, 1st week, 4th week, and 12th week for pre-designed factors which are Pain and Swelling. After the integration period of 4-6 months, the stage surgery was performed and at this level (baseline), another observation were made at 3, 6 and 9 week interval from the baseline. The two factors evaluated after stage I surgery are

pain and swelling and after stage II surgery six factors were evaluated namely mobility, peri-implant radiolucency, mean probing depth, gingival inflammation, sinus discharge and marginal bone loss.

The observed factors were graded as:

-Pain (VAS) 0-No pain
1 to 3-mild pain
4 to 7 moderate pain
8 to 10 severe pain

-Swelling Present = 1
Absent = 0

-Mobility Present = 1
Absent = 0

-Peri-implant radiolucency Present = 1
Absent = 0

-Mean Probing depth: in m

-Gingival inflammation No inflammation = 0
Mild inflammation = 1
Moderate inflammation = 2
Severe inflammation =3

-Sinus discharge Present = 1
Absent = 0

-Marginal bone loss: in mm

Table 1: Distribution of implant success at the stage I surgery according to pain

	N	Mean	Std. Deviation	P value
Stage I	27	2.44	0.641	0.000 (S)
1st week	27	0.00	0.000	
4th week	27	0.00	0.000	
12th week	27	0.00	0.000	

Test applied: ANOVA S=significant

Table showed pain-wise success of the stage I surgery. Pain was gradually decreased with the time period which showed statistically significant results and success of the surgery

Table 2: Intra-group comparison of implant success at the stage I surgery according to pain

Group	Group	Mean Difference	P value
Stage I	1st week	2.44	0.000 (S)
	4th week	2.44	0.000 (S)
	12th week	2.44	0.000 (S)
1st week	4th week	0.00	0.00
	12th week	0.00	0.00
4th week	12th week	0.00	0.00

Test applied: unpaired t test S=significant

Table showed intra-group wise comparison of the stage I surgery. Pain was gradually decreased with the time period but at the 1st, 4th and 12th week there was reduction of pain equally which showed non- statistically significant results

Table 3: Distribution of implant success at the stage I surgery according to swelling

	N	Mean	Std. Deviation	P value
Stage I	27	1.48	0.509	0.000 (S)
1st week	27	0.00	0.000	
4th week	27	0.00	0.000	
12th week	27	0.00	0.000	

Test applied: ANOVA S=significant

Table showed swelling-wise success of the stage I surgery. Swelling was gradually decreased with the time period which showed statistically significant results

Table 4: Intra-group comparison of implant success at the stage I surgery according to swellin

Group	Group	Mean Difference	P value
Stage I	1st week	1.48	0.000 (S)
	4th week	1.48	0.000 (S)
	12th week	1.48	0.000 (S)
1st week	4th week	0.000	1.00
	12th week	0.000	1.00
4th week	12th week	0.000	1.00

Test applied: unpaired t test S=significant

Table showed intra-group wise comparison of the stage I surgery. Swelling was gradually decreased with the time period but at the 1st, 4th and 12th week there was reduction of pain equally which showed non- statistically significant results.

Table 5: Distribution of implant success at the stage II surgery according to mobility

	N	Mean	Std. Deviation	P value
Baseline	27	0.19	0.396	0.49
3 week	27	0.15	0.362	
6 week	27	0.15	0.362	
12 week	24	0.04	0.204	

Test applied: ANOVA

Table showed mobility-wise success of the stage II surgery. Mobility was gradually decreased with the time period but there was not much mobility showed from baseline to 6 week. At the time period of 12 week showed more improvement in mobility from 0.19 to 0.04 but showed non-statistically significant results

Table 6: Distribution of implant success at the stage II surgery according to peri-implant radiolucency

	N	Mean	Std. Deviation	P value
Baseline	27	0.22	0.424	0.34
3 week	27	0.14	0.483	
6 week	27	0.14	0.483	
12 week	24	0.04	0.204	

Test applied: ANOVA

Table showed peri-implant radiolucency -wise success of the stage II surgery. Peri-implant was gradually decreased with the time period but there was not much improvement showed from baseline to 6 week. At the time period of 12 week showed more improvement in mobility from 0.22 to 0.04 but showed non-statistically significant results.

Table 7: Distribution of implant success at the stage II surgery according to probing depth

	N	Mean	Std. Deviation	P value
Baseline	27	2.15	0.456	0.48
3 week	27	2.33	0.555	
6 week	27	2.33	0.555	
12 week	24	2.25	0.442	

Test applied: ANOVA

Table showed probing depth-wise success of the stage II surgery. Probing depth was gradually increased with the time period but there was not much improvement showed from baseline to 12 week which showed non-statistically significant results

Table 8: Distribution of implant success at the stage II surgery according to gingival inflammation

	N	Mean	Std. Deviation	P value
Baseline	27	0.78	0.424	0.83
3 week	27	0.78	0.577	
6 week	27	0.78	0.577	
12 week	24	0.67	0.482	

Test applied: ANOVA

Table showed gingival inflammation-wise success of the stage II surgery. Gingival inflammation was gradually decreased with the time period but there was not much improvement showed from baseline to 12 week which showed non-statistically significant results

Table 9: Distribution of implant success at the stage II surgery according to sinus discharge

	N	Mean	Std. Deviation	P value
Baseline	27	0.04	0.192	0.59
3 week	27	0.04	0.192	
6 week	27	0.00	0.000	
12 week	24	0.00	0.000	

Test applied: ANOVA

Table showed sinus discharge during the procedure. Sinus discharge absent after 6th and 12th week which showed non-statistically significant results

Table 10: Demographic characteristic of the study

	N	Minimum	Maximum	Mean	Std. Deviation
Age	15	18	54	37.53	12.68
Length	27	12	18	14.69	1.86
Diameter	27	3	4	3.83	0.25

Table 11: Distribution of marginal bone loss on mesial and distal side

Mn	Baseline	3 week	6 week	12 week
Mesial				
<0.5	27	27	27	27
Distal				
<0.5	27	27	27	27

DISCUSSION

Missing teeth and the various attempts to replace them have presented a treatment challenge throughout human history. Although Edentulousness is on the decline, but with increasing life expectancy it is increasing dramatically in the adult population. Missing teeth can cause loss of self-esteem and have an impact on social interaction. The diminished masticatory efficiency accompanying tooth loss can compromise nutritional status, putting patients at higher risk for chronic illnesses like diabetes, cancer, hypertension, and heart disease. Conventional dentures typically attain only limited success with respect to both patient satisfaction and chewing ability. An implant-retained prosthesis provides greater stability, improved biting and chewing forces, and higher patient satisfaction than conventional denture. Dental implants also may be used to replace teeth in a client who is partially edentulous. Osseointegration provides support for function, while dental implants are used as replacements for natural teeth. However, the scientific basis for modern implant dentistry was not laid until the 1960s. At that time, vital microscopic studies of osseous wound healing initiated by Brånemark and colleagues using the titanium chamber gave rise to the concept of osseointegration. At the light microscopic level, osseointegration was initially described as "a direct structural and functional link between the ordered, living bone and the surface of a load carrying implant."

Clinical outcome of the implants placed in extraction sockets do not differ from those placed in mature. bone. Marginal gaps occurring between the implant surface and socket wall may

predictably heal with bone formation. This hypothesis is supported by many studies like **Boticelli D (**2003) The present study examined in vivo the clinical and radiographic results of 27 osseointegrated implants placed in infected debrided extraction sockets. The results demonstrated that immediate implant lacement offers clinically acceptable results.

The result of this study were based on following factors: Pain, Swelling, Mobility, Gingival Status, Mean probing depth, Peri-implant radiolucency, and Marginal Bone Loss) in fifteen patients who participated in this study. A total of Twenty seven submerged implant were placed in Maxilla and Mandible. Subjective findings of pain and tenderness associated with an implant body are more difficult to assess than these conditions with natural teeth. In our study the pain score was 4 on visual along scale on the next post operative day, this was highest than any other time in our follow ups. Pain can have several orgins: the skill of the surgeon the procedure used, flap design, trauma to periosteum. Pain can be experienced by postoperative edema or hematoma. it is also related to patients anxiety and stress. The pain score declined to 0 on one week after surgery as healing had occurred by that time.

This finding is supported by **Carl e misch, Morton et al (2008),** according to them pain from implant body does not occur unless the implant is mobile and surrounded by inflamed tissue or has rigid fixation but impinges on nerve. **Thomas and Jean et al (2006)** demonstrated that patients experienced more pain postoperatively with open flap technique as compared to a flapless approach. Probing depth around implants is an important diagnostic process for the assessment of peri-implant soft tissue health and increased probing depth could be correlated with a higher degree of inflammation of the peri-implant mucosa. Since the soft tissue seal inhibited probe tip penetration in healthy and only slightly inflamed periimplant soft tissues, but did not do so in periimplantitis, probing around oral implants must be considered as a sensitive and reliable clinical parameter for long-term clinical monitoring of periimplant mucosal tissues.

The mean probing depth was evaluated by Hu-friedy Williams periodontal probe at 3rd week, 6th week and 9th week which were 2.643±0.51mmf, 2.71±0.82mm and 2.30±0.85mm respectively. This is in accordance with **Branemark P I (1995)** where he had stated that a mean value of 2.6mm indicates that implants are in a healthy condition. **Sandra Huber et al** in there one year study on immediate implants in infected debrided extraction sockets found that the probing depth was mostly 3mm and reached 4-5mm in 17% of the implants. **Botticelli et al** after 5 year examination interval found that the mean probing depth varied between 2.1mm and 2.9mm. Hence we can conclude that mean probing depth of this study relates to most of the long term clinical studies carried out.

REFERENCE

1. **Devorah Schwartz-Arad and Gabriel Chaushu** : The Ways and Wherefores of Immediate Placement of Implants Into Fresh Extraction Sites:A Literature Review: *J Periodontol 1997; 68:1117-11*

2. **ang NP, Pun L, Lau KY, Li KY, Wong MC.** A systematic review on survival and success rates of implants placed immediately into fresh extraction sockets after at least 1 year. Clin Oral Implants Res.2012 Feb;23:39–66.

3. **Marco Degidi,* Diego Nardi,* and Adriano Piattelli†** Peri-Implant Tissue and Radiographic Bone Levels in the Immediately Restored Single-Tooth Implant: A Retrospective Analysis J Periodontol 2008;79: 252-259.

4. **Gregory-George K. Zafiropoulos,* Giorgio Deli,† Barry K. Bartee,‡ and Oliver Hoffmann** Single-Tooth Implant Placement and Loading in Fresh and Regenerated Extraction Sockets. Five-Year Results: A Case Series Using Two Different Implant Designs J Periodontol 2010;81:604-615.

5. **Roberto Crespi**: Immediate Versus Delayed Loading of Dental ImplantsPlaced in Fresh Extraction Sockets in the Maxillary Esthetic Zone: AClinical Comparative Study : *Int J Oral Maxillofac Implants /2010/23/753-758.*

6. **Ugo Covani,*†‡ Roberto Cornelini,* and Antonio Barone*†‡**Vertical Crestal Bone Changes Around Implants Placed Into Fresh Extraction Sockets J Periodontol 2007;78:810-815.

7. **Ugo Covani,*† Giacomo Chiappe,‡ Mario Bosco,*§ Bruno Orlando,*†‡ Alessandro Quaranta,I and Antonio Barone*†**A 10-Year Evaluation of Implants Placed in Fresh Extraction Sockets: A Prospective Cohort Study J Periodontol 2012;83:1226-1234.

8. **Matteo Capelli,*† Tiziano Testori,*‡ Fabio Galli,*§ Francesco Zuffetti,*† Alessandro Motroni,I Roberto Weinstein,¶ and Massimo Del Fabbro** Implant–Buccal Plate Distance as Diagnostic Parameter: A Prospective Cohort Study on Implant Placement in Fresh Extraction Sockets J Periodontol 2013;84:1768-1774

9. **Ugo Covani,*† Luigi Canullo,† Paolo Toti,*† Fortunato Alfonsi,† and Antonio Barone** Tissue Stability of Implants Placed in Fresh Extraction Sockets: A 5-Year Prospective Single-Cohort Study J Periodontol 2014;85:e323-e332.

10. **Arthur B. Novaes**: Immediate Placement of Implants into Periodontally Infected Sites in Dogs: A Histomorphometric Study of Bone-Implant Contact: *Int J Oral Maxillofac Implants /2003/391-398*

11. **Lindeboom JA et al**. Immediate Pplacement of Implants in Periapical Infected Sites: A Prosrective Randomized Study

in 50 patients. *Oral surg Oral Med Oral Pathol Oral Radiol Endod 2006; 101 (6) :705-710. Epub2006 March 22*

12. **Schou S,Holmstrup P,** Worthington HV, Esposito M, Clinical Oral Implants Research[2006,17 Suppl 2:104-123]

13. **Roberto Villa**, Bo Rangert Immediate and early function of implants placed in extraction sockets of maxillary infected teeth: A pilot study , The Journal of Prosthetic Dentistry ,Volume 97, Issue 6, Supplement, June 2007, Pages S96–S108

14. **Frederick C.S. Chu, Fei L. Deng, Tak W. Chow**, The use of immediate implant placement for the replacement of a periodontally involved malaligned lateral incisor: A clinical report The Journal of Prosthetic Dentistry Volume 98, Issue 6, December 2007, Pages 423–428

17.

15. **Nardy Casap, Chassiel Zeltser, Alon Wexler, Eyal Tarazi, Rephael Zeltser** Immediate Placement of Dental Implants Into Debrided Infected Dentoalveolar Sockets Journal of Oral and Maxillofacial SurgeryVolume 65,Issue 3, March 2007, Pages 384–392

16. **Paulo Malo, Miguel de Araujo Nobre,** Bo Rangert[b]Implants placed in immediate function in periodontally compromised sites: A five-year retrospective and one-year prospective stud,The Journal of Prosthetic Dentistry,Volume 97, Issue 6, Supplement, June 2007, Pages S86–S95

Marcaccini AM,Novaes AB Jr, Souza SL, Taba M Jr,Grisi MF , Immediate placement of implants into periodontally infected sites in dogs. Part 2: A fluorescence microscopy study, The International Journal of Oral & Maxillofacial Implants [2003, 18(6):812-819]

18. Marina de Melo Naves[I]; Bruna Zacharias Horbylon[I]; Camila de Freitas Gomes[I]; Helder Henrique Machado de Menezes[I]; César Bataglion[II]; Denildo de Magalhães[III] , Immediate implants placed into infected sockets: a case report with 3-year follow-up,Braz. Dent. J. vol.20 no.3 Ribeirão Preto 2009

Journal of Oral and Dental Health

PHOTOGRAPHIC ANALYSIS OF SOFT TISSUE FACIAL PROFILE OF MITHILANCHAL ADULT POPULATION IN BIHAR

Abstract

Background& Objectives: Facial photography is an essential diagnostic tool, and is an important part of both pre-treatment and post-treatment orthodontic records. An approach is made to establish a "Norm" for use in diagnosis and treatment planning for Mithilanchal people. The prime purpose of the present study will be to establish photographic norms of Mithilanchal adult (Male and Female), mean value and range and also to compare between Mithilanchal people and caucassians and other population through various analysis.

Materials & Methods: Standardized Photographs of 100 Mithilanchal adults were included as samples for this study. There was no gender bias as 50 samples from each gender were selected with an average age 18-35 years. The subjects included in the study had no history of previous Orthodontic treatment, had normal occlusion and a balanced aesthetic profile c.

Results: Mithilanchal population showed some significant differences in various soft tissue parameters such as facial divergence, Nasolabial angle T angle, Z angle.

Conclusion: Nasolabial angle of mithilanchal population is comparatively high than that of Caucasians population and also to Saudi & South Indian population .Average divergence of face is slightly anteriorly. Mentolabial sulcus of mithilanchal population is significantly acute compared to Caucasians. Mithilanchal males may have slightly more convex face compared to females;

Keywords: Mithilanchal Adults , Photographic, Soft Tissue, Facial profile, Angular

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INTRODUCTION

Face depicted as mirror of mind, reflects the personality and also the internal character of individual. Rickett suggested that "esthetic can indeed be described scientifically". He suggested that key to esthetic is the divine proportion of 1.618. Even today esthetic is the major concern of orthodontist as well as the person seeking orthodontic treatment.[1] The study of orthodontics thus has major aim of restoration of facial esthetics feature and also the very concept of orthodontic treatment is based on the principle of improvement of facial esthetic feature. Orthodontics has generally led the way qualitative and quantitative analysis of the soft tissue facial architecture, developing the normal parameters, benefiting clinicians in the various disciplines of dentistry. Apart from the continuing attention received from clinical medicine, the face is now attracting serious study from diverse professions and is even becoming "big business".[2]

Although there are other soft tissue measurements, the most commonly used are: the facial angle of Burstone which measures the convexity of a profile[3], the S-line of Steiner[4] and E-Line of Ricketts.[5] These are the prevalent soft tissue measurements commonly used to analyze soft tissue profiles, and therefore they will be employed in this study as main reference measurements. In Bihar there is a large population who will surely come to demand more and more frequently, the type of aesthetic attention that is available through orthognathic and plastic reconstructive surgical procedures hence there is a need to establish data of facial patterns for the Mithilanchal profiles. This will eliminate the use of Caucasian-based norms on subjects of Mithilanchal descent when diagnosing and treatment planning by Sushner.[6]

With an increasing number of patients of Mithilanchal descent seeking orthodontics and orthognathic surgery, it would be useful to the clinician to have soft tissue facial profile norms for subjects of Mithilanchal descent to aid diagnosis and treatment planning. Single standard of data available pertaining to aesthetics and facial profile is possibly not appropriate to quantify various racial and ethnic population on same set of standards. In the present

multicultural society, racial and ethnic differences are assuming an increasing level of importance. This study is aimed to determine the facial features in frontal and profile photographic analysis of adult Mithalanchal population.

AIM AND OBJECTIVES

1) To establish photographic parameters for mithilanchal population.

2) To compare the result obtained with the photographic norms for Caucasians and other populations.

3) To assess the dental and skeletal relation as photograph reflects the underlying skeletal and dental relation.

METHODOLOGY

The study is based on photographic analysis of Mithilanchal adult population who stay in Bihar. The age range selected is within 18- 35 years, because it is the most stable period for soft tissue drape. The normal values of individuals had to be find out using this study. The sample collection for this study were selected from Mithila Minority Dental college and hospital, Ekmi Ghat , Laheriasarai , Darbhanga and patients visiting the department of orthodontics, Mithila Minority Dental college and hospital Bihar in the age group 18-35 years was selected for the study. Individuals, younger than 18 years were not chosen due to possible growth changes

INCLUSION CRITERIA

Mithilanchal Indian population (Bihar): the Mithilanchal (Bihar) origin of the patient was ascertained by following family lineage up to 3 generations.

1) Bilateral angle's class I molar relation with normal overjet and overbite. (0-3 mms)

2) A full complement of teeth from permanent second molar of one side to the opposite side with normal alignment in dental arches.

3) No gross asymmetry of face on clinical examination

Standardized frontal and profile photographs were taken in natural head postion. The advantage of natural head position lied in the fact that extracranial reference lines can be used. The reliability of NHP has been confirmed by the various workers. Moreover NHP were responsible for the true life appearance of the subject. Standardized digital photographic technique are followed. The camera to subject distance was maintained constant (5 ft.) for all the subjects. This assured similar reproduction for all the photographs.The camera was positioned on a tripod stand in such a way that the plane of that the plane of the film becomes vertical and optical axis of the lens horizontal. The subjects were asked to look at distant object at eye level, standing on horizontal floor. They were also asked to maintain a natural erect position with hands relaxed and hanging on the sides. Thus all the subjects maintained natural head position during photography. In frontal view, the inter-pupillary line will be kept parallel to the floor while in profile view the line from outer canthus of eye to the superior attachment of the ear (C-SA line) will be parallel to the floor. Tracing will be done using 0.003 inch Acetate matte Tracing Paper and 3H pencil.

Fig 1. Camera Nikon Coolpix

Fig 2. Tripod stand for stabilising the camera

Fig 3 : Armamentarium used for Tracing and Measurements

Fig. 4. Soft tissue landmarks

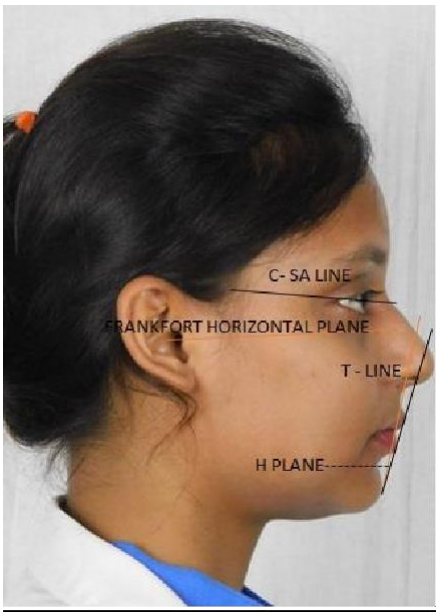


Fig 5. Tracing And Angles

Angle used for study:-

1. Divergence of face : angle between true horizontal (visual axis) and skin nasion- pogonion line

2. H – line: The angle formed between H line and N'-pog'.

3. Profile angle: angle formed by skin glabella to Subnasale and Subnasale to pogonion.

4. Nasolabial angle: angle formed by tangent of lower border of nose and Subnasale to Labrale superior line.

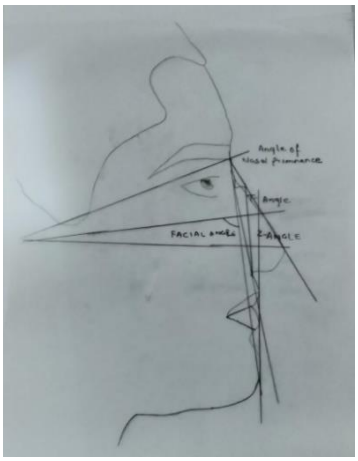
5. Mento-labial angle: angle formed by joining the labrale inferiors to inferior labial sulcus and pogonion to inferior labial sulcus.

6. Angle of nasal prominence: angle formed by joining tip of the nose and skin pogonion to nasion.

7. T-angle: angle formed by line 0 degree meridian and T – line.

8. Z-angle: angle formed by intersection of Frankfort horizontal and Merrifield's Z line.

9. Facial angle: formed by intersection of the Frankfort horizontal plane with N'-Pog' line.



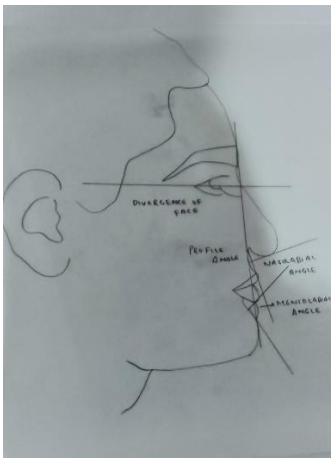


Fig 6. Tracing And Angles

Table 01: Distribution of study subjects (Mithilanchal population) according to gender.

GENDER	Number
MALE	50
FEMALE	50
TOTAL	100

RESULT

Table 02 : Summary of Angular data of present study.

PARAMETER	MALE		FEMALE		Present Study-Total		
	MEAN	SD	MEAN	SD	MEAN	SD	Range
Facial Divergence	91.760	4.0736	89.920	3.7299	90.840	3.994	81.0-100.0
H line Angle	17.520	3.3027	14.920	4.7717	16.220	4.286	5.0-28.0
Nasolabial Angle	119.440	13.6638	102.940	17.4898	111.190	17.679	68.0-140.0
Mentolabial Angle	109.760	12.8929	113.720	25.4743	111.740	20.184	35.0-152.0
Nasal Line Angle	51.420	7.6774	50.240	6.1298	50.830	6.937	31.0-94.0
Nasal Prominence Angle	28.440	2.5806	29.020	4.6092	28.730	3.727	22.0-50.0
't' Angle	9.360	3.5095	13.200	16.3333	11.280	11.91	4.0-120.0
'Z' Angle	70.920	5.2986	74.320	6.8077	72.620	6.305	57.0-104.0
Facial Angle	89.960	2.9483	89.580	4.1996	89.770	3.614	83.0-108.0
Profile Angle	166.24	4.20	166.32	5.57	166.28	4.91	153-180

Facial Divergence was significantly higher among male patients as compare to female. It was 91.760 ±4.073 and 89.920±3.72 among male & female patients respectively. H Line Angle was significantly higher among male patients as compare to female. It was 17.520±3.30 and 14.920 ±4.77 among male & female patients respectively. Nasolabial Angle was significantly higher among male patients as compare to female. It was 119.440±13.66 and 102.940±17.48 among male & female patients respectively. Mentolabial Angle was slightly higher among female patients as

compare to male. It was 109.760±12.89 and 113.720 ±25.47 among male & female patients respectively. Nasal Line Angle was slightly higher among male patients as compare to female. It was 51.420±7.67 and 50.240 ±6.12 among male & female patients respectively. Nasal Prominence Angle was slightly higher among female patients as compare to male. It was 28.440±2.58 and 29.020±4.60 among male & female patients respectively. 't' Angle was slightly higher among female patients as compare to male. It was 9.360±3.50 and 13.200±16.33 among male & female patients respectively. Z' Angle was significantly higher among female patients as compare to male. It was 70.920±5.29 and 74.320±6.80 among male & female patients respectively. Facial Angle was almost same among female & male patients. It was 89.960±2.94 and 89.580±4.19 among male & female patients respectively. Profile Angle was almost same among male & female patients. It was 166.24±4.20 and 166.32±5.57 among male & female patients respectively.

Table 03: Comparative evaluation of angular data of present study with caucasian population data.

PARAMETER	Present Study –Total		Total- Caucasian Population	
	MEAN	SD	MEAN	SD
Facial Divergence	90.840	3.994	84.48	9.05
H line Angle	16.220	4.286	14.12	2.82
Nasolabial Angle	111.190	17.679	107.45	8.5
Mentolabial Angle	111.740	20.184	122	11.7
Nasal Line Angle	50.830	6.937	23.3	2.3
Nasal Prominence Angle	28.730	3.727	29.53	2.51
't' Angle	11.280	11.91	10.0	1.9
'Z' Angle	72.620	6.305	80.0	9.0
Facial Angle	89.770	3.614	84.48	9.05
Profile Angle	166.28	4.91	168.78	4.97

DISCUSSION

The judgement of facial aesthetics is subjective in nature and is undoubtedly dependent on various characteristics and variables like background, geographical location, ethnic and racial differences for a particular society. Orthodontists should consider these variables during treatment planning. Traditionally Orthodontists have used lines and angles for evaluation of the soft tissue profile derived from Caucasian samples and very little information has been available for other races. The data gathered in this study indicates differences in measured parameters when compared to similar studies done on Caucasians (Legan and Burstone, 1980)[7], Negroids (Sushner, 1977)[6], and other African blacks (Naidoo and Miles, 1977 and Flynn et al., 1989)[8]

The mean value for H – line angle of Mithilanchal male population is found to be 17.520±3.30 which is higher to Holdaways value for male population 14.12±2.82. The reading for female population came out to be 14.920±4.717 which is almost similar to Holdaway normal value for female population 13.2±3.07 indicating esthetic pleasing profiles.[2,9] In the present study, the average value of Nasolabial angle of Mithilanchal sample was found to be 111.44° ± 17.67°, with values of 119.440°
±13.66° for males and 102.940° ± 17.48° for females. This can be attributed to the fact that the mithilancal population has a much skinner profile in comparison to the Caucasian.[10,11,12,13] In this study, mentolabial angle (Li-Sm_pg), the mean value for mithilanchal population was found to be 111.74±20.18. which is way below compared to caucassian values.[12,13,14] No significant sexual dimorphism was intrepretaed as males = 109.8◦; females = 113.06◦ were comparable and non significant. . According to Bergman[10,11], in Class II and vertical maxillary deficiency cases, a more pronounced mentolabial angle can be observed. This angle tends to be more when the lower incisors are uprighted. In a study by S. Anic-Milosevic et al[15]. in Croatian sample, there was a great gender difference for this angle (males = 129.6◦; females = 134.50◦). In a studyof Turkish adults, Malkoc S et al also found significant gender difference (males = 130.19◦; females = 137.19◦).[14] Nasal prominence is often the most dominating parameter of the facial profile, and an observer's visual perception is often drawn to this important facial promontory (Pitak-Arnnop et al., 2011).). Intersection of the facial plane and the nasal dorsal plane gives the value of nasal prominence which isa internal angle . A nasofacial angle of approximately 30degree was deemed to be ideal, with a range of 27-36 degree deemed acceptable. Angles above or below this range were perceived as unattractive. .The nasal prominence in relation to chin was found to be mostly 30 degrees for males and 25 degrees for females in esthetically pleasing faces.[16,17,18] This could probably be attributed to the observation that the Mithilanchal population has less prominent nose than North Indian, Bengali population, but more than Caucasian European population. Mithilanchal population has a more convex total facial profile in comparison to the white European population. An angle formed by congruence of O- degree meridian, a line through soft tissue nasion and perpendicular to Frankfort horizontal plane and T – Line: a line from soft tissue pogonion to Subnasale.the mean value being assigned to be 10 degrees, described by Schwarz. The value for mithilanchal population in the study formulated came out to be 11.280± 11.91 wich is near and very much comparable to value of cacassians.. The Z angle, which describes the combined situation of the values of mandibular plane angle, incisor position, and soft tissue thickness, was lower cimapred to the Bangladeshi
73.6 ±7.7 adults than the Japanese group 69.5 which has near to values and lesser to those in the Caucasian group 75.5.[19] The mithilanchal females has alsmost similar value comparable to caucassian standards. This angle, which is more indicative of the soft tissue profile, is responsive to the maxillary incisor position, horizontal mandibular position, and vertical facial height. The results of the present study are useful in understanding the dentoalveolar compensation in normal occlusions of different skeletal types among the mithilanchal Bangladeshi, Japanese, and Caucasian populations. Facial Angle is an angular measurement. The median value of Mithilanchal adult population lies 89 degrees which is similar to that of Holdaway norms (90± 8) degrees indicating good soft tissue chin position.[20,21] S.Avesh.et.al found that men had greater soft-tissue facial angle (92.10^0) than women (89.92^0) in north Indian ethnic population. Profile angle assesses the convexity or concavity of the facial profile. According to this study comparative evaluation of Profile Angle (Angular parameter) between male & female mithilanchal population of Bihar. Profile Angle was almost same among male & female patients. It was 166.24±4.20 and 166.32±5.57 among male & female patients respectively.[23,24] There was statistically not significant difference found in Profile Angle between male & female mithilanchal population of Bihar. (P=0.936) which was similar to the values given by Devi et al. (Bengali; males = 165.138° and females = 168.52°) and Moshkelgosha et al[23.] (Persian males = 165.17 and females = 165.9°). This value was slightly less than the values given by Anić- Milosevic et al[14]. (males = 168.78 ± 4.9° and females = 169.05 ± 4.69°) and Malkoç et al[80]. In the present investigation of the mithilanchal population the value for the facial angle for males was 168.8 ± 4.96 degrees, in agreement with the fi ndings of Fernández-Riveiro et al[14] and Arnett and Bergman. The facial angle for females was 169.07 ±
4.72 degrees, in accordance with Arnett and Bergman[18] (1993a ,b; 169.3 ± 3.4 degrees), also with no significant gender differences. It was suggested that mithilanchal males may have slightly more convex face compared to females; however, in this study, no gender dimorphism was found. According to Proffit et al.Divergence of the face is influenced by a patient's ethnic and racial background. American Indians and Asians[25], for example, tend to have anteriorly divergent faces, whereas Whites of northern European ancestry are likely to be posteriorly divergent. From the orthodontic point of view a person'sfacialtypeisbest described by relative anterioposteror relationship of forehead middle face (maxilla) and lower face(mandible). Divergence of the face represents the inclination of the lower face relative to the forehead (anterior or posterior) depending on position of mandible being anteriorly or posteriorly placed, summarised as anterior or posterior divergent profile in nature. It was 91.760

±4.073 and 89.920±3.72 among male & female patients respectively. There was statistically significant difference found in Facial Divergence between male & female mithilanchal population of Bihar. (P=0.020). This value is also comparable to Iraqi population where mean value 91.66 ±3.88. Orthognathic face was prominent feature of the sample used in this study with a non-significant gender difference.[26,27]

CONCLUSION

- H angle of mithilanchal population is significantly more than that of acdeptable mean range of holdaway. Indicating near to esthetically pleasing profiles.
- Nasolabial angle of mithilanchal population is comparatively high than that of caucassian population and also to Saudi & South Indian population .The values are veru much comparable to values found by hinds and kent .
- Angle of Nasal Prominence are within the range of normal value when compared with caucassian and south indian population .
- Facial angle of mithilanchal population are little higher to caucassian population. Average divergence of face si slightly anteriorly.
- T angle or mouth tangent value in this study is same as described by **Schwarz,** with normal range values and no sexual dimorphism.
- Mentolabial sulcus of mithilanchal popul;ation is significantly acute compared to Caucasians.
- Z angle of Merrifield oif mithilanchal population is significantly less comaparble to caucassian population and bangaldeshi population but coim parable to japaneese population.
- Profile angle of mithilanchal population are very much comparable to caucassains values of Arnett . Mithilanchal males may have slightly more convex face compared to females; however, in this study, no gender dimorphism was found.

REFERENCE

1. Ricketts RM. Divine proportion in facial esthetics. Clin Plast Surg 1982; 9:401-22.
2. Alcade RE, Jinno Ti Orsini ME, Susakia, Sugiyarm, Matsumura T. Soft tissue cephalometric norms in Japanese adults. *Am J Dentofac Orthop*. 2000; 118, 84-89.
3. Broadbent BH. A new X-ray technique and its application on orthodontia. *Angle Orthod*.1931; 1: 45-66.
4. Steiner C. The use of cephalometrics as an aid to planning and assessing orthodontic treatment.Am J Orthod 1960; 46; 721-735.
5. Ricketts RM. The biologic significance of the divine proportion and Fibonacci series. Am J Orthod 1982; 81:351-70.
6. Sushner NI.A photographic study of the soft tissue profile of the Negro population..*Am J Orthod*,1977; 72: 373-85.
7. Burrstone C J. The integument profile. Am J Orthod 1958; 44:1-25.
8. Flynn TR, Ambrogio RI, Zeichner SJ. Cephalometric norms for orthognathic in black American adults. J Oral Maxillofac Surg 1989: 47: 30–39.
9. K S Singh et al. A Photographic Analysis of the Soft Tissue Facial Profile in Assamese Population Volume 4 (1), 2016, Page-998-1003.
10. Arnett GW, Bergman RT. Facial keys to orthodontic diagnosis and treatment planning. Part I. Am J Orthod Dentofacial Orthop 1993;103:299‐312.
11. Arnett GW, Bergman RT. Facial keys to orthodontic diagnosis and treatment planning – Part II. Am J Orthod DentofacialOrthop 1993;103:395‐411.
12. Talass M F , Baker R C 1987 Soft tissue profi le changes resulting from retraction of maxillary incisors . American Journal of Orthodontics 91 : 385 – 394.
13. Anić‐Milosević S, Lapter‐Varga M, Slaj M. Analysis of the soft tissue facial profile by means of angular measurements. Eur JOrthod 2008;30:135‐40
14. Malkoç S, Demir A, Uysal T, Canbuldu N. Angular peckphotogrammetric analysis of the soft tissue facial profile ofTurkish adults. Eur J Orthod2009;31:174‐9.
15. Pattanaik S, Pathuri S. Establishment of aesthetic soft tissue norms for Southern India population: A photogrammetric study.Orthod J Nepal2014;4:29‐35.
16. Clements BS. Nasal imbalance and the orthodontic patient. Am J Orthod 1969;55:244‐64.
17. Hinds EC, Kent JN. Surgical Treatment of Developmental Jaw Deformities. C.V. Mosby Company, St. Louis; 1972
18. Merrifield LL.The profile line as an aid ion critically evaluating facial esthetics. Am j orthod 1966;52.

19. Basciftci F A , Uysal T , Büyükerkmen A 2003 Determination of Holdaway soft tissue norms in Anatolian Turkish adults . American Journal ofOrthodontics and Dentofacial Orthopedics 123 : 395 – 400.

20. Ajmad Al Taki ,Fatma Oguz ,Eyas Abuhijleh. facial soft tissue values in Persian adult with normal occlusion and well balanced faces. Angle orthod 2009:79;49-4

21. Fernández‐ Riveiro P, Smyth‐ Chamosa E, Suárez‐ Quintanilla D, Suárez‐ Cunqueiro M. Angular photogrammetric analysis of the soft tissue facial profile. Eur J Orthod 2003;25:393‐ 9.

22. Moshkelgosha V, et al. Open Dent J. 2015.AuthorsOpen Dent J. 2015 Jul 31;9:346-56. doi: 10.2174/1874210601509010346. eCollection 2015

23. Arnett GW, Bergman RT. Facial keys to orthodontic diagnosis and treatment planning.Am J Orthod Dentofacial Orthop1993;1103:299- 312,395-411.

24. Bell WH, Profit WR and White RP.Surgical correction of dento-facial deformities.1980, WB Saunders Company Ch. 6, p183.

25. Ahsan A, yamaki m, Hossain Z. craniofacial cephalotric analysis of bangladeshiand Japanese adults with normal occlusionand balanced face. a comparativestud. J orthodontsci 2013;2:7-15.

26. Haider M.A ahmad , Hiba M.H. AL-Chalabi and Mohammed Nahidh.Facial divergence and facial profile in a sample of Iraqi adults with normal occlusion..IOSR Journal of Dental and medical sciences(IOSR JDMS)2017;16:78-81.

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CEPHALOMETRIC NORMS FOR EVALUTION OF MITHILANCHAL ADULT PEOPLE (BIHAR) BY STEINER'S ANALYSIS

Abstract

Background & Objective: A cephalometric radiograph in diagnosis and treatment planning is an essential tool in orthodontics. The prime purpose of the present study will be to establish cephalometric norms of Mithilanchal adult (Male and Female), mean value and range and also to compare between Mithilanchal people and Steiner's norm for white American statistically.

Materials & Methods: Standardized lateral cephalometric radiograph of 100 Mithilanchal adults were included as samples for this study. There was no gender bias as 50 samples from each gender were selected with an average age 20-25 years. Standard principles of Steiner's analysis were followed during locating and measuring landmarks and angles respectively.

Results: The results showed that Mithilanchal population has significantly low values for parameters like SNA, ANB, Interincisal Angle, SN-GoGn Angle, SN-OP, SE Distance as compare to Caucasian population while SNB, Upper Incisor to NA Angle, Lower Incisor to NB Angle, S.N.D. Angle, Upper Incisor to NA Plane in mm, Lower Incisor to NB Plane, Pog to NB Plane, SL Distance parameters found significantly high as compare to Caucasian population.

Conclusion: In Mithilanchal ethnic groups with well-balanced faces, there was some fundamental variations in the dentofacial features when compared with that of Steiner's norms for white American statistically. These should be established to serve in the diagnosis and treatment planning of the Mithilanchal patients.

Keywords: Steiner's Analysis, Mithilanchal Adults, Lateral Cephalometric, Dentofacial

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INTRODUCTION

The most challenging task in any diagnostic system is the establishment of range of normality. In order to determine the very existence of an abnormality, we must be able to demonstrate the cardinal sign of pathology, "Changes in structure. "Thus, in order to demonstrate changes, we should first establish a normal range from which measure and evaluate this changes.[1] For many years, research workers have traced, measured and compared dozens of planes, angles and dimensions on head radiographs. From these observations, a concept gradually evolved of what constitutes acceptable balance and harmony of the component parts of the many investigators using lateral and antero – posterior radiographs.[2]

The study of craniofacial relations and variations in man has long been used to differentiate various facial groups in physical anthropology. The culture, climate and geographic boundaries are bound to influence the facial morpjology.[3]. Therefore, it important to know the same normal dentofacial pattern of each group for better clinical evaluation. This provided the rationale to study the craniofacial morphology of the heterogenous Indian population.[4]Cephalometries has assisted the clinician in making an accurate diagnosis, planning treatment and evaluating the progress of orthodontic treatment[4]. Norms defined ideal cephalometric measurements for a patient based on such factors as age, sex, and size and occur among and between individuals of different racial origins.

The research of the last two decades of Cotton, Takanon, Wong, Haralabakis, Altemus and Kotak[5] had indicated that the normal measurements of one group can't be considered normal for other racial groups. Thus, different racial groups will have to traced according to their own individual's characteristics. India is a country with a large number of racial subgroups and several religious and inters –racial mixtures. According to Sarkar[4], Indians are predominantly dolichocephalic, however, mesocephals and brachycephals are found in appreciable numbers. He classified them into six ethnic elements constituting

the main types in the Indian population i.e. Australoids, Dravidians, Indo-Aryans, Irano-Scythians, Mundari speaking people of central India and Mongolians. India over the century has received waves of immigration from the West as well as from the East leading to population dispersion.

Measurements of dental and skeletal variations in different population groups are important. It could determine the priority and the need of orthodontic modalities according to the severity of malocclusioine the available sources. It could be used to estimate the need of treatment in population and an orientation towards possible limitations in carrying out orthodontic protocol. The skeletal, dental as well as soft tissue variations exist in different groups of population. The cephalometric parameters of hard and soft tissue of one population can't be applied to another group. So, it becomes necessary to understand the cephalometric norms for different groups of population. Thus, the present study was conducted to determine the cephalometric norms for Mithilanchal (Bihar) population.

AIM AND OBJECTIVES

1) To evaluate the mean cephalometric values for Steiner Analysis in Mithilanchal (Bihar) population.

2) To evaluate the cephalometric features of a Mithilanchal population and to present an organized, comprehensive cephalometric norms for Steiner ciphalometric analysis

3) To introduce mean values to assess skeletal, dental and soft tissue relationship using Steiner analysis for orthodontic diagnosis.

4) To compare standards that will be derived with the earlier established norms for which population.

MATERIALS AND METHODS

The present analysis was made on lateral cephalgrams of 100 subjects with well-balanced and acceptable facial profile of Mithilanchal population. The subjects were informed about the purpose of the study. Subjects with age group of 20-25 years with dento-alveolar class I malocclusion and acceptable facial profile were selected.

INCLUSION CRITERIA

1) Mithilanchal Indian population (Bihar): the Mithilanchal (Bihar) origin of the patient was ascertained by following family lineage up to 3 generations.
2) Have a pleasing Profile: Individuals with good balance and harmony of dentofacial structure with no history of orthodontic treatment/orthognathic surgery were included.
3) Subjects were 20-25 years of age.
4) Subjects had full complement of teeth with the exception of 3rd molar
5) No apparent dental or skeletal discrepancies.
6) Angle Class I occlusion with minimal or no crowding.
7) Normal overjet and overbite.

A sample of 100 subjects from different part of mithilanchal, Bihar with the age group 20-25 years were selected for the study. Individuals younger than 20 years were not chosen due to possible growth changes.

STUDY PERIOD: Approximately two years. (October 2017 to September 2019)

SAMPLE SIZE: 100subjects (50 females with an age range of 20-25 yrs and 50 males with an age range of 20-25 yrs) were taken for the study.

The lateral view of each patient was obtained using a standardized cephalometric technique. The radiograph was recorded in NHP position with Frankfort Horizontal plane parallel to the floor and teeth in occlusion. The subjects were fixed on the cephalostat with ear rods and nasion pointer. The distance between the X-ray source and mid sagittal plane was 5 feet or 60 inches. Lateral cephalgrams were traced upon a 0.003-inch matte acetate tracing paper with a 3H hard lead pencil. The values were measured by using protractor, corrected up to 0.5 degree. The mean, standard deviation, minimum and maximum values of each measurement were tabulated. The mean, the standard deviation and 95% confidence levels were computed statistically. All the values of different parameters were collected, arranged and computed for statistical analysis. All the required hard tissue skeletal and dental landmarks were marked and various angular and liner measurements were measured in accordance to the Steiner's analysis for present study. The data obtained was subjected to statistical analysis with the consult of a statistician. The data so obtained was compiled systematically. Statistical analysis was done using Statistical Package of Social Science (SPSS Version 22.0; Chicago Inc., USA) and one sample t Test was analyzed by using statistical analysis software graph pad prism (version 5). Data comparison was done by applying specific statistical tests to find out the statistical significance of the comparisons. Quantitative variables were compared using mean values and qualitative variables using proportions. The Student's t-test was used to analyze the variation in mean between two groups of a variable with a normal distribution.

RESULT

Table 1: Mean, S.D , T-Test value of each parameters in present study.

PARAMETER	Present Study			Student 't' test value	p- value between Male & female
	MEAN	SD			
S.N.A Angle	81.54	3.652	72-90	-0.136	0.892(NS)
S.N.B Angle	80.36	4.074	70-90	0.809	0.421(NS)
A.N.B Angle	1.20	2.44	-5 -6	-0.652	0.516(NS)
Interincisal Angle	116.69	10.008	94-145	-1.166	0.246(NS)
SN-GoGn Angle	24.09	4.99	13-35	1.500	0.137(NS)
SN-OP Angle	12.46	4.58	1-21	3.320	0.001(HS)
Upper Incisor to NA Angle	33.04	7.24	20-53	2.859	0.005(HS)
Lower Incisor to NB Angle	29.35	7.18	12-45	0.631	0.529(NS)
S.N.D. Angle	77.61	3.91	69-87	0.944	0.347(NS)
Upper Incisor to NA Plane in mm	8.17	2.58	4-15	2.313	0.023(S)
Lower Incisor to NB Plane	6.35	2.11	1-11	1.477	0.143(NS)
Pog to NB Plane	1.98	1.51	-3-5	1.877	0.064(NS)
SL Distance	52.60	6.88	35-66	2.795	0.006(S)
SE Distance	20.16	2.71	12-28	3.849	0.001(HS)

Table 2 : mean, S.D. & P value of Caucasians & mithilanchal population

PARAMETER	Caucasian Population		Mithilanchal population				t, df	P value
			Mean	SD	Minimum	Maximum		
S.N.A Angle	82	3.2	81.54	3.652	72	90	t=1.260 , df=99	0.2108 (NS)
S.N.B Angle	80	2.9	80.36	4.074	70	90	t=0.8835 , df=99	0.3791 (NS)
A.N.B Angle	2	1.9	1.2	2.445	-5	6	t=3.271 , df=99	0.0015 (S)
Interincisal Angle	131	5	116.7	10.01	94	145	t=13.29 , df=99	<0.0001 (S)
SN-GoGn Angle	32	5.1	24.09	4.999	13	35	t=15.83 , df=99	<0.0001 (S)
SN-OP Angle	14	2.9	12.46	4.58	1	21	t=3.360 , df=99	0.0011 (S)
Upper Incisor to NA Angle	22	1.8	33.04	7.245	20	53	t=15.24 , df=99	<0.0001 (S)
Lower Incisor to NB Angle	25	4.1	29.35	7.183	12	45	t=6.049 , df=99	<0.0001 (S)
S.N.D. Angle	76	3.5	77.61	3.916	69	87	t=0.4.112 , df=99	<0.0001 (S)
Upper Incisor to NA Plane in mm	4	1.1	8.165	2.584	4	15	t=16.12 , df=99	<0.0001 (S)
Lower Incisor to NB Plane	4	1.2	6.35	2.111	1	11	t=11.13 , df=99	<0.0001 (S)
Pog to NB Plane	1	0.8	1.98	1.511	-3	5	t=6.487 , df=99	<0.0001 (S)
SL Distance	51	4.3	52.6	6.88	35	66	t=2.326 , df=99	0.0221 (S)
SE Distance	22	2.1	20.16	2.718	12	28	t=6.769 , df=99	<0.0001 (S)

Table 3: Comparative evaluation of cephalometric parameters of present study with Caucasian population data.

PARAMETER	Present Study		Caucasian Population	
	MEAN	SD	MEAN	SD
S.N.A Angle	81.54	3.652	82	3.2
S.N.B Angle	80.36	4.074	80	2.9
A.N.B Angle	1.20	2.44	2	1.9
Interincisal Angle	116.69	10.008	131	5
SN-GoGn Angle	24.09	4.99	32	5.1
SN-OP Angle	12.46	4.58	14	2.9
Upper Incisor to NA Angle	33.04	7.24	22	1.8
Lower Incisor to NB Angle	29.35	7.18	25	4.1
S.N.D. Angle	77.61	3.91	76	3.5
Upper Incisor to NA Plane in mm	8.17	2.58	4	1.1
Lower Incisor to NB Plane	6.35	2.11	4	1.2
Pog to NB Plane	1.98	1.51	1	0.8
SL Distance	52.60	6.88	51	4.3
SE Distance	20.16	2.71	22	2.1

DISCUSSION

India is one of the largest countries in Asia with four different zones ---- East, west, North and South. All four zones have different people having different facial characteristics. People living in North India have different facial form than people living in south India. Over the centuries, Indian has received large groups of people of different ethnical and cultural origins. Thus, these will lead to dispersion of different ethnic groups in Indian population. The goal of orthodontics is to achieve optimal facial attractiveness. For this, the orthodontist has to assess not only hard tissue but also soft tissue of the face. The old school of thought that the soft tissue curtain will also alter in accordance to the skeletal and dental changes had long been questioned. This led to culmination of newer concept which lay emphasis upon harmonizing facial profile too, as it undergoes alterations as a result of orthodontic treatment. Thus, the traditional cepholometric concepts based on hard tissue analyses exclusively are gradually being supplemented with soft tissue analysis[4]Understanding orofacial balance, proportions and beauty is made simpler by recent aids in diagnosis and treatment planning by means of a combination of clinical facial analysis and hard and soft tissue cephalometrics. The number of cephalometric studies done in India is lesser. With the above-mentioned background, this study was conducted to obtain Steiner analysis cephalometric norms for Mithilanchal population of Bihar.

1. SNA ANGLE:

Angle SNA showed no significant difference between Mithilanchal and white people, indicating that the relation of the anterior limit of the upper apical base to cranial base in Mithilanchal population is almost same to in white people. The study by Dr. Hari Prasad Rao (1987)[6] on the Hyderabad population showed a prognathic maxilla and almost orthognathic mandible as well (SNA- 83) and (SNB- 79.8). When a study on the Assamese population was conducted by Dr.Baruah N and Dr.Bora M.[7] the sample showed a prognathic maxilla and mandible (SNA- 84.5), the study on the Kerala Population was conducted by Dr. John (1987)[8] the samples showed a prognathism. (SNA- 84.14) with a standard deviation of 3.24. the study by Dr. Shivaratna (1987)[9] on the Karnataka population showed a prognathic maxilla (SNA 83.45). Which is greater than those presented by Steiner and Mithilancal subjects.

2. SNB ANGLE:

Angle SNB showed no significant difference between Mithilanchal and white people, indicating that the relation of the anterior limit of the lower apical base to cranial base in Mithilanchal population is almost same to in white people. This finding is in agreement with the findings of Mohode R.et al., (2008)[10] who had done study on Marathi population and also the finding observed Grewal H et al., (1995) on indo-Aryans.[4] The study by Dr. Hari Prasad Rao (1987) on the Hyderabad population showed a prognathic maxilla and almost orthognathic mandible as well (SNA - 83 and SNB -79.8) In a similar study conducted by Dr. Patel on Gujarati population, there were differences between males and females population. The Gujarati males were found to have a prognathic maxilla than their female counterparts, the males showed SNA of an average 83.5 with a standard deviation 3.60 whereas the females showed 80.6 with a standard deviation 4.93. But for the same population the SNB angle was somewhat similar between the sexes. In the present study no statistically significant sex differences were found in Mithilanchal population otherwise.

3. ANB ANGLE:

Angle ANB which is the most common indicator to determine the relative positions of the upper and lower jaw to each other showed a slightly less value than the Caucasians (2˚) which meant less convexity. This finding is in agreement with the study done by Farista S et al.[11] in Chhattisgarhi subjects angle ANB (1.90˚). The ANB angle found in Assamese the study done by Baruah N et al. (ANB=3.01), Patel H.M. et al on Gujarathis Population (ANB=3.01), Valiathan A on Indian residents in USA

(ANB=4.32), was slightly more than the Mithilanchal population and the Caucasion population, indicating greater convexity.

4. SND ANGLE:
The mean value of angle SND was more in Mithilanchal subjects indicating that the position of the center of the symphysis was placed more forwards than the Caucasian. The mean value of angle SND (79.18) was more in Chhattisgarhi subjects study conducted by Farista S et al. indicating that the position of the center of the symphysis was placed more forwards than the Mithilanchal population and the Caucasion population.

5. SN-GoGn ANGLE:
Mandibular plane angle to the cranial base (SN-GoGn angle) of Mithilanchal adults was significantly smaller than that of Steiner's norms. From this results, it may be a reasonable assumption that Mithilanchal people have a more prominent horizontal growth than the Caucasians.This finding is an agreement with the study done by Farihta S et al. on chhattishgarhi population (mandibular plane ange-27.40), Baruah N et al. on dentofacial patterns of Assamese Population (mandibular plane angle-26.6), and Kharbanda et al.[12] on north Indian Population (mandibular plane angle-27.03) where mandibular plane angle was lesser than the value given by Steiner's.

6. SN-OP ANGLE:
SN-OP angle of Mithilanchal adults was significantly smaller than that of Steiner's norms. From this result, it may be a reasonable assumption that Mithilanchal people have a more prominent horizontal growth than the Caucasians. This finding is an agreement with the study done by Farihta S et al. on chhattishgarhi population (occlusal plane ange-13.40), Baruah N et al. al on dentofacial patterns of Assamese Population (occlusal plane angle-13.63) and Valiathan A et al.[13] on Kerala Population (occlusal plane angle-11.79) where occlusal plane angle was lesserthanthevaluegiven by Steiner's.

7. INTERINCISAL ANGLE:
Interincisal angle relates the relative position of the upper incisor to that of the lower incisors. The mean value of interincisal angle in present study for Mithilanchal population of Bihar was significantly lower than those given by steiner, indicating proclined maxillary and mandibular teeth. This finding is in agreement with the study done by Nanda R et al (1969)[5] on north Indians in which they had reported acute interincisal angle suggesting more vertical incisors in north Indians,Valiathan A on Indian population (interincisal angle-119˚) in which she had concluded that the incisor teeth of people from India were more labially placed.This finding is also in agreement with the study done by Elbe P et al (2000) in which it was found that interincisal angle was less for North Indians as compare to Caucasians and was concluded that North Indians have more proclined lower incisors as compared to Caucasians.

8. UPPER INCISOR TO NA ANGLE:
Maxillary incisor position represents the relative location and axial inclination of the upper incisors. The upper incisor to NA reading in degrees indicates the relative angular relationship of the upper incisor teeth to NA line, the mean value of maxillary incisor position in degrees in present study for Mithilanchal subjects is significantly higher than those presented by Steiner indicating more labia inclination of maxillary teeth in Mithilanchal population of Bihar.

9. UPPER INCISOR TO NA PLANE IN MILLIMETERS:
The upper incisors to NA reading in millimeters provides information on the relative forward or backward positioning of the incisor teeth to NA line, the mean value in present study for Mithilanchal subjects was significantly higher than those presented by Steiner indicating more forward positioning of maxillary teeth in Mithilanchal population.This finding is in agreement with the study done by John and Valiathan on Kerala population (Angular measurement-27.44˚, linear measurement-7.46 mm).

10. LOWER INCISOR TO NB ANGLE:
The lower incisor to NB line in degrees indicates relative angular relation. The mean value of mandibular incisor position in degrees in present study for Mithilanchal population was significantly higher than those presented by Steiner indicating more labial inclination of mandibular teeth in mithilanchal population. But there was statistically not significant difference found in the lower incisor to NB plane angle between male & female mithilanchal population of Bihar (P=0.529).

11. LOWER INCISOR TO NB PLANE IN MILLIMETERS:
The lower incisors to NB reading in millimeters provides information on the relative forward or backward positioning of the incisor teeth to NB line, the mean values in present study for the Mithilanchal subjects is significantly higher than those presented by steiner,indicating more forward positioning of mandibular teeth in the Mithilanchal population of Bihar. This finding is in agreement with the study done by Valiathan A (1975)[13], Valiathan A(1976)[14] on Indian population in which she had concluded that the incisor teeth of people from India were more labially placed. This finding is also in agreement with the study done by Kannappan JG et al.(1976)[15] on Madras population (angular measurement-26˚, linear measurement-5.2 mm) and also in a study done by Chandranee (1982) on North India children (angular measurement-27.8˚ and linearmeasurement- 6 mm) where both the angular and linear measurements were more as compared to that given by Steiner.

12. POGONION TO NB PLANE IN MILLIMETER:
In Mithilanchal samples, the mean value of bony chin position in relation to the NB plane (Pog to NB) was1.98; with SD of ±1.51 mm. Steiner remarks that this value was less important because the pogonion was influenced greatly by growth. So he did not establish any reference norm for this parameter. This finding is in agreement with the study done by Baruah N et al on Assamese population(Pog to NB-2.32),Valiathan A on Indian residents in USA (Pog to NB-2.25),

13. SE DISTANCE:
SE distance represents the most distal location of mandibular condyle with teeth in occlusion. the mean value in present study for Mithilanchal subjects was significantly lower than those presented by Steiner. This finding is in agreement with the study done by Baruah N et al. on Assamese population (SE-20.97) and Kharbanda OP et al. on North India population (SE-20.48).

14. SL DISTANCE:
SL distance represents the effective size of the mandible. the mean value in present study for Mithilanchal subjects was significantly higher than those presented by Steiner. This finding is in agreement with the study done by Farihta S et al. on chhattishgarhi population (SL-55.06), Baruah N et al on Assamese population (SL-53.17)and Kharbanda OP et al. on North India population (SL-53.66),

CONCLUSION

From the present study following conclusions were made:-

Mithilanchal population norms had significant difference in the skeletal and the dental profile with that of Caucasian population. The Mithilanchal population showed an orthognathic or normally placed maxilla and mandible in relation to cranial base. The SNB anlge was slight more than the Caucasians and the ANB angle was less than the Caucacians which showed that mandible located ahead of the maxilla. The Interincisal angle in Mithilanchal population was significantly smaller than the Steiner's norms, which indicates dentoalveolar protrusion. Mithilanchal Population has proclined and forwardly placed upper and lower incisor, which was indicative of bimaxillary protrusion as compared to Caucasians. There was increase in linear measurements showing a proclined upper anteriors in relation to cranial base and subsequently the angular measurement shows an

anterior inclination with reference to cranial base. The position of the center of the symphysis was placed more forwards than the Caucasian samples. The Mithilanchal male group reported with a more prominent chin than the female group.The angular relationship of the mandibular plane in relation to the cranial base plane (SN-GoGn angle) showed a decreased in the value indicating Mithilanchal population had tendency towards horizontal growth pattern than the Caucasians. The male group reported more horizontal growth pattern than the females. There was wide divergence of SL distance (anteroposterior length of mandible) in Mithilanchal population when compared to the Caucasians.

REFERENCE

1) Alfred T. Baum. A celphalometric evaluation of the normal skeletal and dental parttan of children of children with excellent occlusion. Angle orthod 1951;21(2): 96-103.

2) Willam B. Downs. Analysis of the dentofacial profile. Angle orthod 1956;26(4):191-212.

3) Manish Valiathan Ashima Valiathan and V. Ravinder. Jaraback cephalometric analysis reborn. J. Ind. Orthod2001; 32:66-76.

4) Harpreet Grewal, S.S Sidhu and O.P. Kharbanda. Cephalometric appraisal of the craniofacial pattern in Indo-Aryans. J. of Ind. Orthod 1995;26(2):43-48.

5) Ravindra Nanda and ram S. Nanda cephalometric Study of the dentofacial

complex of North Indians. Angle orthod 1969; 39(1): 22-28.

6) Hariprasad Rao As cited in the text "Indian Cephalometric norms" published by Indian Orthodontic Center, 1987.

7) Baruah N et al Cephalometric Evaluation based on Steiner analysis on young adults of Assam.

8) JohnK.K. "Indian cephalometricnorms"published by Indian Orthodontic center, Vellore 1987.

9) Shivaratna S ;Indian cephalometric Norms (text) published by I.O.C. Vellore 1987.

10) Rakesh Mohode and Asha Betigiri: An establishment of skeletal and Soft tissue norms for Indian Marathi population and relating it with the perception of balanced profiles by lay person. J. Ind. Orthod 2008; 33-40.

11) SaibelFarishta, Dr. Praveen Kumar, K Sirnivas Reddy, Subhash Chandra, Zinnie Nalanda. Cephalometric Evaluation-based on Steiner's Analysis on

Young Adults of Chhattisgarh, India. The Journal of Contemporary Dental Practice, May-June 2011;12 (3):174-178.

12) Kharbanda OP ,Sidhu SS, Sundaram KR, Cephalometric profile of Aryo-Dravidians part II J Indian orthodontic Society 1989;20:89-94.

13) Valiathan A. Down' cephalometric analysis on adults from India. J Indian Dent Assoc,1974 Nov;46(11):437-441.

14) Valiathan A.Tweed analysis applied to Indian adults J. .Ind Orthod. Soc. 1976;48:215-217.

15) Kannappan JG, ,Balasubramaniam MR Cephalometric norms for Madras city population. J Ind dent Assoc. 1976;48:359-362.

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ESTIMATION OF EFFECT OF LOCAL THERAPY ON THE LEVELS OF FREE RADICALS AND ANTIOXIDANTS IN SALIVA OF DIABETICS AND SMOKERS WITH PERIODONTITIS

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Abstract

Background & objective: Periodontal disease is a chronic adult condition caused by bacterial plaque resulting in destruction of connective tissue and bone. Recently it has been established that the disease process is affected by an array of factors including free radicals and antioxidants. This study was done to estimate the levels of free radical Lipid peroxidase Malondialdehyde (MDA) and antioxidants Glutathione (GSH) and Superoxide dismutase (SOD) in saliva of smokers and diabetics with periodontitis and healthy control subjects.

Methods: 60 subjects with age group 18-59 years (40 males and 20 females) were selected. Saliva samples were obtained and the levels of free radicals and antioxidants were assessed at baseline and 1 month post Scaling & Root Planing (SRP).

Results: showed that local therapy plays a highly significant role in reducing the levels of free radicals & increasing the levels of GSH in all the groups (p=0.000) from their baseline values and were comparable to control group. SOD levels increased significantly (p=0.000) in all the groups post SRP, though not to a level comparable to the control group.

Conclusion: The non-surgical periodontal therapy reduces parameters of oxidative stress thereby improving the clinical parameters in subjects afflicted with chronic periodontal disease.

Keywords: antioxidants; free radicals; glutathione; superoxide dismutase

INTRODUCTION

A free radical may be defined as "any species capable of independent existence that contains one or more unpaired electrons".[1] This makes it extremely reactive towards other molecules. Living cells are exposed to oxidants originating from a variety of exogenous or endogenous sources.

Exogenous sources of the oxidants are air pollutants, ozone, radiation, chemicals, toxins, and pathogenic microorganisms.[2]

Endogenous sources can be:

- Due to leaks in electron transport chain in mitochondria during oxidation of food stuffs.
- Inflammatory cells produce free radicals by a process of respiratory burst during phagocytosis.
- Enzymes which indirectly produce free radicals.

Free radicals cause tissue damage by a number of different mechanisms which include:

- DNA damage
- Lipid per oxidation
- Protein damage
- Oxidation of important enzymes [e g anti proteases]
- Stimulation of pro inflammatory cytokines release

Reactive oxygen species is a collective term which includes oxygen-derived free radicals, such as superoxide radical (O_2^-), hydroxyl radical (OH) and nitric oxide radical (NO) species, and non-radical derivatives of oxygen, such as hydrogen peroxide (H_2O_2) and hypochlorous acid (HOCl). The presence of one or more unpaired electrons in the outer orbit of oxygen-derived free radicals makes such species extremely reactive in nature. In addition to providing an important function in normal metabolic reactions, ROS when produced in concentrations greater than normally required result in host tissue damage instead.

Several periodontopathogenic bacteria have been implicated in the etiology of this disease, which causes destruction of the connective tissue and bone around the root area of the tooth. As a result of stimulation by bacterial antigen, PMN produce the ROS superoxide as part of the host response to infection. Patients with periodontal disease display increased PMN number and activity. It has been suggested that this proliferation results in increased release of ROS, which consequently causes heightened oxidative damage to the periodontium. Studies have shown that there is degradation of the glycosaminoglycans and proteoglycans

associated with mineralized and non-mineralized periodontal tissue. In vitro studies [3] were also conducted to relate the in vivo release of ROS by PMN during initial bursts and the more cumulative periods of disease activity by exposing proteoglycans and glycosaminoglycans to a broad spectrum of ROS species having wide range of reactivity.

A study[3] for the biochemical analyses of proteoglycans metabolites in GCF of subjects with advanced periodontitis concluded that the metabolites are likely to originate from the alveolar bone and are released into the GCF following their partial degradation. Another study [5] has demonstrated that *Fusobacterium* species which is a known periodontopathogen can induce increased production of oxygen radicals, cytokines and elastase in leukocyte activated under in vitro conditions, which might be a possible pathogenic factor in periodontitis and has suggested that *Fusobacterium* species stimulates oxygen radical dependent lipid peroxidation in neutrophils and a possible cause of the emergence of inflammation and periodontitis

Antioxidants are "those substances which when present in lower concentrations compared to those of an oxidisable substrate, will significantly delay or inhibit oxidation of that substrate".[1]

The different possible mechanisms by which antioxidants may offer protection against free radical damage include[6]

- prevention of formation of free radicals
- interception of free radicals by scavenging the reactive metabolites and converting them to less reactive molecules
- facilitating the repair of damage caused by free radicals

Since there is paucity of literature to show specifically the levels of superoxide dismutase in saliva of subjects with diabetes mellitus and the levels of glutathione in the saliva of smokers, hence the present study was undertaken to evaluate the effect of local therapy on the levels of free radicals and antioxidants in saliva of smokers and diabetics with chronic periodontal disease.

MATERIALS AND METHODS

The present study was carried out on 60 subjects with age group 18-59 years (40 males and 20 females) attending the Out patients' Department of Dentistry, Anugrah Narayan Magadh Medical College And Hospital, Gaya, Bihar,India. The present study was approved by the institutional review board. Study is both observational and interventional supplemented with specific laboratory investigations, information generating interview with the subjects and experimental evaluation of some parameters as defined in the study. Subjects afflicted with chronic periodontal disease with pocket depth ≥ 5mm prior to SRP and who have had no periodontal treatment within the last 6 months were included in the study. Pregnant and lactating women, subjects with any neoplastic condition or those with any known allergy or hypersensitivity to the substances to be used in the study were however excluded.

The subjects selected for the study were divided into four groups with 15 subjects per group.

GROUP A: Subjects who have a healthy periodontium. (CONTROL GROUP)

GROUP B: Subjects with chronic periodontal disease and were neither smokers nor diabetic
GROUP C: Subjects who had chronic periodontitis and were smokers but were non diabetic

GROUP D: Subjects with chronic periodontitis and suffering from Diabetes mellitus Type II but were non smokers.

Collection of whole saliva:
Un-stimulated whole saliva samples were collected by expectoration .Subjects had no food intake, drink or oral rinsing 2 hrs prior to sample collection. The collected saliva samples were centrifuged (4000 g x 5 min).The supernatants were stored at -80^{o} C until further analysis. After samples were taken, the clinical measurements which included Plaque index (PI), probing pocket depth levels (PPD) and clinical attachment levels (CAL) were recorded.

Non surgical periodontal therapy was performed in the study groups which included phase I therapy followed by a 1 month period of periodontal maintenance and monitoring of oral hygiene at a weekly intervals. After 1 month, saliva samples were recollected by the same technique and clinical measurements were re-recorded.

Biochemical analysis
The bio chemical analysis was performed at the Department of Pathology, Anugrah Narayan Magadh Medical College and Hospital Gaya, Bihar, India. The collected saliva samples were analyzed for the levels of free radical lipid peroxidase and antioxidants superoxide dismutase and glutathione.

Estimation of lipid peroxidation (LPO) (MDA) assay
Lipid peroxide levels in saliva samples was estimated according to modified method of Ohkawa [7]et al (1979)

Principle
Acetic acid detaches the lipid and protein of the clinical sample. The protein in the reaction mixture is dissolved by the addition of sodium dodecyl sulphate (SDS) 2- Thiobarbituric acid (TBA) reacts with lipid peroxide, hydroperoxide and oxygen labile double bond to form the color abducts with absorption maxima at 532nm.

Procedure:
0.2 ml of saliva sample was mixed with 0.2 ml of 8% aqueous SDS. Subsequently 1.0 ml of 20% acetic acid was mixed in above reaction mixture; the pH of the mixture was adjusted at 4.0 using concentrated sodium hydroxide solution. After adjusting the pH of the reaction mixture, 1.5 ml of 8% TBA solution and sufficient amount of distilled water was added to make the final volume 4.0 ml. Then the reaction mixture was incubated in a boiling water bath for 1 hour. The reaction mixture was then centrifuged at 10,000rpm for 15 min. A clear supernatant obtained after centrifugation was used for measuring the absorbance at 532nm. An appropriate standard made up of malondialdehyde (MDA, 2.5nm) was run simultaneously .A molecular extinction coefficient of $1.56 \times 10^5 m^{-1} cm^{-1}$ was used to calculate n moles of MDA formed per mg of protein in saliva samples.

Estimation of Superoxide Dismutase (SOD) level:
Superoxide dismutase was estimated in saliva samples by using the method of Misra & Fridovich [8](1972).The assay system consisted of 2.45 ml carbonate buffer (.05M, pH 10.2), suitable aliquote of saliva & water to make up the volume. Three hundred microlitre of epinephrine was added to give the final concentration of 2mM to start the reaction. The reaction was monitored at 12-seconds interval for 1min at 480nm at 25^{0} C. Suitable control lacking enzyme was run simultaneously.

The enzyme unit expressed was calculated as the amount of the enzyme required to inhibit auto oxidation of epinephrine by 50%.

Estimation of Glutathione (GSH) level:
GSH level measured in saliva sample by method of Ellman[9] (1959)
Glutathione level was measured in saliva samples after precipitation of proteins with pre chilled 10% (w/v) trichloroacetic acid (TCA). After 30 min the mixture was centrifuged at 3000 rpm for 10 min, 0.5 ml of aliquot was mixed with 2 ml of 0.3 M disodium hydrogen phosphate solution. 0.25 ml of DTNB reagent was added just before measuring the optical density of the samples at 412nm. GSH solution of known

concentrations (10-50 µg) was simultaneously processed to prepare a standard curve .Amount of GSH in the sample was measured by the standard curve .The standard curve was obtained by plotting a line graph between the various concentrations of GSH (10 – 50 µg) and the absorbance obtained at 412nm.

Statistical methodology: The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 15.0 statistical Analysis Software. The values were represented in Number (%) and Mean±SD.

1. Mean:
To obtain the mean, the individual observations were first added together and then divided by the number of observation. The operation of adding together or summation is denoted by the signΣ.
The individual observation is denoted by the sign X, number of observation denoted by n, and the mean by.

$$\bar{X} = \frac{\Sigma X}{\text{No. of observations}(n)}$$

2. Standard Deviation:
It is denoted by the Greek letter σ. If a sample is more than 30 then.

$$\sigma = \frac{\sqrt{\Sigma(X - \bar{X})^2}}{n}$$

3. Student 't' test:

To test the significance of two means the student 't' test was used

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where $S^2 = \frac{(_1-1)^2+(_2-1)^2}{+_1-2_2}$

Where $\bar{}_1, \bar{}_2$ are means of group 1 and group 2

N_1, N_2 are number of observation group1 and group 2
SD_I, SD_2 are standard deviation in group1 and group 2

Level of significance: "p" is level of significance

p > 0.05 Non Significant
p < 0.05 Significant
p < 0.01 Highly Significant
p = 0.000 Very Highly Significant

RESULTS

A comparative assessment of salivary biochemical parameters (malondialdehyde, glutathione and superoxide dismutase) and clinical parameters (Plaque index, probing pocket depth, clinical attachment level) has been made between the periodontally healthy controls and study groups B, C and D at baseline and one month after scaling and root planing.

ASSESSMENT OF BIOCHEMICAL PARAMETERS

1. Lipid peroxidase (MDA)
The mean MDA levels at baseline were 0.081±0.043µmol/l, 0.11±0.040µmol/l, 0.14±0.030µmol/l and 0.15±053µmol/l in Group A, Group B Group C and Group D respectively (Table-1)

It was found that statistically significant difference in the mean MDA levels was obtained when control group subjects (Group A) were compared with study groups. However when the experimental groups were compared with each other, statistically significant difference in the mean MDA levels were seen only when group B was compared with group D (p=0.045). (Table-2)

One month post scaling and root planing the mean Malondialdehyde (MDA) levels were 0.081±0.043µmol/l, 0.077±0.035µmol/l, 0.078±0.016µmol/l and 0.104±0.031µmol/l in Group A, Group B Group C and Group D respectively. A highly significant difference (p=0.000) between baseline and post-treatment values of MDA in groups B, C and D 1 month following SRP. (Table-1).

Statistically significant difference was obtained on comparing group B with group D (p=0.037) and group C with group D (p=0.008) while other inter group comparisons were non significant for the levels of MDA I month after SRP (Table-3).

2 Glutathione (GSH)
At baseline, the mean Glutathione (GSH) levels were 0.82±0.16 µgm/mg, 0.55±0.14 µgm/mg, 0.41±0.16 µgm/mg and 0.58±0.13 µgm/mg in Group A, Group B Group C and Group D respectively (Table-1).

Table 2 shows the comparison of mean GSH levels at base line amongst the various groups. Statistically highly significant difference was seen when group A was compared with groups B, C and D (p=0.000). Similarly significant difference were seen when group B was compared with C (p=0.02) and group C Vs D (p=0.005).

One month after scaling and root planing the mean GSH levels were 0.82±0.16 µgm/mg, 0.71±0.12 µgm/mg, 0.71±0.14 µgm/mg and 0.70±0.17 µgm/mg in Group A, Group B Group C and Group D respectively. Statistically the differences in the levels of GSH 1 month post SRP were highly significant (p=0.000) from their baseline values in all the groups. (Table-1)

.However when the groups were compared with each other to assess the levels of GSH 1 month following SRP the results were statistically were non significant.(Table-3)

3. Superoxide dismutase (SOD)
Table 1 shows that the baseline mean Superoxide dismutase (SOD) levels were 1.19±0.16 U/ml, 0.79±0.18 U/ml, 0.29±0.11 U/ml and 0.55±0.26 U/ml in Group A, Group B Group C and Group D respectively.

All the inter group comparisons were found to be statistically highly significant at baseline for the SOD levels (table –2)
After one month of scaling and root planing the mean SOD levels were 1.19±0.16 U/ml, 0.97±0.15 U/ml, 0.40±0.12 U/ml and 0.77±0.25 U/ml in Group A, Group B Group C and Group D respectively. A highly significant difference ($p \leq 0.001$) between baseline and post-treatment values of salivary SOD in all the groups. (Table-1)

Statistically, all the inter group comparisons were found to be highly significant for the SOD values one month post SRP (Table- 3)

ASSESSMENT OF CLINICAL PARAMETERS

1 Plaque index (PI)
At baseline the mean Plaque Index was 0.91±0.29, 2.54±0.26, 2.27± 0.27 and 2.44±0.36 in Group A, Group B, Group C and Group D respectively.(Table-4)

The plaque index scores were statistically highly significant when control group was compared with the study groups (p=0.000) and when group B was compared with group C (p=0.009) (Table-5). The mean Plaque scores were 0.91±0.29, 1.24±0.16, 1.33± 0.20 and 1.23±0.23 in Group A, Group B Group C and Group D respectively 1 month post SRP. A highly significant difference (p=0.000) between baseline and post-treatment values of plaque index in all the study groups (table-4).

On inter group statistically highly significant difference in plaque score were seen when control group was compared with group B (p=.001), group C (p=.000) and group D (p=0.003). However non significant differences were seen when study groups were compared with each other.(Table-6)

2 Probing pocket depth (PPD)

At baseline, the mean PPD was 2.55±0.29, 5.59±0.29, 5.23±0.27 and 5.78±0.34 in Group A, Group B Group C and Group D respectively. (Table-4)

Statistically highly significant difference was seen when group A was compared with groups B, C and D (p=0.000), when group B was compared with C (p=0.002) and group C was compared with group D (p=0.000). However non significant difference was seen when group B was compared with group D (p=.108) (Table-5)

One month after SRP the mean PPD were 2.55±0.30, 4.36±0.17, 4.82± 0.28 and 5.05±0.40 in Group A, Group B Group C and Group D respectively. Statistically highly significant differences were observed in the PPD from their base line values in all the groups.(Table-4)

On inter group comparisons 1 month post local mechanical therapy statistically highly significant difference in the PPD values were seen when control group was compared with the study groups (p=0.000) and when group B was compared with groups C & D (p=.000) (Table -6).

3 Clinical attachment level (CAL)

At baseline, the mean Clinical Attachment Levels were 0.47±0.34, 3.63±0.42, 3.11±0.26 and 3.88±0.30 in Group A, Group B Group C and Group D respectively. (Table -4)

At baseline statistically highly significant difference was seen when group A was compared with groups B, C and D (p=0.000), group B was compared with C (p=0.001) and group C was compared with group D (p=.000) (Table-5).

1 month post SRP, the mean CAL were 0.47±0.34, 2.58±0.44, 2.78±0.19 and 3.07±0.40 in Group A, Group B Group C and Group D respectively. A statistically highly significant difference (p=0.000) in the mean CAL levels were achieved 1 month post SRP in all the groups. (Table-4)

Statistically highly significant difference was seen when control group was compared with the study groups (p=0.000), group B was compared with D (p=.003) and group C was compared with group D (p=.017 (Table -6)

DISCUSSION

Reactive oxygen species (ROS) are associated with pathogenesis of variety of inflammatory diseases and have a role (direct or indirect) in tissue destruction. Chronic inflammatory conditions are associated with increased oxidative stress with phagocytes (particularly neutrophils) being implicated in disease pathogenesis because of generation of oxidative burst during phagocytosis and killing.[2]

The present study evaluated clinical parameters (Clinical attachment level, Probing pocket depth and Plaque index) and levels of oxidative stress and antioxidants in saliva in a cohort of subjects with chronic periodontitis who were either smokers, non smokers or diabetic compared to periodontally healthy control subjects and effect of non surgical treatment in the form of scaling and root planing on the said parameters.. In present study, when compared at baseline subjects with chronic periodontitis and/or those who were smokers without diabetes had a significantly increased lipid peroxidation (MDA) levels in saliva as compared to the healthy controls. At baseline statistically significant difference in the mean MDA levels was obtained when control group subjects (Group A) were compared with study groups. However when the experimental groups were compared with each other, statistically significant difference in the mean MDA levels was seen only when group B was compared with group D (p=0.045). All other comparisons were non significant.

1 month after scaling and root planing, statistically significant difference was obtained on comparing group B with group D (p=0.037) and group C with group D (p=0.008). All other inter group comparisons were statistically insignificant. MDA levels decreased significantly in all the study groups to levels comparable to periodontally healthy groups. Thus results obtained in the present study indicate that scaling and root planing has significant effect in reducing oxidative stress in test groups. Lipid peroxidation is one of the most important reaction of free radical .Tissue destruction by oxidative stress can be measured by final end products of lipid peroxidation like MDA. Findings of the present study are consistent with various studies [10,11,12] which have demonstrated that increased MDA levels correlate with presence of periodontal disease. **Panjamurthy[13] et al. (2005)** investigated lipid peroxidation and antioxidant status in subjects with periodontitis and found that the level of thio barbituric acid reactive substances (MDA) in plasma, erythrocytes, erythrocyte membranes and gingival tissues were significantly higher in periodontitis subjects when compared with healthy controls. Further, these subjects also showed higher levels of the tested enzymatic and non-enzymatic antioxidants. They concluded that disturbances in the endogenous antioxidant system due to overproduction of lipid peroxidation products at inflammatory sites can be related to a higher level of oxidative stress in subjects with periodontitis. In chronic periodontitis there is continuous production of ROS which adversely affects the anti oxidant mechanisms leading to tissue damage, measureable in the tissue or saliva. **Celec [14]et al. (2005)** demonstrated increased salivary MDA levels in subjects with periodontitis. However, they found no correlation between MDA concentration in saliva and serum and suggested that local oxidative stress in periodontitis may lead to increased MDA levels. **Tsai [15]et al.** (2005) reported that lipid peroxidation concentration was significantly correlated with periodontal disease, and periodontitis subjects showed significantly lower lipid peroxidation concentrations after treatment than prior to therapy. The increase in the mean lipid peroxide level in smokers was caused by an increase in free radical production, which damages the cell membrane lipids. The increase in free radicals might be attributed to cigarette smoke, which by itself is a rich source of free radicals and to polymorphonuclear neutrophils activation by cigarette smoke which again, in turn, increases the free radical activity in the body. **Garg [10]et al. (2006)** found that smoking increases the levels of free radicals in periodontal tissues. **Guentsch [12](2008)** observed that tobacco smoke is not only source of free radicals but affects the anti oxidant capacity as well. **Staudte[16] et al. (2005)** observed that periodontitis subjects had lower plasma ascorbic acid levels, especially if they smoked. Glutathione is a non-essential tri-peptide that can be synthesized within the cell; however, its constituent amino acids are essential and obtained through the diet.

Glutathione exists in oxidized Glutathione disulphide (GSSG) and reduced (GSH) forms and GSH is a ubiquitous thiol that plays a major role in human physiology and pathology as:

1. it is one of the most vital intracellular free radical scavenger.
2. it is essential to the glutathione peroxidase antioxidant enzyme system, which removes hydrogen peroxide by converting two GSH molecules to one GSSG molecule and water
3. it plays a major role in maintaining the intracellular redox balance and thus regulating signaling pathways which are affected by oxidative stress;

The present study observed that when compared at baseline subjects with chronic periodontitis who were either smokers or non smokers and diabetic or non diabetic had significantly decreased glutathione (GSH) levels in saliva as compared to the periodontally healthy controls. At baseline chronic periodontitis subjects who were diabetics (Group D) had higher glutathione levels as compared to subjects who were smokers with chronic periodontitis (Group C) or subjects who had only chronic periodontal disease (Group B). At baseline statistically highly significant difference was seen when group A was compared with groups B, C and D (p=0.000). Similarly significant difference were seen when group B was compared with C (p=0.02) and group C Vs D (p=0.005). When group B was compared to group D, the results were non significant (p=0.57). A study by **Arana C [17] et al. (2006**) showed that diabetic subjects had significantly lower levels of GSH than healthy controls. Furthermore there's paucity of studies to assess specifically the levels of glutathione in chronic periodontitis subjects who additionally smoke and suffer from diabetes. Expectedly the present study found that periodontally healthy subjects had higher levels of GSH. After 1 month of scaling and root planing, statistically all the inter group comparisons were non significant though GSH levels increased significantly in all the study groups (B, C and D). Glutathione levels post treatment was observed to be comparable to periodontally healthy groups. This increase in the level of GSH after scaling and root planing had significant effect in reducing oxidative stress in study groups. The results of the present study are in accordance with various studies [10, 18] which have demonstrated that decreased GSH levels correlate with presence of periodontal disease.

Hassan [19] et al. (2001) have shown that salivary GSH level of subjects with any other chronic inflammatory disease like arthritis (Periodontitis too is a chronic inflammatory disease) is significantly lower than those of healthy individuals and was reported to be about 50% of healthy controls . This data suggests that a large amount of GSH was consumed during the ROS generation leading to a deficiency of antioxidants. In addition, many bacteria in the oral cavity and periodontal pockets could also consume GSH. **Carlsson[20] et a**l. **(1993)** reported that *Peptostreptococcus micros* uses GSH and produces H_2S. **Chu[21] et al. (2002)** reported that *Treponema denticola* can metabolize GSH, which is also necessary for virulence expression. It is conceivable that many microbiotas metabolize GSH leading to lower levels of salivary and/or gingival crevicular fluid GSH. Because of the increased level of ROS, GSH was continuously consumed and became greatly insufficient .Glutathione is a scavenger of hydroxyl radicals and singlet oxygen, it functions as a substrate for the hydrogen peroxide-removing enzyme, glutathione peroxidase (GPx). The reduction of glutathione disulphide (GSSG) to become GSH and the speed of synthesis of GSH from amino acids could not match the consumption of GSH resulting in an imbalance of the GSH/ GSSG (reduced/oxidized GSH) ratio· The subsequent increase of ROS could cause periodontal destruction.

GSSG accumulates and contributes to various inactivating enzymes, which may have led to the lower levels of GSH found in smokers. It has also been reported that the smoking of a single cigarette is capable of inducing a significant reduction of salivary glutathione concentration and similar data exist for plasma

.Circulating polymorphonuclear lymphocytes from cigarette smokers have been shown to release more superoxide. The detrimental effects of smoking on cell and tissue GSH levels have been reviewed[10]. Similar data exist for periodontitis with a dose dependent reduction of periodontal ligament GSH reported as a result of smoking and GSH has been shown to protect against the cytotoxic actions of nicotine in periodontal ligament fibroblasts. **Chappel [22]et al. (2002)** observed a reduction of glutathione and antioxidant capacity in subjects with chronic periodontitis. A study by **Garg [10]et al. (2006**) observed that glutathione level in tissue and blood was consistently lower in smokers than in non smokers. The findings in the present study have found a similar correlation between smoking and GSH levels in the saliva of chronic periodontitis subjects. However **Rai [23]et al. (2008)** conducted a study to determine the association between total glutathione levels in saliva of chronic periodontitis subjects but concluded that total glutathione levels in saliva were significantly higher in smoking subjects with periodontitis when compared to non-smokers and salivary total glutathione concentrations were significantly reduced following scaling and root planing in smokers as well as in nonsmokers. These findings are a complete contrast to various other studies [10,18] including the present one in which GSH levels were found to be much less in smokers at base line but increased significantly after local mechanical therapy. The possible reason for the anomalous results obtained by Rai et al could be that they used a paraffin stimulated saliva samples to determine the GSH levels which according to **Takane [24]et al. (2005**) have a lower anti-oxidant levels as compared to un stimulated saliva samples. Moreover, the mastication process employed in most stimulation technique may cause expulsion of relatively high quantities of GCF from periodontal pocket, artificially increasing the antioxidant capacity in saliva with plasma derived antioxidants.

Superoxide Dismutase is the first of the free radical scavenger enzyme series to ameliorate the damage caused by free radicals in cells.[25] SOD catalyzes the dismutation between two moles of superoxide anion to yield one mole of oxidized product (oxygen) and one mole of reduced product hydrogen peroxide. The present study observed that when compared at baseline, subjects with chronic periodontitis who were either smokers, non smokers or diabetic had significantly decreased superoxide dismutase (SOD) levels in saliva as compared to the periodontally healthy controls. The subjects with chronic periodontitis who were smokers (Group C) or diabetics (Group D) tends to have significantly lower levels of SOD compared to those with CP (Group B) alone

.Further periodontally healthy subjects were found to have highest levels of SOD. At baseline all the inter group comparisons were found to be statistically highly significant (p=.000).

1 month after scaling and root planing statistically, all the intra & inter group comparisons were found to be highly significant (p=.000). Although SRP had increased SOD levels in all the study groups but not to an extent that can be comparable to periodontally healthy group and statistically a highly significant difference were observed in the mean SOD levels when the control group was compared to study groups 1 month post scaling and root planing (p=0.000). Findings of our study are consistent with various studies [10,18,26,27] which have similarly demonstrated that decreased SOD levels correlate with presence of periodontal disease. **Agnihotri R[26] et al. (2009) and** various other studies have concluded that there was progressive reduction in SOD levels from healthy non-smokers to light smokers to heavy smokers. .Cigarette smoking may also result in the reduction of SOD due to inactivation by increased production of hydrogen peroxide. This reduction in the levels of SOD may be related to an increased concentration of cadmium in cigarette smoke as cadmium replaces the bivalent metals in SOD, such as zinc, copper, and manganese, resulting in its inactivation.[26] An increased accumulation of cadmium in blood and decrease in levels of SOD enhance the destructive process. The saturation of already present SOD by the increased concentrations of free radicals in cigarette smoke is another possible mechanism for the increased destruction of the periodontium, especially in heavy smokers.[28]

There are only a few studies on the SOD activity in periodontal/dental tissues [and] the results are conflicting. ROS have been shown to de-polymerize gingival hyaluronic acid and proteoglycans and it has been assumed that the balance between

ROS and the presence of SOD is disturbed. **Ellis [29]et al. (1998**) found a significant and progressive reduction in SOD activity in gingiva adjacent to deeper pockets. **Marton[30]et al. (1993)** showed that SOD activities were similar in periapical granuloma and healthy gingiva. The human periodontal ligament has been shown to possess the enzyme SOD, which might afford biological protection against ROS, particularly O_2, during the inflammatory response **(Jacoby & Davis [31]1991).** Bacterial LPS was shown to stimulate O_2^- release from gingival fibroblasts, suggesting that the induction of SOD may represent an important defense mechanism of fibroblasts during inflammation

There are limited studies to assess specifically superoxide dismutase levels in diabetics with chronic periodontal disease therefore further research in this area is warranted. In studies on various organs and tissues, ambiguous findings have been reported, some studies have reported an increase in the SOD levels,[32,33] some reported a decrease,[32,34]while few observed no change[34,35] in diabetics. The differences in the results were attributed to factors such as time-dependent changes in the enzyme activity, enzyme opposing the oxidative stress by adaptation, and the examined tissues being different. In conditions where chronic oxidative damage has occurred, SOD enzyme adapts to the situation. SOD enzyme, catalyzing the dismutation of the O2 radical in all oxygen consuming cells, is considered as one of the most important antioxidant reaction. The over expression of SOD corrects a variety of hyperglycemia-induced phenotypes in the target cells of diabetic complications.

The clinical parameters which included the plaque index, clinical attachment levels and pocket depth were analyzed and compared at base line and 1 month after scaling and root planing for all the groups.

At baseline subjects with chronic periodontitis who were either smokers, non smokers or diabetic had significantly increased mean plaque index scores as compared to periodontally healthy controls. The present study found that periodontally healthy subjects had lowest mean plaque index scores while chronic periodontitis subjects who were neither smoker nor diabetic had highest plaque index level amongst the study groups. At baseline statistically highly significant difference was seen in plaque index level when control group was compared with the study groups (p=0.000) and when group B was compared with group C (p=0.009), all other comparisons were non significant.

1 month after scaling and root planing, plaque index levels decreased significantly in all the study groups as compared to baseline. When different groups were compared with each other statistically highly significant difference in plaque index level was seen when periodontally healthy subjects were compared with subjects with chronic periodontitis who were smokers, non smokers or diabetics(p=0.000) However non significant differences were seen when study groups (B,C and D) were compared with each other. Thus results obtained in the present study indicate that scaling and root planing has significant effect in reducing plaque index levels in study groups though statistically no difference was found between the study groups.

In the present study the pocket depth when compared at baseline, subjects with chronic periodontitis who were either smokers, non smokers or diabetics had significantly increased probing pocket depth level as compared to periodontally healthy controls. Pocket depth was minimum in group A and maximum in group D at base line and statistically highly significant difference was seen in probing pocket depth level when control group was compared with the study groups (p=0.000) , group B was compared with C (p=0.002) and group C was compared with group D (p=0.000)) . However non significant difference was seen when group B was compared with group D (p=.108).

1 month after scaling and root planing, probing pocket depth levels were decreased significantly in all the study groups as compared to baseline. The maximum pocket depth reduction is observed in chronic periodontitis subjects who were neither smokers nor diabetic and minimum pocket depth reduction is observed in chronic periodontitis subjects who were smokers. When different groups were compared with each other statistically highly significant difference in probing pocket depth level was seen when periodontally healthy subjects were compared with subjects of the study groups (p=0.000), group B was compared with C and group D (p=0.000) .However on comparing group C and group D statistically non significant results were seen (p=.082) which shows that 1 month post SRP the pocket depth reduction was comparable in groups C and D.

Observing the results of the present study it is seen that when compared at baseline subjects with chronic periodontitis who were either smokers, non smokers or those afflicted with diabetes had significantly decreased clinical attachment level (Increased Clinical Attachment Loss) as compared to periodontally healthy controls. Periodontally healthy subjects had highest clinical attachment level (Minimum attachment loss) and chronic periodontitis subjects who were diabetic had lowest clinical attachment level (Maximum attachment loss). At baseline statistically highly significant difference was seen in the mean attachment level when group A was compared with groups B, C and D (p=0.000), group B was compared with C (p=0.001) and group C was compared with group D (p=.000).However non significant difference was seen when group B was compared with group D (p=.074).

1 month after scaling and root planing, clinical attachment levels increased significantly (gained attachment) in all the study groups from their baseline values. When different groups were compared with each other statistically highly significant difference was seen when control group was compared with the study groups (p=0.000), group B was compared with D (p=.003) and group C was compared with group D (p=.017). However, statistically non significant difference was seen when group B was compared with group C (p=0.116) which shows that similar gain in attachment levels were achieved when chronic periodontitis subjects who are neither smokers nor diabetic are compared with those who also smoke but are non diabetic.

Results of the present study are in accordance with number of other studies done previously. **Faria–Almeida [36]et al. (2006)** reported statistically significant differences in pocket depths between the control and diabetic groups between baseline and 3 months after SRP. Different approaches to periodontal therapy in subjects with diabetes have been reported. Conventional therapy was used by **Christgau[37] et al. (1998)** and **Faria Almeida[36] et al. (2006)** in diabetes. These investigators found no differences in clinical responses between the two groups. Similarly **Westfelt[38]et al (1996)** did not find any differences in clinical response following conventional therapy complemented by surgical therapy in subjects with and without type 1 or 2 diabetes after 5 years of follow up. The smokers show less pocket depth reduction after scaling and root planing .This is in accordance with the study by **Wan [39] CP et al. (2009)** who concluded that smokers showed less pocket depth reduction at deep sites after non-surgical periodontal therapy. Previous studies have generally demonstrated that smokers have an increased risk of periodontal destruction and less favorable healing in response to nonsurgical periodontal therapy. However, the factors affecting the variability of treatment outcomes among different smoking subjects and at different sites within individual smokers are still not fully understood.

Local decreases in the antioxidant capacity in GCF are likely to be of greater significance in the etiology of periodontitis and associated damage to the gums and the teeth than the more systemic changes that were noted in whole saliva. The presence of antioxidants bathing the GCF may be of major importance in dampening down the inflammatory processes initiated by bacterial infection. Obtaining and analyzing the GCF samples is however, a complex process requiring a degree of specialism. It is therefore suggested that whole saliva may contain simply analyzed indicators of oxidative processes and may in future provide an excellent tool for the development and monitoring of

new treatment strategies for periodontal diseases. Thus from results of the present study it is evident that scaling and root planing are significant means to improve both the bio chemical and clinical parameters in subjects with periodontal disease who either smoke or do not smoke and who are either diabetic or non- diabetic. Since there's hardly any literature to assess specifically levels of superoxide dismutase in diabetics and glutathione in smokers, it is therefore recommended that more future studies with possibly more sample size with a greater time span between the baseline and period after SRP should be undertaken for a better evaluation of the said bio chemical parameters and clinical parameters.

REFERENCE

1. Chapple IL. Reactive oxygen species and antioxidants in inflammatory diseases. *J Clin Periodontol* 1997; 24: 287-96.
2. Chapple IL, Matthews JB. The role of reactive oxygen and antioxidant species in periodontal tissue destruction. *Periodontol 2000* 2007; 43: 160-232
3. Moseley R, Waddington R, Evan P, Halliwell B, Embery G. The chemical modification of glycosaminoglycan structure by oxygen-derived species in vitro. *Biochimica et Biophysica Acta* (BBA) 1995; 1244: 245-252.
4. Waddington RJ, Embery G, Smith AJ. Immunochemical detection of the proteoglycans decorin and biglycan in human gingival crevicular fluid. *Arch Oral Biol* 1998; 43: 287-95
5. Sheikhi M, Gustafsson A and Jarstrand C. Cytokine, elastase and oxygen radical release by *Fusobacterium nucleatum*-activated leukocytes: a possible pathogenic factor in periodontitis. *J Clin Periodontol* 2001; 27: 758-762
6. Battino M, Ferreiro MS, Galalrdo I, Newman HN, Bullon P. The antioxidant capacity of saliva. *J Clin Periodontol* 2002; 29: 189-94.
7. Ohkawa H, Oshish N, Yag K. Assay of lipid peroxidation in animal tissue by Thiobarbituric acid reaction. .*Anal Biochem* 1979; 95: 351-358
8. Misra HP, Fridovich I. The role of superoxide anion in the auto-oxidation of epinephrine and a simple assay for superoxide dismutase. *J Biol Chem* 1972; 247: 3170-3175
9. Ellman GL. Plasma antioxidants. *Arch Biochem Biophys* 1959; 82; 70-77
10. Garg N, Singh R, Dixit J, Jain A, Tewari V. Levels of lipid peroxides and antioxidants in smokers and nonsmokers. *J Periodontal Res* 2006; 41: 405–410
11. Akalin FA, Baltacioglu E, Alver A, Karabulut E. Lipid peroxidation levels and total oxidant status in serum, saliva and gingival crevicular fluid in patients with chronic periodontitis. *J Clin Periodontol* 2007; 34: 558-65
12. Guentsch A, Preshaw PM, Bremer-Streck S, Klinger G, Glockmann E, Sigusch BW. Lipid peroxidation and antioxidant activity in saliva of periodontitis patients: effect of smoking and periodontal treatment. Clin Oral Investi 2008; 12: 345-5
13. Panjamurthy K, Manoharan S, Ramachandran C. Lipid peroxidation and antioxidant status in patients with periodontitis. *Cell Mol Biol Lett* 2005; 10: 255-264
14. Celec P, Hodosy J, Celecova V, et al. Salivary thiobarbituric acid reacting substances and malondialdehyde-their relationship to reported smoking and to parodontal status described by the papillary bleeding index. Dis Markers 2005; 21: 133–137
15. Tsai CC, Chen HS, Chen SL, et al. Lipid peroxidation: a possible role in the induction and progression of chronic periodontitis. *J Periodontal Res* 2005; 40: 378-384.
16. Staudte H, Sigusch BW, Glockmann E .Grapefruit consumption improves vitamin C status in periodontitis patients. *Br Dent J 2005*; 199: 213–217
17. Arana C, Cutando A, Ferrera MJ, et al. Parameters of oxidative stress in saliva from diabetic and parenteral drug addict patients. *J Oral Pathol Med.* 2006; 35: 554-9.
18. Zappacosta B, Persichilli S, Mordente A, et al. Inhibition of salivary enzymes by cigarette smoke and the protective role of glutathione. *Human Exp Toxicol* 2002; 21: 7–11
19. Hassan MQ, Hadi RA, Al-Rawi ZS, Padron VA, Stohs SJ .The glutathione defense system in the pathogenesis of rheumatoid arthritis. *J Appl Toxicol* 2001; 21: 69-73
20. Carlsson J, Larsen JT, Edlund MB. *Peptostreptococcus micros* has a uniquely high capacity to form hydrogen sulphide from glutathione. *Oral Microbiol Immunol* 1993; 8: 42-45
21. Chu L, Dong Z, Xu X, Cockxan DL, Ebersole JL. Role of glutathione metabolism of *Treponema denticola* in bacterial growth and virulence expression. *Infect Immune* 2002; 70:1113-1120
22. Chapple IL, Brock G, Eftimiadi C, Matthews JB. Glutathione in gingival crevicular fluid and its relation to local antioxidant capacity in periodontal health and disease. *J Mol Pathol* 2002; 55: 367–373
23. Rai B. Total Salivary Glutathione Levels: Periodontitis in Smoker and Non-Smoker. Adv in Med Dent Sci 2008; 2: 47-19.
24. Takane M, Sagano N, Ezawa T, Uchiyama T, Ito K. A Marker of oxidative stress in saliva: association with periodontally involved teeth of a hopeless prognosis. *J. Oral Science* 2005; 47: 53-57.
25. Slater TF. Free radical mechanism in tissue injury. *Biochem J* 1984; 222: 1-15
26. Agnihotri R, Pandurang P, Kamath SU, et al. Association of cigarette smoking with superoxide dismutase enzyme levels in subjects with chronic periodontitis. *J Periodontol* 2009; 80: 657-62
27. Buduneli N, Kardesler L, Isik H, et al. Effects of smoking and gingival inflammation on salivary antioxidant capacity. *J Clin Periodontol* 2006; 33: 159-164
28. Sharma SB, Dwivedi S, Prabhu KM, Singh G, Kumar N, Lal MK. Coronary risk variables in young asymptomatic smokers. *Indian J Med Res* 2005; 122: 205-210
29. Ellis SD, Tucci MA, Serio FG, Johnson RB. Factors for progression of periodontal diseases. *J Oral Pathol Med* 1998; 27: 101-5
30. Marton IJ, Balla G, Hegedus C, et al. The role of reactive oxygen intermediates in the pathogenesis of chronic apical periodontitis. *Oral Microbiol Immunol* 1993; 8: 254-257
31. Jacobi B H, Davis WL. The electron microscopic immunolocalization of a copper-zinc superoxide dismutase in association with collagen fibres of periodontal soft tissues. *J Periodontol* 1991; 62: 413-420.
32. Wohaieb SA, Godin DV. Starvation-related alterations infree radical tissue defense mechanisms in rats. Diabetes 1987; 36: 169–73.
33. Sechi LA, Ceriello A, Griffin CA, et al. Renal antioxidant enzyme mRNA levels are increased in rats with experimental diabetes mellitus. Diabetologia 1997; 40: 23–29.
34. Aliciguzel Y, Ozen I, Aslan M, Karayalcın U. Activities of xanthine oxidoreductase and antioxidant enzymes in different tissues of diabetic rats. *J Lab Clin Med* 2003; 142: 172–7.
35. Dohi T, Kawamura K, Morita K, Okamoto H, Tsujimoto A. Alterations of the plasma selenium concentrations and the activities of tissue peroxide

metabolism enzymes in streptozotocin-induced diabetic rats. *Horm Metab Res* 1988; 20: 671–5

36. Faria-Almeida R, Navarro A, Bascones A. Clinical and metabolic changes after treatment of type 2 diabetic patients with chronic periodontitis. *J Periodontol* 2006; 77: 591-598

37. Christgau M, Palitzsch KD, Schmalzkreiner U, Frenzel S. Healing response to non surgical periodontal therapy in patients with diabetes mellitus: Clinical, microbiological and immunologic results. *J Clin Periodontol* 1998; 25: 112-124

38. Westfelt E, Rylander H, Blohme G, Jonasson P, Lindhe J. The effect of periodontal therapy in diabetics. Results after 5 years. *J Clin Periodontol* 1996; 23: 92-100

39. Wan CP, Leung WK, Wong MCM, et al. Effects of smoking on healing response to non-surgical periodontal therapy: a multilevel modelling analysis. *J Clin Periodontol* 2009; 36: 229–239.

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PREVALENCE OF DENTAL CARIES AMONG SMOKED AND SMOKELESS TOBACCO USERS: A CROSS SECTONAL STUDY

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Abstract

Background: Dental caries is a polymicrobial multifactorial disease caused by various associations. Tobacco usage also affects the occurrence of dental caries.

Aim and objective: To assess the prevalence of dental caries in smokers and smokeless tobacco users.

Materials and method: A sample of 312 patients of both genders within 18–75 years formed the study population and were categorized as follows: Group 1 - 175 patients who smoked tobacco, Group B - 137 patients who used chewable form of tobacco. A clinical examination of dental caries was conducted using Black's criteria, and habit duration, frequency, form, and the type of tobacco used were recorded. The obtained data was descriptively analyzed.

Result: Of the 312 enrolled subjects, 183 were males while 129 were females, thus showing male predilection. Of the 312 tobacco dependents, 175 (56.09%) belonged to group A (smokers) and 137 (43.91%) belonged to group B (smokeless tobacco users).Dental caries was encountered in 98 (71.53%) of the smokeless tobacco users and 87 (49.71%) of the smoked tobacco users.

Conclusion: Individuals who use chewable form of tobacco are more affected by dental caries than the individuals who smoke tobacco. This may be due to the increased sweetening and flavouring agents used in the commercial smokeless tobacco preparations. Thus, individuals should be educated about this dreadful consequence of tobacco usage which could ultimately result in loss of teeth, difficulty in mastication and other esthetic issues, thus desecrating the quality of life.

Key words: Dental caries, Prevalence, Smoked tobacco users, Smokeless tobacco users.

INTRODUCTION

The use of tobacco and its products adversely affects the entire human body and has resulted in a myriad of health complications including cancer, chronic obstructive pulmonary disorder, cardiovascular diseases, strokes and several other entities. Around 7 million deaths occur worldwide annually due to tobacco usage. [1] The tobacco burden in India is no less with 28.6% of the adult population (>15 years) and 14.6% of the youth (13-15 years) having this addiction.[2]

Tobacco is consumed in various forms in India, with the consumption pattern being affected by several factors like demographic area, socioeconomic status, socio-cultural and religious influences.[1] Surveys have shown that of the estimated 28.6% tobacco use in India, 10.7% of the total tobacco consumption is in smokable form as cigarettes and bidis, while 21.4% is used in the form of smokeless tobacco products such as paan, gutkha, paan masala and mishri.[3]

Tobacco usage wrecks havoc on the whole body including the oral cavity, wherein the most significant effects seen are : oral cancers and oral potentially malignant disorders, increased severity and extent of periodontal diseases along with poor healing.[4] Tobacco is also considered as a major risk factor for dental caries and oral mucosal lesions and adult periodontal diseases. Tobacco use also suppresses the immune system's response to oral infections.[5]

There is a general consensus that tobacco is associated with increased caries rate but this cause and effect relationship is not firmly proven. Therefore, the aim of this study was to assess the influence of smoked as well as smokeless tobacco on dental caries development in individuals of all age groups.

MATERIALS AND METHODS

The present observational study was conducted to estimate the prevalence of dental caries in individuals who used tobacco either in smoking or smokeless form. Individuals who gave their consent, were current tobacco users and consumed tobacco either in smoked or chewable form formed the study population. Subjects having less than 10 teeth in one arch, with history of major systemic disease or subjects who had undergone past oral propylaxis were excluded from the study. Moreover, individuals on antibiotic medication within 6 months prior to the study, individuals who used tobacco in both smoked and chewable form and subjects diagnosed with dental fluorosis were also not included in the study.

Data related to the subject's dietary habits, oral hygiene habits (brushing frequency, paste used and mouth rinsing habit was recorded) and tobacco history (habit duration, type, frequency and form) was obtained after receiving informed consent from the patient. A thorough clinical examination was performed on 312 individuals using WHO guidelines using adequate illumination, mouth mirror and an explorer. Patients were asked to rinse mouth thoroughly before examination, then the teeth were dried with cotton swab and dental caries were recorded. The criteria to diagnose decayed tooth was: catch with explorer, discontinuity of enamel surface, definite cavitation and soft base. All the examination was done by a single calibrated examiner and trained assistant recorded the clinical findings as dictated by the examiner.

A simple random sampling was performed during subject recruitment. All 312 patients of both gender, aged between 18 and 75 years were categorized into two groups.

Group A: Smokers (subjects consuming only smoked form of tobacco).

Group B: Chewers (subjects consuming only smokeless form of tobacco).

Group A and B included subjects who had history of tobacco consumption (smoked and smokeless form, respectively) atleast for the past six months.

Data was charted and descriptively analysed.

RESULTS

Data related to the Table 1 shows patient distribution according to gender and habit. Of the 312 enrolled subjects, 183 (58.65%) were males while 129 (41.35%) were females, thus showing male predilection. Of the 312 tobacco dependents, 175 (56.09%) belonged to group A (smokers) and 137 (43.91%) belonged to group B (smokeless tobacco users).

		Frequency	Percentage (%)
Gender	Male	183	58.65
	Female	129	41.35
Habit	Smokers (Group I)	175	56.09
	Chewers (Group II)	137	43.91
Prevalence of caries	Smokers (Group I)	87	49.7
	Chewers (Group II)	98	71.53

Table1: Distribution of study participants according to gender, habit and caries prevalence.

the smokeless tobacco users and 87 (49.71%) of thsmoked tobacco users (Table 1). This shows that the prevalence of dental caries was more in individuals who used smokeless forms of tobacco than the individuals who smoked tobacco.

Data analysis also revealed that among smokers, bidi was more commonly used than cigarettes and in smokeless tobacco users gutkha was used by majority of the study subjects followed by khaini, tambaku and zarda. Among smokers, majority of the subjects smoked 1-5 times in a day followed by 6-10 times and very few used more than 10 times in a day. Among smokeless tobacco users, majority of the subjects used 1-5 times in a day followed by more than 10 times in a day. Amongst smokers, a larger population smoked for more than a decade, followed by 5-10 years while very few had been smoking for less than 5 years. A different trend was observed in the chewing category wherein maximum of the participants had been chewing tobacco for the past 5-10 years followed by individuals who had been chewing tobacco for less than 5 years and >10 years, respectively (Table 2).

Parameters	Smokers		Chewers	
Types	Bidi	113	Gutkha	52
			Khaini	38
	Cigarette	62	Tambaku	29
			Zarda	18
Frequency per day				
1-5	113		76	
6-10	48		22	
> 10	14		39	
Duration in years				
< 5	21		40	
5-10	66		73	
> 10	88		24	

Table 2 : Table depicting the distribution of study participants based on type, frequency and duration of tobacco consumption.

Table 3 shows the distribution of caries affected and caries free individuals based on age group distribution (<25 years, 25-50 years, >50 years). Among smokers, maximum of the caries affected individuals belonged to 25-50 years, <25 years and >50 years. Whereas amongst chewers, most caries affected individuals belonged to <25 years age group followed by 25-50 years group followed by >50 years age group (Table 3).

Age group	Smokers		Chewers	
	With caries	Without caries	With caries	Without caries
< 25	27	31	43	08
25 -50	39	22	37	15
> 50	21	35	18	16

Table 3: Distribution of study subjects according to age group and presence or absence of caries.

DISCUSSION

The results of the present study showed that individuals who chewed tobacco were more affected by dental caries than the individuals who smoked tobacco. Moreover, a male predilection was seen. It was also observed that majority of the caries affected individuals who smoked tobacco belonged to 25-50 years age group while majority of the caries affected chewers belonged to young age group i.e <25 years.

Zitterbart in the year 1990 reported that smokers had significantly higher decayed, missing, and filled teeth (DMFT) score, thus suggesting an association between smoking and prevalence of dental caries in adult males. He also correlated frequency of smoking with missing teeth, and reported that with more number of cigarettes were smoked per day, more were the missing teeth noted in a smoker's mouth.[6] Some other studies have also suggested that smoking actually reduces dental caries.[7-10] The results of these studies are not in concordance with ours. The reasoning given for this observation was that thiocyanate, a component of tobacco smoke is increased in smokers saliva which is believed to have anti caries effect, thus reducing the incidence of dental caries in these individuals.[11] However, some studies have also stated increased susceptibility to dental caries in individuals who smoked tobacco due to possible lower pH levels, a decreased buffering capacity of smoker's saliva, and higher number of lactobacilli and Streptococcus mutans, caries causing bacteria.[11,12]

Campus et al, Sitzes L Jr reported the evidence linking smokeless tobacco use with increased prevalence of dental caries, a finding similar to ours.[13,14] Data from the multipurpose health survey (Third National Health and Nutrition Examination Survey) conducted in the USA from 1988 to 1994 was used to examine the relationship between chewing tobacco and the other forms of tobacco use and decayed or filled coronal or root surface caries. The results of the study stated that tobacco chewers had a slightly higher mean for decayed and filled coronal surfaces than individuals using the other forms of tobacco. In addition, the mean number of decayed and filled root surface for those who used chewing tobacco was four times higher than nonusers.[15] All of these findings are in concordance with our study. Thus, it can be considered that smokless tobacco plays a significant role in the promotion and development of dental caries.

Chaitanya et al assessed the prevalence of dental caries in smokers and smokeless tobacco users and compared it with that of nonusers. They reported a high prevalence of caries in control patients followed by smokeless tobacco users when compared to the group with smoking habit.[16] Nidhi et al assessed the prevalence of dental caries among smokers and smokeless tobacco users and reported higher presence of caries in the smokeless tobacco user group.[17] Sharma et al conducted a study to determine the influence of tobacco dependence on caries development in young male adults, and concluded that DMFT index was higher for smokeless tobacco users than smoked tobacco users.[18] The findings of all these studies were in concordance with our study. The higher presence of caries in the smokeless tobacco usage group might be due to the presence of sweeteners in tobacco-chewing agents, which acts a substrate for the caries promoting bacteria.[16] Moreover, it may also be considered that chewing tobacco may reduce the salivary flow, which reduces the flushing action of saliva. and the other caries inhibiting salivary actions.

On the contrary, Hegde et al compared the dental caries experience and count of Streptococcus mutans, Streptococcus sanguis and Candida among tobacco users and concluded that dental caries experience and growth of microbes was found higher among smokers compared to smokeless users and non-users.[19]

Similarly, Rooban et al evaluated the effect of different psychoactive substances (tobacco and alcohol) use in different combination to understand the association between psychoactive substance uses and different components of the dental caries experience. They summarized that the entire study population exhibited a higher incidence of caries experience and use of tobacco in any form substantially increased the risk for dental caries. However, attrition with use of chewing tobacco and presence of extrinsic stains with tobacco use appeared to provide a protective effect from caries.[20] The findings of both these studies were in concordance with ours. Similarly, Zitterbart et al did not find any evidence of dental caries in the area where quid was placed.[6]

CONCLUSION

Individuals who use chewable form of tobacco are more affected by dental caries than the individuals who smoke tobacco. This may be due to the increased sweetening and flavouring agents used in the commercial smokeless tobacco preparations. Thus, individuals should be educated about this dreadful consequence of tobacco usage which could ultimately result in loss of teeth, difficulty in mastication and other esthetic issues, thus desecrating the quality of life.

REFERENCES

1. Chhabra A, Hussain S, Rashid S. Recent trends of tobacco use in India. J Public Health (Berl.): From Theory to Practice 2019. https://doi.org/10.1007/s10389-019-01091-3.

2. https://apps.who.int/iris/bitstream/handle/10665/272672/wntd_2018_india_fs.pdf?sequence=1.

3. GATS (2017) Global adult tobacco survey Fact Sheet India 2016–17. WorldHealth Organisation.https://www.who.int/tobacco/ surveillance/survey/gats/GATS_India_2016-17_FactSheet.pdf.

4. Borse M, Nagar P, Jessy P, Tanvi P. Dental Caries in Primary and Permanent Molars in 7-8-Year Old School Children Evaluated with Caries Assessment Spectrum and Treatment (CAST) Index from Bangalore North. International Journal of Contemporary Medical Researrch 2016;3:2275-8.

5. Kumar S, Prabu D, Kulkarni S, Dagli RJ. Tobacco as risk factor for periodontal disease in green marbles mine laborers of Rajasthan, India. Braz J Oral Sci 2015;7:1641-7.

6. Zitterbart PA, Matranga LF, Christen AG, Park KK, Potter RH. Association between cigarette smoking and the prevalence of dental caries in adult males. Gen Dent 1990;38:426-31.

7. Simon-Soro A, Belda-Ferre P, Cabrera-Rubio R, Alcaraz LD, Mira A. A tissue-dependent hypothesis of dental caries. Caries Res 2013;47:591-600.

8. Hart A. Prevention of decay of the teeth. Dent Items Interest 1899;21:11.

9. Gibbs M. Tobacco and dental caries. J Am Coll Dent 1952;19:3.

10. Schmidt H. Tobacco smoke and the teeth. Stoma (Heidelb) 1951;4: 14.

11. Johnson NW, Bain CA. Tobacco and oral disease. EU-Working Group on Tobacco and Oral Health. Br Dent J 2000;189:200-6.

12. Kassirer B. Smoking as a risk factor for gingival problems, periodontal problems and caries. Univ Tor Dent J 1994;7:6-10.

13. Campus G, Cagetti MG, Senna A, Blasi G, Mascolo A, Demarchi Petal. Does smoking increase risk for caries. A cross-sectional study in an Italian military academy. Caries Res 2011;45:40-6.

14. Sitzes L Jr. On Chewing tobacco [Letter]. ADA News 1977;8:6.

15. Tomar SL, Winn DM. Chewing tobacco use and dental caries among U. S. men. J Am Dent Assoc 1999;130:1601-10.

16. Chaitanya NC, Boringi M, Madathanapalle R, Renee A, Sree SV, Priyanka N, et al. The Prevalence of Dental Caries in Smokers and Smokeless Tobacco Users. Dent Hypotheses 2018;9:36-40.

17. Nidhi, S P Singh. Assessment of prevalence of dental caries among smokers and smokeless tobacco users - A descriptive study. International Journal of Contemporary Medicine Surgery and Radiology. 2019;4(1):A4-A8.

18. Sharma S, Mishra SK, Mittal N. Influence of tobacco dependence on caries development in young male adults: A cross-sectional study. J Conserv Dent 2018;21:597-601.

19. Hegde V, Sreekumar S. Assessment of dental caries experience along with Streptococcus mutans, Streptococcus sanguis and Candida count among male tobacco users visiting a dental institute of Mangalore, Karnataka, India: A cross-sectional study, J Res Med Dent Sci 2019, 7(1): 131-5.

20. Rooban T, Vidya KM, Joshua E, Rao A, Ranganathan S, Rao UK, Ranganathan K. Tooth decay in alcohol and tobacco abusers. J Oral Maxillofac Pathol 2011;15:14-21.

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QUALITATIVE ANALYSIS OF SALIVARY Ph IN DENTAL CARIES USING SYNDER TEST

Abstract

Background : Caries activity can generally be defined as the occurrence and the rate at which, teeth are destroyed by acid production by the plaque bacteria.

Aims and objectives : To test the salivary pH in dental caries patients using Snyder test.

Materials and methods : DMFT index was calculated and patients were categorized according to the score. Saliva samples were collected from patients. Prepared Snyder's test medium was melted in the micro centrifuge tubes, which were then kept in hot water bath at 50°C. The fluid thiglycolate medium was prepared and poured in test tubes and kept ready. 0.2 ml of saliva was pipetted into the melted Snyder's medium at 50°C. After the addition of saliva into the medium, tubes were rotated for proper mixing of saliva and the medium. The micro centrifuge tube was incubated at 37°C for up to 72 h. The observations for colour change and pH were made every 24 h for a period of 72 h.

Result : A statistically significant difference was seen for the values between the groups for DMFT index, pH values at 24 hrs, 48 hrs and 72 hrs ($p<0.01$). There was a statistically highly significant difference seen for the frequencies of various types of colours at 48 and 72 hrs between the sub groups 1 & 2 ($p<0.01$) with lower frequency for yellowish green in subgroup 1 while higher of yellowish green in subgroup 2 at 48 hrs. Gender and age did not have an influence on the outcome of variable.

Conclusion: Snyder test was performed and it was found to be a simple and an inexpensive method for assessment of caries activity. We observed a close relationship between DMFT index and salivary pH value which could be suggestive of increased risk of dental caries within an acidic environment.

Keywords: Dental caries, DMFT, Snyder test..

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INTRODUCTION

Dental caries, a multi-factorial disease is considered to be the most prevalent oral disease worldwide and also the main cause of tooth loss among the population of all ages.[1] Dental caries can be defined as a localized post eruptive, pathological process of external origin involving softening of the hard tooth & proceeding to the formation of a cavity.[2] This multi-factorial disorders, dental caries can affect the human in various ways i.e. presence of tooth pain, infection or dysfunction of the stomatognathic system can limit the necessary ingestion of energetic foods, affecting the growth in children and adults as well as their learning communication skills and recreational activities.[3]

The microbial community of caries is diverse and contains many facultatively and obligately-anerobic bacteria belonging to genera Actinomyces, Bifidobacterium, Eubacterium, Lactobacillus and Parvimonas.

It can also be caused by other bacteria Enterococcus fecalin, Prevotella Fusobacterium.[4] However, the most common microorganisms related to caries are Streptococcus and Lactobacilli, present in the dental plaque formed along the tooth. Worldwide, the main species associated with caries in humans is Streptococcus mutans.[5]

Dental caries gets established in the mouth long before it manifests clinically in the form of visible lesions. This makes it possible to assess the caries activity in a patient or in a population. Caries activity can be defined as the occurrence and

the rate at which, teeth are destroyed by acid production by the plaque bacteria.[6] Currently there are many tests available which check for caries activity and caries susceptibility. One such test is Snyder Test used to estimate the relative number of lactobacilli in saliva.

This test is a colorimetric analysis which measures the rapidity of acid formation when a sample of stimulated saliva is inoculated into glucose agar adjusted to pH 4.7 to 5 and with bromocresol green as colour indicator. Indirectly the test is also a measure of acidogenic and aciduric bacteria.[7,8] Hence the purpose of this study was to test the salivary pH in dental caries patients using Snyder test.

MATERIALS AND METHODS

The present study was carried out in a private dental college in Patna, Bihar. A total of 100 randomly selected individuals of either sex and any age group who gave their consent formed the study population. Individuals who had brushed their teeth at least 2 hours prior formed the study population. Subjects taking antibiotics for the last one month, additional fluoride use or the ones wearing any orthodontic or prosthodontic appliance were excluded from the study. Moreover, individuals with reduced salivary flow were also not included in the study.

Oral examination

All the participating subjects received a thorough oral examination using a mouth mirror and World Health Organization (WHO) probe in adequate illumination. The decayed, missing and filled teeth (dmft/DMFT) were recorded as per WHO criteria. The caries experience was calculated as the dmft + DMFT. The mean index value of the sample was 6.30 ± 1.85. The subjects were divided into two groups according to their dmft/DMFT scores.

Group I: with score between 1-5.

Group II: with score between 6-10.

All the subjects were taken for the study only after a gap of 90 min after the last intake of food or drink.

Collection of salivary sample

Subjects were asked to rinse their mouth with water and then instructed to chew paraffin for 25 chewing strokes on the same side and spit. This process was continued. The first two saliva samples were discarded, the third sample collected in a sterile vial. The entire collection procedure was repeated until 10ml of saliva had been collected.

Procedure for Snyder's caries activity test

Prepared Snyder's test medium was melted in the micro centrifuge tubes, which were then kept in hot water bath at 50°C. The fluid thiglycollate medium was prepared and poured in test tubes and kept ready. 0.2 ml of saliva was pipetted into the melted Snyder's medium at 50°C. After the addition of saliva into the medium, tube was rotated for proper mixing of saliva and the medium. The micro centrifuge tube incubated at 37°C for up to 72 h. An un-inoculated tube was used as a negative control. The observations for colour change and pH were made every 24 h for a period of 72 h. The rate of colour change of Snyder's medium from green to yellow is indicative of caries activity (Figure 1).

Statistical Analysis

Data obtained was subjected to statistical analysis using statistical package for social sciences (SPSS V21, IBM) software. Appropriate statistical tests were used. For all the statistical tests, $P<0.05$ was considered to be statically significant, keeping α error at 5% and β error at 20%, thus giving a powers to the study as 80%

RESULTS

Age wise distribution of the sample was done. The minimum age recorded was 6 years and maximum was 65 years. The mean age of the subjects was 34.47 ± 12.00. Gender wise distribution of the subjects revealed that out of 100 samples, 41% were females and 59% males. The mean (dmft+DMFT) index of the sample was 6.30 ± 1.850. Out of 100 cases, the minimum index value recorded was 3 while the maximum was 10.

Inter group comparison of variables as per (dmft + DMFT) subgroups

On the basis of index scores, samples were classified into two subgroups. Subgroup I consisted of 35 individuals with index score ranging between 1-5 while subgroup II had 65 individuals with scores between 6 and 10. Table 1 shows the intergroup comparison in terms of pH value. Mean pH value in group A after 24 hours was 4.60 and in group B was 4.68. After 48 hours, mean pH values were 4.50 and 4.58 in groups A and B respectively. After 72 hours, the pH values had dropped to 4.40 in group A and 4.48 in group B. The difference in pH values of both the groups was found to be statistically significant at all the three time intervals which reduced gradually (Table 1). There was a statistically highly significant difference seen for the values between the groups for DMFT index, pH values at 24 hrs, 48 hrs and 72 hrs ($p<0.01$).

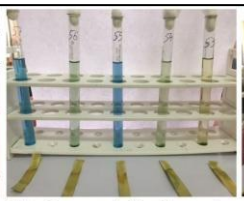
	DMFT subgroups	N	Mean	Std. Deviation	Std. Error Mean	T value	p value of t test
DMFT index	Subgroup-A	35	4.34	.725	.123	-12.340	0.000**
	Subgroup- B	65	7.35	1.340	.166		
	Subgroup- B	65	5.00	.000[a]	.000		
pH value 24 hrs	Subgroup- A	35	4.60	.071	.012	-2.771	0.007**
	Subgroup- B	65	4.68	.172	.021		
pH value 48 hrs	Subgroup- A	35	4.50	.071	.012	-2.691	0.008**
	Subgroup- B	65	4.58	.174	.022		
pH value 72 hrs	Subgroup- A	35	4.40	.071	.012	-2.601	0.011*
	Subgroup- B	65	4.48	.177	.022		

*Significant; **Highly significant

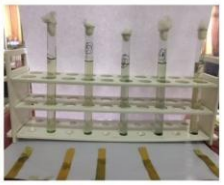
Table 1: Intergroup comparison in terms of pH value.

Changes in the colour of the Snyder solution was recorded and was subjected to statistical analysis (Table 2, Figure 1). The colour of the solution at time of inoculation was blue, which changed to bluish green after 24 hours in all the 100 samples. The change in the colour of the solution at 48 and 72 hours was recorded as greenish yellow, pale yellow and yellowish green. After 48 hours, greenish yellow change was found in all the 35 samples of subgroup A and 49 of subgroup B. Pale yellow colour was noted in 2 samples of subgroup B while 14 samples of subgroup B showed yellowish green colour change. Colour change after 72 hours, was recorded as greenish yellow, pale yellow, yellow and yellowish green. After 72 hours, all 35 samples of subgroup A showed greenish yellow change, while 6,20,1 and 38 samples of subgroup B showed greenish yellow, pale yellow, yellow and yellowish green colour changes respectively. There was a statistically highly significant difference seen for the frequencies of various types of colours at 48 & 72 hrs between the sub groups 1 & 2 ($p<0.01$) with lower frequency for yellowish green in subgroup 1 while higher of yellowish green in subgroup 2 at 48 hrs.

Color changes seen in the saliva samples after 24 hours



Color changes seen in the saliva samples after 48 hours



Color changes seen in the saliva samples after 72 hours

Time	Colours	DMFT subgroups		Chi square value	p value of chi square test
		1	2		
Colour of solution at I	Blue	35	65	---	-----
Colour change 24 hrs	Bluish green	35	65	---	---
Colour change 48 hrs	Greenish yellow	35	49	10.256	0.006**
	pale yellow	0	2		
	yellowish green	0	14		
Colour change 72 hrs	Greenish yellow	35	6	77.486	0.000**
	Pale yellow	0	20		
	Yellow	0	1		
	Yellowish green	0	38		

**Highly significant

Table 2: Inter group comparison according to colour change

A comparison of numerical values between the genders was done. There was a stastistically non significant difference seen for the value between the gender (P>0.05) thus indicating that gender did not have an influence on the outcome of variable. Similarly, non significant correlations were seen with age, indicating that age also did not have an influence on the outcome variable.

DISCUSSION

A Caries activity tests are useful in establishing the risk for incidence of caries and for targeting specific preventive measures to the susceptible groups. They are even more useful in situations of limited resource availability. Saliva serves as a major component in most caries activity tests, and aids in the categorization of patients into high, medium and low caries activity.[9]

Studies carried out by Ferraro et al revealed females were more prone to caries when compared to males. The possible reason for this disparity was postulated to be multi‑factorial. It was considered that males express a greater amount of amelogenin which contributes to the strength of the tooth, hence less caries. Salivary IgA, a protective immunoglobulin found in the oral cavity which acts as a protective mechanism against caries was detected in low concentration in women saliva. Moreover, pregnancy also has negative effects on salivary flow, impairing the protective washing and buffering mechanisms of saliva against caries development. [10] The findings of these studies were not in concordance with ours, as we observed a male predilection. On the other hand, Psoter et al suggested that supra and sub gingival biofilms in adolescents and both the gender was in equal proportion, thus showing no difference between the two genders.[11]

In our study, the mean DMFT index was found to be 6.30± 1.850. Based on the DMFT index an intergroup comparison of variables was carried out, which showed statistically significant value. A study carried out by Kunte et al showed similar result, where the DMFT index co-related well with the existing caries status of the individuals.[12] In a study carried out by Ramesh et al, comparison was done between the DMFT indices of the patient with the pH values at 24, 48, and 72 hours which showed statistically significant difference. [13]

In our study, it was found that with increase in the DMFT index, the pH value of saliva decreased. This finding was in accordance with Shetty et al.[14] In our study changes in the colour of the Snyder solution was recorded at 24,48 and 72 hours, and subjected to statistical analysis. There was statistically significant difference seen for the frequencies of various types of colour at 48 and 72 hours between the DMFT sub groups 1 and 2 with lower frequency for yellowish green in subgroup 1 while higher of yellowish green in subgroup 2 at 48 hours. The change in the colour of the solution was recorded in relation to the change in the pH of the solution.

In our study, DMFT index was co-related with gender and numerical value of pH, but a statistically non significant difference was seen indicating that gender did not have an influence on the pH changes. Similar study was carried out by Lorne et al and they showed similar finding.[15] This finding was in contrary to the results of an Australian study of preschool children that found males to have higher caries rate than females.[16] A bivariate correlation of age with DMFT and pH at various time intervals was done, which also showed statistically non significant co-relations, indicating that age did not have an influence on the outcome variables. This finding was in contrary to the findings of Lorne et al, where they stated that caries is age related. They found significantly higher caries rate in 5 year old children than in 3 year olds.[15]

CONCLUSION

Dental caries is a disease with multi-factorial etiology which begins with the loss of ions from the apatite crystals and leads to cavitations. Caries activity tests are valuable adjunct for patient motivation in plaque control program. In our study, Snyder test was performed and it was found to be a simple and an inexpensive method for assessment of caries activity. We observed a close relationship between DMFT index and salivary pH value which could be suggestive of increased risk of dental caries within an acidic environment.

REFERENCES

1. Wang X. Genetic and environmental factors associated with dental caries in children: The Iowa Fluoride Study. Caries Res 2012; 46(3): 177–184.

2. Sanghi DK, Tiwle R. A comprehensive review of dental caries. JIPBS 2015;2(4):369-77.

3. Sheiham A. Dental caries affects body weight, growth and quality of life in pre-school children. Br Dent J 2006; 201:625-6.

4. Bradshaw DJ, Marsh PD, Watson GK, Allison C. Role of Fusobacterium nucleatum and coaggregation in anaerobe survival in planktonic and biofilm oral microbial communities during aeration. Infect Immun 1998;66(10):4729-32.

5. Al-Shahrani MA. Microbiology of Dental Caries: A Literature Review. Ann Med Health Sci Res 2019;9:655-9

6. Wyne AH, Guile EE. Caries activity indicators : A review. Indian J Dent Res 1993;4:39-46.

7. Snyder ML. Colorimetric method for estimation of the relative number of lactobacilli in saliva. J Dent Res 1940;19:349-55.

8. Patalay A, Shubhada C, Nadiger SL. Oratest: A simple, chair-side caries activity test. J Indian Soc Pedod Prev Dent. 1996;14:6–9.

9. Guo L, Shi W. Salivary Biomarkers for Caries Risk Assessment. J Calif

Dent Assoc 2013; 41(2):107–18.

10. Ferraro M, Vieira AR. Explaining gender differences in caries: A multifactorial approach to a multifactorial disease. Hindawi Publishing Corporation International Journal of Dentistry Volume 2010, Article ID 649643, 5 pages doi:10.1155/2010/649643.

11. Psoter WJ, Ge Y, Russell SL, Chen Z, Katz RV, Jean-Charles G, Li Y. PCR detection of Streptococcus mutans and Aggregatibacter actinomycetemcomitans in dental plaque samples from Haitian adolescents. Clin Oral Investig. 2011 Aug;15(4):461-9.

12. Kunte SS, Chaudhary S, Singh A, Chaudhary M. Evaluation and co-relation of the oratest, colorimetric Snyder test and Salivary Streptococcus mutans count in children of age group of 6-8 years. J Int Soc Prev Community Dent 2013;3(2):59-66.

13. Ramesh K, Kunjappan S, Ramesh M, Shankar S, Reddy S. Comparative evaluation of predictive value of three caries activity test-snyder, lactobacillus count and cariostat in mixed dentition children with and without caries. J Pharm Bioallied Sci 2013;5(1):1-9.

14. Shetty C, Hegde MN, Devadiga D. Correlation with dental caries and salivary flow, PH and Buffering capacity in adult south Indian population - An in vivo study. Int J Res Ayurveda Pharm 2013;4(2):219-23.

15. Koroluk L, Hoover JN, Komiyama K. The sensitivity and specificity of a colorimetric microbiological caries activity test (Cariostat) in preschool children. Pediatr Dent 1994;16(4):276-81.

16. Lukacs JR, Largaespada LL. Explaining Sex Differences in Dental Caries Prevalence: Saliva, Hormones, and Life-History Etiologies. AM J HUM BIOL 2006,18(4):540-55.

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ANTICIPATORY GUIDANCE

Abstract

Anticipatory Guidance is the process of providing practical, developmentally-appropriate information about children's health to prepare parents for the significant physical, emotional, and psychological milestones. Anticipatory guidance is valuable, because it emphasizes prevention of dental problems rather than surgical or restorative care. Recent evidence suggests that the use of Xylitol chewing gum (4 pieces per day by the mother) had a significant impact on decreasing the child's caries rate. Child's early development integral components are speech and language. Abnormal delay in speech and language production can be recognized early and referral can be made to address these concerns. Pain, infection, and tooth fracture to life-threatening conditions of bleeding, edema, and airway obstruction complications can range from Intraoral/perioral piercings. Piercings are most commonly observed in the teen-aged pediatric dental patients.

Key words: Oral hygiene, Delay of colonization, perioral piercing.

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INTRODUCTION

Anticipatory Guidance is defined as counselling of parents, patients and developmental changes that will occur in interval between health supervision visits that includes information about daily care taking specific to the upcoming interval.[1]. It provides a framework for prevention that goes beyond caries to address all aspects of children's oral health.[2]

It forces interaction by requiring the clinician to seek information about child's development from the parent and by directing the clinician to develop individualised plans or strategies.[3] Anticipatory guidance during the first 2 years of life decrease the number of hospitalizations among poor children irrespective of race and health status. Oral health anticipatory guidance can reduce dental expenditures.[4]

Anticipatory guidance for parents and caregivers include the following:

1. ORAL HYGIENE

BIRTH TO 12 MONTHS

- Before eruption of the first tooth good dental habit should begin. After feeding, gently brush the baby's gums using water on a baby toothbrush or wipe them with a clean cloth. Infant's teeth cleansing as soon as they erupt with either a washcloth or soft brush will help reduce bacterial colonization. The use of dental floss is important to reduce interproximal caries.

- Ask about fluoride: After the first tooth appears, ask your paediatric dentist if your baby is getting enough fluoride.

- Schedule a regular dental check-up.[5]

12 TO 24 MONTHS

- Brush the child's teeth 2 times a day using water on a baby toothbrush that has soft bristles. After breakfast and before bed are the best time.

- Limit juices or other sugar containing drinks. Make sure the child doesn't drink more than 1 small cup of juice each day and only at mealtimes.

- Consult with your paediatric dentist about sucking habits. Sucking too strongly on a pacifier, a thumb, or fingers can affect the maxilla-facial growth pattern.

- Schedule a regular dental check-up.

24 MONTHS AND ABOVE

- Help the child brush the teeth 2 times a day, themselves. There are brushes designed to address the different needs of children at all ages, ensuring selection of a toothbrush that is appropriate for the child.

- If child doesn't want his/her teeth to be brushed, turning brushing into a game may help. Teaching the child a proper oral care at a young age is an investment in his or her health that will pay lifelong dividends. One can start by setting an example like taking good care of their own teeth which sends a message that oral health is something of great value. Brushing along with your child or letting them choose their own toothbrush, encourages proper oral care.

- By raising oral health awareness, the prevention, early detection, and management of dental, oral and craniofacial tissues can become integrated into healthcare, community based programs, and social services. It's especially important that the child brush his or her teeth before going to bed at night. The eight to 10 hours the child is asleep gives bacteria lots of time to feast on food particles left on the teeth and produce decay. The flow of saliva which washes off the food debris, is also reduced while sleeping, which makes it more important to clean teeth at bed time.

- Use fluoridated toothpaste: Start using fluoride containing toothpaste, which helps prevent cavities. Teach the child not to swallow it. A _smear' or _rice-size' amount of fluoridated toothpaste (approximately 0.1 mg fluoride) should be used for children less than three years of age. A _pea-size' amount of fluoridated toothpaste (approximately 0.25 mg fluoride) is appropriate for children aged three to six.[6,7]

- Floss: Begin flossing the child's teeth as soon as the two teeth touch or come in contact. But not all children need their teeth flossed at this age, so check with the paediatric dentist first.

- Schedule a regular dental check-up.

Following simple steps can be of great help to care-providers:

1. Brush twice a day with a fluoride containing toothpaste.

2. Floss daily to remove plaque from between your teeth and under the gum line, before it can harden into tartar. Tartar formation can only be removed by professional cleaning.

3. Eat balanced diet that limits starchy or sugary foods, which produce plaque acids that leads to tooth decay. When you do eat these foods, try to eat them with your meal instead of as a snack- the extra saliva produced during a meal helps rinse food from the teeth.

4. Use dental products containing fluoride, including toothpaste.

5. Make sure that your children's drinking water is fluoridated. Dentist or paediatrician may prescribe daily fluoride supplements, if the water supply, municipal and bottle does not contain fluoride.

6. Talk With Your Paediatrician About Making a Dental Home: Establishment of a dental home by 12 months of age allows the institution of individualized caries-preventive strategies, including dietary recommendations and appropriate oral hygiene instruction, as the primary teeth begin to erupt.[5,8]

FLOSSING

Flossing helps prevent cavities by removing plaque and food particles caught between teeth. When your child is about two and a half years old, flossing can be done daily and at a minimum twice a week. Children should be able to floss their own teeth by the time they are 9 years old. Place them in your lap facing you and floss younger children's teeth. The technique is the same, no matter who is doing it.[5]

Move the floss between the teeth, and gently take it up and down, against the surfaces of each tooth. Do not snap the floss down between the teeth as the floss may cut into the gum and cause bleeding. After flossing, rinse with water, then brush. Floss holders can be purchased that make flossing easier for some children.[9]

2. DIET

Integral part of anticipatory guidance during the infant oral health visit is diet counselling. Similar to dietary instructions for children of all ages, the primary emphasis is on sugar intake frequency. There are, however, other infant-specific dietary issues that must also be addressed during the infant oral health visit.[10] Human breast milk is uniquely superior in providing the best possible nutrition to infants and has not been epidemiologically associated with caries.[11,12,13]Breastfeeding greater than or equal to seven times daily after 12 months of age is associated with increased risk for ECC.[14]

During the first year of life breast-feeding should be promoted, although ad libitum nocturnal breast-feeding should be discouraged as the first primary tooth erupts. Bottle-fed infants should not be put to sleep with the bottle. Weaning from the breast or the bottle should be encouraged by 12 to 14 months of age. 6 months older infants with exposure to less than 0.3 ppm fluoride in their drinking water need dietary fluoride supplements of 0.25 mg fluoride per day. Fruit juice 4 to 6 oz should be consumed by infants per day. Infants should not be given powdered beverages or soda pop, as these drinks pose increased risk for dental caries. Iron-fortified infant cereals, along with breast milk or infant formula, should be consumed by infants who are at least 6 months of age. In the first year of life cow's milk should be completely avoided and restricted to less than 24 oz per day in the second year of life. Parents should be cautioned regarding the potential of various foods to constitute a choking hazard for infants.[10]

Important components of dietary education for the parents include the caries potential of their diet, cariogenicity of certain foods and beverages, role of frequency of consumption of these substances, and demineralization and remineralization process. After the eruption of the first primary teeth, ECC prevention is possible by restricting bottle/breast-feeding to normal meal times and not allowing the infant to feed ad libitum or while sleeping. The parent's understanding of the cariogenicity of certain foods can help the infant and child eliminate or reduce their caries levels.[15]

In 12 months of age caries-conducive dietary practices appear to be established, and are maintained throughout early childhood. Dietary practices, including prolonged and/or frequent bottle or training cup with sugar-containing drinks and frequent between-meal consumption of sugar-containing snacks or drinks (eg, juice, formula, soda), increase the risk of caries. The role of carbohydrates in caries initiation is unequivocal. Acids in carbonated beverages and sports drinks can have a deleterious effect (ie, erosion) on enamel.

Excessive consumption of carbohydrates, fats, and sodium leads to poor systemic health. Dietary analysis and the role of dietary choices on oral health, mal-nutrition, and obesity should be addressed through nutritional and preventive oral health counseling at periodic visits. The US Department of Agriculture's Food Plate and Center for Disease Control and Prevention/National Center for Health Statistics' Growth Charts provide guidance for parents and their children and promote better understanding of the relationship between healthy diet and development.[2]

3. FLUORIDE

Using a fluoridated toothpaste approved by the American Dental Association and rinsing every night with an alcohol-free, over-the-counter mouth rinse containing 0.05% sodium fluoride have been suggested to help reduce plaque levels and help enamel remineralization. Optimal exposure of teeth to fluoride is manadatory to all dentate infants and children but should use with caution as indicated in fluoride-containing products. Administration of additional fluoride should be decided on the basis of the unique needs of each patient.[15]

No more than a _smear‘ or _rice-sized‘ amount of fluoridated toothpaste should be used for children under age three; no more than a _pea-sized‘ amount should be used for children ages three to six. High risk caries patients should be considered for professionally-applied topical fluoride, such as fluoride varnish. Similarly children who drink fluoride deficient water (less then 0.06ppm) along with all other dietary source of fluoride, should be administered with systemically-administered fluorides. Fluorosis has been associated with cumulative fluoride intake during enamel development.16

Fluoride varnish is a protective coating that is painted on a chil‘‘s teeth to prevent cavities and remineralize early decayed lesions. The five percent sodium fluoride varnish may be painted on the teeth at least 1 to 2 times each year. The number of times depends on risk factors and if the child has cavities.[17]

4. CARIES REMOVAL

Diagnosis of oral disease or trauma should be done by the health care providers carefully. Either they should provide appropriate therapy or should refer the patient to an appropriately-trained individual for the treatment as Immediate intervention is necessary to prevent further dental destruction, as well as reduce the widespread health problems. Postponed treatment can result in exacerbated problems that may lead to the need for more extensive care.[2] Routine professional dental care for the parents can help keep their oral health in optimal condition. Removal of active caries and subsequent restoration are important to minimize infecting the infant with the parents' oral flora.[15]

The risk of pit and fissure caries in susceptible teeth can be reduced with the help of dental sealants and are cost-effective when maintained. Both primary and permanent teeth with deep pits and fissures that are predisposed to plaque retention are indicated for pits and fissure sealants. Deep pits and fissures are at maximum risk of so it should be sealed as soon as possible. Caries risk may increase at any time during a patient's life due to changes in habits (eg, dietary, home care), oral microflora, or physical condition therefore sealant application might benefit the sealed teeth. There-evaluation of the sealant placed should be reassessed at periodic preventive care appointments. Sealants should be monitored and repaired or replaced as needed.[2]

5. DELAY OF COLONIZATION

Human oral cavity consist of diverse microflora but caries results from an overgrowth of specific organisms that are part of normally occurring human oral cavity. Species that are principal indicator and are responsible of caries are *Streptococcus mutans* and *Lactobacillus.*Until the eruption of the primary dentition at approximately 6 to30 months of age, an infant is not colonized with normal oral flora since human oral flora is site specific.one of the most documented colonization of *S mutans is* vertical colonization which spreads from mother to infant and evidence suggests that genotype of s. mutans in 71% of infants and the corresponding mothers are identical. Furthermore, the average age of the acquisition of *S mutans* occurs at approximately 2 years.

The significance of this information totally depends on 3 points, First if the mother have high rate of caries then the children of the mother are at higher risk of caries since it usually are passed from generation to generation. Second, approximately 70% of carious lesions are found in 20% of our nation's children. Third, modification of the mother's oral flora at the time of the infant's colonization can impact significantly the child's caries rate. Therefore, an oral health risk assessment before 1 year of age can help the health care provider to identify high-risk patients and provide timely referral and intervention for the child. Early colonization of the oral flora in their infants can be prevented by educating the parents, especially mothers, on sharing utensils (eg, shared spoons, cleaning a dropped pacifier with their saliva), foods, and cups.[15]

6. XYLITOL CHEWING GUMS

Recent evidence suggests that the use of Xylitol chewing gum (4 pieces per day by the mother) had a significant impact on decreasing the child's caries rate.[15]

The products which readily provide Xylitol are available in forms of gums, mints, chewable tablets, lozenges, toothpastes, mouthwashes, cough mixtures, oral wipes, nutraceutical products.[18.29,20 .]

The oral bacteria are unable to metabolise the xylitol as well as the sugar alcohols and thus are considered non-cariogenic sugar substitutes.[21]

7. FACIAL TRAUMA

Psychological health of the child is greatly influenced by his or her appearance and facial trauma (e.g fractured, displaced, or lost teeth) can have significant negative functional, esthetic, and psychological effects. One of the most common causes of injuries to the permanent teeth are accidental fall followed by traffic accidents, violence and also sports injury. Dental injuries could have improved outcomes if the public awareness about the dental injuries, first-aid measures and the need to seek immediate treatment can help in the improved outcome of orofacial trauma. Practitioners should provide guidance regarding use of play objects, pacifiers, car seats, and electrical cords to avoid any unfortunate events.[2]

During the period when children start to walk, especially between the ages of 1 and 2 years, poor muscle coordination results in an increased risk of trauma.[22,23,24] Andreasen reported another peak in injury at age 4, when children's physical activity increases.[25] As motor coordination develops, the parent/patient should be counselled on additional safety and preventive measures, including use of athletic mouthguards for sporting activities.[2]

8. NONNUTRITIVE ORAL HABITS

Forces to teeth and dentoalveolar structures are applied by nonnutritive oral habits (eg, digital and pacifier habits, bruxism, abnormal tongue thrusts) Early use of pacifiers and digit sucking are considered normal, habits of sufficient frequency, intensity, and duration can contribute to deleterious changes in occlusion and facial development. Three years or younger children stop sucking habits if they have early dental visits School-aged children and adolescent patients, counseling is appropriate regarding any existing habits (eg, fingernail biting, clenching, bruxism).

9. SPEECH

Child's early development integral components are speech and language. Abnormal delay in speech and language production can be recognized early and referral can be made to address these concerns. Appliance therapy with a speech and language professional can assist in the timely treatment of speech disorders.

10. SMOKING

In adolescence smoking and smokeless tobacco use are initiated and established. Children may be exposed to other substances that negatively impact their health and well-being during this time period. Education should be provided regarding the serious health consequences of tobacco use and exposure to second hand smoke. Information regarding tobacco use and alcohol/drug abuse should be obtained confidentially from an adolescent patient.

11. INTRAORAL/PERIORAL PIERCINGS:

Pain, infection, and tooth fracture to life-threatening conditions of bleeding, edema, and airway obstruction complications can range from Intraoral/perioral piercings. Piercings are most commonly observed in the teen-aged pediatric dental patients. Education regarding pathologic conditions and sequelae associated with these piercings should be initiated for the preteen child/parent and reinforced during subsequent periodic visits.[2]

REFERENCE

1. Ivonne Ganem, dental care for infants, Crest® Oral-B® at dentalcare.com Continuing Education Course, Revised 2011 December 12: 1-12. (www.dentalcare.com/en-US/dental-education/continuing-education/ce387/ce387.aspx).

2. Guideline on periodicity of examination, preventive dental services, anticipatory guidance/ counseling, and oral treatment for infants, children, and adolescents. American Academy of Pediatric Dentistry.Pediatr Dent. 2013 Sep-Oct;35(5):E148-56.

3. Anticipatory Guidance in Pediatric Dentistry Sharma SA, Jayaprakash R, Rajasekharan S, Sharma SS. Journal of Dental and Medical Sciences 2014Dec;13(12):13-17.

4. Preventive oral health intervention for pediatricians. Section on Pediatric Dentistry and Oral Health. Pediatrics. 2008 Dec;122(6):1387-94.

5. Julka S, Pandey N , Essentials of oral hygiene measures for children and anticipatory guidance for the care providers , Annals of Dental Specialty , 2014 July – Sept;2(3):97-99.

6. Wright JT, Hanson N, Ristic H, Whall CW, Estrich CG, Zentz RR. Fluoride toothpaste efficacy and safety in children younger than 6 years. J Am Dent Assoc 2014; 145(2):182-9. 36.

7. American Dental Association Council on Scientific Affairs. Fluoride toothpaste use for young children. J Am Dent Assoc 2014;145(2):190-1.

8. American Academy of Pediatric Dentistry. Policy on the dental home. Pediatr Dent 2012;34(special issue):24-5.

9. Australian dental association, Oral hygiene for babies and toddlers; Australian Dental Association.

10. Nainar S.M, Mohummed S. Diet counseling during the infant oral health visit. Pediatr Dent. 2004 Sep-Oct;26(5):459-62.

11. Erickson PR, Mazhari E. Investigation of the role of human breast milk in caries development. Pediatr Dent 1999;21(2):86-90.

12. Iida H, Auinger P, Billings RJ, Weitzman M. Association between infant breastfeeding and early childhood caries in the United States. Pediatrics 2007;120(4):e944-52.

13. Mohebbi SZ, Virtanen JI, Vahid-Golpayegani M, Vehkalahti MM. Feeding habits as determinants of early childhood caries in a population where prolonged breastfeeding is the norm. Community Dent Oral Epidemiol 2008;36(4):363-9.

14. Feldens CA, Giugliani ER, Vigo Á, Vítolo MR. Early feeding practices and severe early childhood caries in four-year-old children from southern Brazil: A birth cohort study. Caries Res 2010;44(5):445-52. Epub 2010 Sep 13.

15. Clinical guideline on infant oral health care.American Academy of Pediatric Dentistry.Pediatr Dent. 2004;26(7 Suppl):67-70.

16. American Academy of Pediatric Dentistry. Clinical Affairs Committee--Infant Oral Health Subcommittee. Pediatr Dent. 2014;36(6):141-45.

17. Oral Screening Guidelines for Child Health Clinics, Developed by the Saskatchewan Dental Public Health Network in collaboration with the Ministry of Health May 2015.

18. Ly KA, Milgrom P, Rothen M. Xylitol, sweeteners, and dental caries. Pediatr Dent 2006;28(2):154-63.Discussion 192-8.

19. Lynch H, Milgrom P. Xylitol and dental caries: An overview for clinicians. J Calif Dent Assoc 2003;31:205-9.

20. Zhan L, Cheng J, Chang P, et al. Effects of xylitol wipes on cariogenic bacteria and caries in young children. J Dent Res 2012;91(7 Suppl):85S-90S.

21. Scheinin A, Mäkinen KK, Ylitalo K. Turku sugar studies. V. Final report on the effect of sucrose, fructose and xylitol diets on caries incidence in man. Acta Odontol Scand 1976;34(4):179-216

22. Glendor U, Andersson L. Public health aspects of oral diseases and disorders: dental trauma. In: Pine C, Harris R, editors. Community oral health. Quintessence publishing; London: 2007. pp. 203–214.

23. Cunha RF, Pugliesi DM, Mello Vieira AE. Oral trauma in Brazilian patients aged 0–3 years. Dent Traumatol. 2001;17:210–212.

24. Llarena del Rosario ME, Acosta AV, Garcia-Godoy F. Traumatic injuries to primary teeth in Mexico City children. Endod Dent Traumatol. 1992;8:213–214.

25. Andreasen JO, Andreasen FM, Andersson L. Textbook and color atlas of traumatic injuries to the teeth.4th edn. Oxford: Blackwell Munksgaard; 2007.

Journal of Oral and Dental Health

RECENT ADVANCEMENT OF PULP CAPPING AGENTS – A REVIEW

Abstract

Pulp capping agents are applied in dental restorations to protect the dental pulp from dying, after being exposed or nearly exposed due to a mechanical exposure. The aim of this article is to discuss about the newer and different pulp capping agents applied for protection of the dentine-pulp complex.

Keywords: Dental caries, Pulp capping agent, Reparative dentin, Dentin bridge

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INTRODUCTION

Preservation of the integrity of primary dentition is the most important aspect of paediatric dentistry. Nothing is more valuable than preservation of the primary tooth, which reflects the general health of the child patients. Dental caries is the most common cause for the premature loss of primary teeth[1]. The purpose of deciduous tooth pulp therapy is to preserve it until their natural exfoliation as it is essential for the proper growth of facio-skeletal complex. Pulp tissue is constantly subjected to environmental impact. Pulp cells have the intrinsic capacity to repair, differentiate into odontoblasts and produce different dentin matrix proteins during wound healing [2]. Pulp capping is a technique applied in dental restorations to protect the dental pulp from dying, after being exposed, or nearly exposed during a cavity preparation. Pulp capping materials are used in order to induce formation of reparative dentin. Recently there are various pulp capping materials with it's own properties. The main goal of pulp capping materials is to induce formation of hard tissue by the pulp cells [3]. The objectives of the treatment are formation of dentin bridges to wall off outside stimulation and preservation of healthy pulp tissue [4].

Dentin bridge forming pulp capping agents:

1. Calcium Hydroxide
2. Propolis
3. Biodentine (Bioactive Molecules)
4. Mineral Trioxide Aggregate
5. Bonding agents
6. Laser

1. CALCIUM HYDROXIDE:

Calcium hydroxide is capable of stimulating the formation of tertiary dentin by the pulp cells because it release hydroxyl (OH) and calcium (Ca) ions upon dissolution [5,6]. It also has antibacterial properties[7]. Therefore, it is known as the "gold standard" material for direct pulp capping [8]. It is causes dentin demineralization by activating the enzyme ATPase. Tunnel defect is more common in calcium hydroxide where tunnels are formed in reparative dentin however the quality of reparative dentin improves as the bridge gets thicker.

Advantages- stimulates reparative dentin formation acts as a mechanical barrier when applied to dentin. High pH neutralizes acidity of silicate and zinc phosphate cements. Cytotoxicity is low in calcium hydroxide.

Disadvantages- highly soluble, lacks adhesion, it obliterates the pulp chamber due to high extensive dentin formation property gets easily degraded after acid etching. Risk of pulp inflammation is more in calcium hydroxide.

2.PROPOLIS:

It is a natural extract of honey bees from different kinds of plants which has high concentration of phenolic acids (antioxidant) Furthermore it has antimicrobial and anti-inflammatory properties [9]. The main ingredients in propolis are alcohols, aldehydes, aliphatic acids& esters, amino acids, ketons, sugars and other[10]. In Direct pulp capping propolis is used to induce formation of reparative dentin by decreasing the permeability of the dentin 11. ***Parolia A, et al.,*** compared propolis, MTA and Dycal histologically in human dental pulp and concluded that

Propolis and MTA showed similar bridge formation when compared to Dycal.

3.BIODENTINE (BIOACTIVE MOLECULES):

Biodentine is a biocompatible material with high bonding strength and better handling, which influences healing by promoting the proliferation, migration and adhesion of human dental pulp stem cells when it is used as pulp capping material in direct pulp capping.[12] In the few in vitro studies, Biodentine induced the differentiation of cultured pulp cells into odontoblast-like cells[13] and mineralized foci formation, which is similar to MTA and calcium hydroxide[14]. It is new bioactive cement having dentin-like mechanical properties. It can be used as a dentine substitute on crowns and roots. It stimulates tertiary dentin formation and has a positive effect on viable pulp tissue. Due to its improved material properties, it becomes an interesting alternative to conventional calcium hydroxide-based materials. It has capacity of tissue regeneration, mineralization and strong antibacterial action with excellent marginal adaptability. It is applied in the crown for temporary enamel restoration, permanent dentin restoration, apexification, pulpotomy and retrograde filling etc.

4. MINERAL TRIOXIDE AGGREGATE:

MTA was developed for use as dental root repair material by Md. Torabinejad in 1993. MTA has been emerging as a good direct pulp capping agent in recent years. MTA is mainly calcium oxide in the form of dicalcium silicate, tricalcium silicate, and tricalcium aluminate. Bismuth oxide is added for radiopacity. Basically calcium hydroxide is the combination of water and Mineral Trioxide Aggregate (MTA). However MTA is used more common next to calcium hydroxide due to its good compatibility, less pulpal inflammation, radiopacity and antibacterial property[15]. Moreover it releases bioactive dentin matrix proteins. It has more predictable hard tissue barrier formation compared to calcium hydroxide. A disadvantage is its high solubility similar to calcium hydroxide[16].

5.BONDING AGENTS:

Dentine bonding agents are resin materials applied to make a dental composite filling material adhere to both dentin and enamel. Bonding agents are also methacrylates with some volatile carrier and solvent like acetone. They may also contain diluent monomers. Dentine should be conditioned with polyacrylic acids to remove the smear layer for proper bonding of resin composite restoration, during mechanical treatment with dental bur, and expose some of the collagen network of dentin. Adhesive resin should create so-called hybrid layer. Modern dental bonding systems come as a “three-step system”, “two-step system” and a “one-step system” where, all the components are premixed and applied in a single application (seventh generation of bonding agents).

6.LASER:

Pulp capping therapy using lasers results in good prognosis for the tooth. Laser of different wavelengths is used. For Example, Er, Cr: YSGG lasers (2780 nm) and laser assisted technique using Erbium: YAG lasers (2940 nm).[17] In a study by JW Blanken [18] erbium laser produces minimal temperature increase because the tooth is air/water-cooled, while being bactericidal and hemostatic[19].Neodymium-doped yttrium-aluminum-garnet laser (1064nm) is infrared beam of therapeutic benefit for direct pulp capping .

CONCLUSION

Regular clinical and radiographic review following pulp capping in primary and permanent teeth is strongly recommended. However, proper case selection and a meticulous technique is paramount for successful outcome.

REFERENCE

1. N.Sue Seale.Vital PulpTherapy for the Primary Dentition A Peer-Reviewed Publication.

2. Chan C, Lan W, Chang M, Chen Y, Lan W, Chang H. Effects of TGFbetas on the growth, collagen synthesis and collagen lattice contraction of human dental pulp fibroblasts in vitro. Arch Oral Biol. 2005;50(5):469-79

3. Obeid M,Saber Sel D,Ismael Ael D,Hassanien E;Mesenchymal stem cells promote hard tissue repair after direct pulp capping – Journal Of Endododntics 2013;39(5):629-31.

4. Swarup SJ, Rao A, Boaz K, Srikant N, Shenoy R. Pulpal response to nano hydroxyapatite, mineral trioxide aggregate and calcium hydroxide when used as a direct pulp capping agent: an in vivo study. J Clin Pediatr Dent 2014; 38: 201-206.

5. Desai S, Chandler N. Calcium hydroxide-based root canal sealers: a review. Journal of Endodontics 2009; 39:415-22.
6. Mohammadi Z, Dummer PMH. Properties and applications of calcium hydroxide in endodontics and dental traumatology.International Endodontic Journal. 2011;40:697-730.

7. T. Matsuo, T. Nakanishi, H. Shimizu, and S. Ebisu. A clinical study of direct pulp capping applied to carious-exposed pulps. Journal of Endodontics.1996;22(10):551–556.

8. T. J.Hilton. Keys to clinical success with pulp capping: a review of the literature. Operative Dentistry 2009;34(5): 615–625.

9. Silva G, Lanza L, Lopes-Júnior N, Moreira A & Alves J (2006) Direct pulp capping with a dentin bonding system in human teeth: A clinical and histological evaluation *Operative Dentistry* 31(3) 297-307.
10. Pameijer C & Stanley H (1998) The disastrous effects of the Total Etch” technique in vial pulp capping in primates *American Journal of Dentistry* 11 S45-S54.

11. Demir T & Çehreli Z (2007) Clinical and radiographic evaluation of adhesive pulp capping in primary molars following hemostasis with 1.25% sodium hypochlorite: 2-year results *American Journal of Dentistry* 20 182-188

12. Stanley H (1998) Criteria for standardizing and increasing credibility of direct pulp capping studies *American Journal of Dentistry* 11(Spec No) S17-S34.

13. Stanley H (1989) Pulp capping: Conserving the dental pulp—can it be done? Is it worth it? *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics* 68 628-639.

14. de Sousa Costa C, Edwards C & Hanks C (2001) Cytotoxic effects of cleansing solutions recommended for chemical lavage of pulp exposures *American Journal of Dentistry* 14 25-30

15. Camilleri J, Montesin FE, Di Silvio L, Pitt Ford TR. The chemical constitution and biocompatibility of accelerated Portland cement for endodontic use. International Endodontics Journal 2005;38:834–842.

16. Islam I, Kheng Chng H, Jin Yap A. Comparison of the physical and mechanical properties of MTA and Portland cement. Journal of Endodontics 2006;32(3):193–197.

17. Asma Qureshi et al., Newer Pulpcapping Agents Journal of Clinical and Diagnostic Research. 2014;8(1): 316-321.

18. Blanken JW. Direct pulp capping using an Er,Cr:YSGG laser. Journal of Oral Laser Applications 2005; 5:107-114.

19. Murat Maden,Ekim Onur Orhan,Ihsan Fukran Ertugrul,Burcu Senguven. Journal of Stomatology 2014;4:14-21

Journal of Oral and Dental Health

INTER OCCLUSAL RECORD MATERIALS FOR PROSTHETIC REHABILITATION - A LITERATURE REVIEW

Abstract

To accomplish a good prosthesis it's critical to attain harmony between the maxillomandibular relationship and anatomy of patient. This relationship is not simple opening or closing, but a complex relationship which exists in 3 dimensions - vertical, anteroposterior, or mediolateral. Thus, it is essential to record this relationship with the smallest amount possible error to get a successful prosthesis. This article seeks to present a review of major bite registration materials and their modification as well as their advantages and disadvantages.

Keywords: *Interocclusal Recording Material, Occlusion, MMP*

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INTRODUCTION

The correct and precise mounting of casts in the articulator is necessary for favourable outcome of any prosthetic rehabilitating treatment[1], so an accurate transfer of the intraoral maxillomandibular relationship to the articulator is critical .When the teeth don't offer vertical and horizontal stability between the arches, an interocclusal record is needed to relate the casts.[2]Articulators have been made which approximate the patient's maxillomandibular relation and movements. This allow the dental practioner and technician to study the dentition in function and construct restorative appliances in the patient's absence.[3]Berman stated that the material used to record this maxillo-mandibular relationship was largely responsible for the accuracy of the record[4].Models cannot always be poured and mounted on the articulator the same day the impressions are made. Often impressions and bite registration are send to the technician. The impressions are then poured at his convenience and models are articulated.

Wear facets guide the dentist and technician to hand articulate models. This has proven to be accurate. However, if (1) the existing occlusion is not within physiologic limits, (2) posterior occlusal stops in the partially edentulous patient are absent, (3) the patient is edentulous, hand articulation is not possible. Some recording medium is necessary in such situation.[5]

Ideal Requirements of Interocclusal Bite Registration Materials[6-8,10-12]

1) Minimal dimensional change after setting and it should be rigid.

2) Limited resistance before setting-avoids displacement of teeth and mandible during closure.

3) Incisal and occlusal surface of the teeth should be accurately reproduced.

4) Handling and manipulation of material should be easy.

5) No adverse effects on the tissues involved in procedure.

6) Easy verification.

Types of Interocclusal Recording medium[11] Waxes, Plaster of Paris, Zinc oxide eugenol pastes, Acrylic resin, Polyether elastomers, Silicone elastomers

THERMOPLASTIC WAXES

The most commonly used material for interocclusal registration or as a carrier for registration are thermoplastic waxes. Although wax is perhaps the foremost maligned, it's yet the foremost versatile and widely accepted material. This is due to its cost and clinical flexibility of waxes that it can be corrected, modified, changed and verified with comparative ease[13] .Studies have demonstrated that wax as an interocclusal records material when put next to other materials are unstable, inaccurate, inconsistent, and at risk of distortion on removal from mouth. As a result they can interfere with passive and active mandibular movement. Vertical direction distortion more frequently seen than anteroposterior direction. Bite registrations are often made up of 28- gauge casting wax sheets or from hard baseplate wax, but waxes identified as bite waxes seem to be formulated from

beeswax or hydrocarbon waxes like paraffin or ceresin. Certain bite waxes contain aluminium or copper particles. There are not any ADA specifications for bite waxes.[4]

Handling Technique

Before preparing the abutment, a wax interocclusal centric relation record is made. After the preparation of abutment another interocclusal record is made by using ½ sheet of softened wax. The wax is molded into the form of the dental arch and is positioned on the teeth and also the patient is asked to close the jaws or, the mandible is guided into centric relation. Then patient is instructed to open and close the mouth several times. While the teeth are held together the wax is cooled with water then the patient is asked to open the mouth and wax is further cooled. Cool it for 2 minutes and now under tap water cool for 1 minute on removal of wax record from the mouth. The wax record is trimmed for possible interferences with the help of sharp blade by shaving the wax in order to prevent distortion and is returned to the mouth. There must be precise seating of record on teeth upon closure. The registration is compared with the record made before the abutment preparation. The wax record is kept on the opposing cast by storing in a cool place.[14]

PLASTER OF PARIS

Impression plaster is based on calcined calcium sulphate hemihydrate, which reacts with water to form a hard mass of calcium sulphate dihydrate. 0.3-0.6% expansion is seen with this setting reaction. When expansion is within the confines of an impression tray, it causes significant reduction in accuracy. It may be reduced by mixing the plaster with anti-expansion solution (containing 4% potassium sulphate and 0.4% borax). The potassium sulphate reduces expansion to 0.05%, but this also accelerates the setting reaction, and borax is added as a retarder, which gives more time to take the impression.

Records of impression plaster are accurate, rigid after setting, and don't distort with extended storage. Studies show that the plaster records, along with a few others showed the least 3 dimensional changes after ½ hour of storage and remained dimensionally stable for more than 24 hours.[15] However, the use of plaster is more complicated than wax or zinc oxide eugenol paste. It is difficult to handle because the material is fluid and unmanageable before setting. The final inter occlusal record is brittle.

Handling Technique

Impression plaster is applied over the top of the recording plate and the patient is asked to close in centric relation[16]. A rectangular contact area in plaster remains after the impression plaster on the adjacent teeth is cut away. Undercuts due to adverse tooth contours are reduced to assure removal of the plaster without chipping or cracking the record. Right angle cuts are made on buccal and lingual /palatal indices of the teeth adjacent to the copings. The interocclusal record and the buccal and lingual

/palatal indices are removed and are reassembled. The dies are positioned in the record and a master cast is poured.[17]

ZINC OXIDE EUGENOL PASTE

Zinc oxide Eugenol paste is- effective and reliable interocclusal registration material. It's simple to use, sufficiently rigid and easy to store. It has various advantages namely[11]

1) Fluidity before setting –To ensures minimal interference with mandibular closure during record making procedures with an interocclusal registration material the critical quality is its fluidity.
2) Adhesion to its carrier.
3) Rigidity and inelasticity after final set.
4) Accuracy in recording occlusal and incisal surfaces of the teeth.
5) High degree of repeatability.

However, it dehydrates and becomes significantly brittle so it can sticks to the teeth and important portions of the record may be lost due to breakage. Certain studies don't recommend the use of zinc oxide eugenol paste as it is extremely variable with lengthy setting time and can result in open cast relationship.

Handling Technique

A frame is used to carry the paste into position between the teeth. Sufficient paste is mixed - cover both sides of the gauze, register half of the length of the abutments and at least one adjacent tooth. The frame is placed distal to the last tooth to prevent impingement upon the metal of the frame[13]. The patient is instructed to close in centric relation. After the paste is set the record is removed from mouth and then subsequently interocclusal record is removed from the frame and is used for mounting the cast.

ACRYLIC RESIN

The fabrication of single stop centric occlusion records is the most common application of acrylic resin for interocclusal record. It is supplied in powder and liquid form.[18]

Composition

Powder - Polymer – Polymethyl methacrylate, benzyl peroxide.
Liquid - Monomer – Methyl methacrylate
- Tertiary amine – Dimethyl Para toluidine

It is accurate and rigid after setting. It has Initial hardening time is ½ hour. The dimensional instability is because of continued polymerization shrinkage, rigidity of the material which can damage plaster cast and dies during mounting on the articulator.

Handling Technique

Apply petroleum jelly over occlusal surfaces of teeth. Measure monomer and polymer according to manufacturer's recommendations wait until dough stage is reached. Form dough patty into a flattened shape - 2mm thick. Keep it over occlusal surfaces of teeth. Patient is asked to occlude while guiding the mandible to centric position. Wait for final set according to manufacturer's instructions. Trim the excess and recheck the record.[19]

POLYETHER ELASTOMERS

Polyether interocclusal registration materials are supplied as two paste systems containing plasticizer such as glycol ether or phthalate and filler such as colloidal silica. The advantages of this material as an interoclussal record material such as accuracy, stability after polymerization and during storage, fluidity and minimal resistance to closure, can be used without carrier[20]. Disadvantage- resiliency and accuracy may exceed the accuracy of plaster casts. Both of these factors can interfere with the placement of the plaster cast into the recording medium during mounting procedures.[21]

Handling Technique

Place the material over the occlusal surface of teeth. Ask patient to occlude and guide the mandible to centric, wait for final set according to manufacturer's instructions. Trim the excess and recheck the record.[22]

SILICONE ELASTOMERS

2 types of elastomers are available as interocclusal registration materials namely addition silicone and condensation silicone.

1. Addition silicone

Composition:

Base Paste - Polymethyl hydrogen siloxane, Siloxane prepolymers, Fillers

Catalyst Paste -Divinyl polydimethyl siloxane, Siloxane pre polymers, Fillers .

Hybrid silicone must be present in base paste if the catalyst paste contains platinum salt activator. Retarders may also be present in the paste that contains catalyst.

2. Condensation silicone Composition:

Base paste- Tetraethyl orthosilicate

Catalyst paste -Stannus acetate

By product of condensation setting reaction- Ethyl alcohol. Its subsequent evaporation probably accounts for much of the contraction that takes place in a set silicone.

Addition silicone has gained acceptance because it's more stable than condensation silicone.

They are highly accurate, and were found to be dimensionally stable over a period of 48hrs. The other advantage are minimal resistance to closure and doesn't require a carrier. However the disadvantages are minimum working time, resistance to compression of a set material which contributes to difficulty in the seating of plaster casts.

Handling Technique

Take equal amount of base paste and catalyst paste and mix as per manufacturer's instructions obtaining a streak free mixture. Load the syringe by maintaining a slight angle while scraping the pad. Place the material over the occlusal surface of teeth. Ask patient to occlude and guide the mandible to centric, wait for final set according to manufacturer's instructions. Trim the excess and recheck the record.[23]

CONCLUSION

It is mandatory that the diagnostic casts and the final casts are placed in an articulator in approximately the same relationship to the TMJ as it exists in the patient to properly evaluate a patient's occlusion and to build up an artificial dynamic occlusal scheme. The placement of indirectly fabricated prostheses in the patient's mouth with no occlusal adjustment can be achieved by ideal material-technique combination for making interocclusal records and hence it plays a major role in the success of the rehabilitative procedures in terms of function and esthetics.

REFERENCE

1. Thota KK, Jasthi S, Ravuri R, Tella S. A comparative evaluation of the dimensional stability of three different elastomeric impression materials after autoclaving–an invitro study. *Journal of clinical and diagnostic research*: *JCDR.* 2014 Oct;8(10):ZC48.

2. Ghazal M, Kern M. Mounting casts on an articulator using interocclusal records. *Journal of Prosthetic Dentistry*. 2008;100(5):408-9.

3. Harcourt JK. Accuracy in registration and transfer of prosthetic records. *Australian dental journal*. 1974;19(3):182-90.

4. Berman MH. Accurate interocclusal records. *Journal of Prosthetic Dentistry*. 1960;10(4):620-30.

5. Strohaver RA. A comparison of articulator mountings made with centric relation and myocentric position records. *Journal of Prosthetic Dentistry*. 1972;28(4):379-90.

6. Michalakis KX, Pissiotis A, Anastasiadou V, Kapori D. An experimental study on particular physical properties of several Interocclusal recording media. Part II: Linear Dimensional change. *J Prosthodont* 2004;13:150–159.

7. Anusavice: Philips science of Dental materials. Eleventhth edition. India: Saunders Publication; 2003.

8. Michalakis KX, Pissiotis A, Anastasiadou V, Kapori D. An Experimental Study on Particular Physical Properties of Several Interocclusal Recording Media. Part I: Consistency Prior to Setting. *J Prosthodont* 2004;13:42–46.

9. Freilich MA, Altieri JV, Wahle JJ. Principles for selecting Interocclusal records for articulation of dentate and partially dentate casts. *J Prosthet Dent* 1992;68:361–367.

10. Shanahan TEJ, Leff A: Interocclusal records. *J Prosthet Dent* 1960;10:842–848.

11. Harry S Accurate interocclusal records. *J prosthet Dent* 1969;21(2):154–165.8.

12. Lassila V Comparison of five interocclusal recording materials. *J Prosthet Dent* 1986;55(2):215–216.

13. Fattore L, Malone WF, Sandrik JL, Mazur B, Hart T. Clinical evaluation of the accuracy of interoccusal recording materials. *J Prosthet Dent* 1984;51:152- 157.

14. Philip Millstein, Joseph H. Kornman and R. Ernest Clark. – Determination of accuracy of waxinterocclusal registrations. J Prosthet Dent1973;29, 1.

15. Philip Millstein, R. Ernest Clark and Richard L. Mycrson. – Differential accuracy of silicone body interocclusal records and associated weight loss due to volatiles. Jprosthet Dent1975;33, 6.

16. Philip L. Millstein and R. Ernest Clark. –Differential accuracy of silicone body and self curing resin interocclusal records and associated weight loss.J Prosthet Dent1981;46, 4.

17. Philip L. Millstein and R. Ernest Clark –Determination of the accuracy of laminated wax interocclusal wafers. J Prosthet Dent1983;50, 3.

18. J. Muller, G. Gotz, W. Horz, E. Kraft. Study of the accuracy of different recording materials. J Prosthet Dent. 1990 Jan;63(1):41-46.

19. Baraban djestablishing centric relation and vertical dimension In occlusal rehabilitation. J Prosthet Dent 1962; 12:1157-1165.

20. Philip L. Millstein, Chii-Chih Hsu. Differential accuracy of elastomeric recording materials and associated weight change. J Prosthet Dent. 1994 April; 71(4):400-403.

21. Aris-petros Tripodakis, Vasilis k. Vergos, Andreas G. Tsoutsos. Evaluation of accuracy of interocclusal records in relation to two recording techniques. J Prosthet Dent. 1997 Feb; 77(2):141-146.

22. Sato Y, Hosokawa R, Tsuga K, Kubo T. Creating a vertical stop for interocclusal records. J Prosthet Dent 2000;83:582- 585.

23. Gerald j. Ziebert. Stabilized baseplate technique for interocclusal records. J Prosthet Dent. 1984 October;52(4):606- 608.

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BIOLOGICAL AND CLINICAL GUIDELINES OF PULP REVASCULARIZATION - A LITERATURE REVIEW

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Abstract

The discovery of pulp stem cells by Gronthos in 2000 highlighted a new therapeutic alternative to current endodontic treatments. Biology researchers have been able to develop dental revascularization protocols and have, in particular focused much attention on the revascularization of necrotic immature permanent teeth. The recent alternative treatment of necrotic immature teeth is revascularization rather than apexification. Revascularization has been established as an improved treatment of immature teeth with damaged pulp to preserve the potential of continual root growth in treated teeth.

KEYWORDS*:* Revascularization, stem cells, necrotic, immature

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INTRODUCTION

Two types of stem cells: embryonic stem cells and adult stem cells (or postnatal cells).[1]These cells are found in many sites of the dental element in the pulp, in the apical papilla, and in the periodontal ligament.[1,2] Pulp revascularization is dependent on the ability of residual pulp and apical and periodontal stem cells to diffrentiate.[3,4]

Revascularization allows the growth of root thus avoiding thin and fragile roots. It will reduce the risk of root fracture.[5] Management of immature necrotic permanent teeth with necrotic pulp still a challenge for the clinicians. It creates a situation where achieving the goals of conventional root canal treatment is not only difficult, but even when these are met, it leaves the root short, weak, and prone to fracture. Other alternative treatment can be, Calcium hydroxide & MTA apexification, but both doesn't result it continuous root development, and leading to high risk of root fracture.[6,7] The incidence of cervical root fractures was quite high in endodontically treated immature as compared to mature teeth (28%-77%) by Cvek.[8]

Iwaya et al in 2001 described a procedure, which they termed revascularization, that was undertaken on a necrotic immature mandibular second premolar with a chronic apical abscess. After 30 months they noted thickening of the root canal walls by mineralized tissue and continued root development.[9] Drugs required for root canal disinfection can be obtained from any pharmacy and introduced into the root canal by using readily available instruments.[10]

The new norm in regenerative endodontic practice with high success reported is root canal revascularization via blood clotting, although the conventional methods like partial pulpotomy, appexification and apexogenesis are not obsolete.[11]

The Dental Pulp

The pulp is a heterogeneous loose connective tissue, composed of different cell types and an extra-cellular matrix rich in collagen. [12]

The Dental Stem Cells

Pulpal stem cells have a high capacity for proliferation and differentiation They represent an important therapeutic interest in tissue regeneration.[13] The identification of these cells within the dental pulp has opened up new perspectives in dentistry. They could be used in the regeneration of the dentino-pulpal complex, the regeneration of the dental organ, and the pulp revascularization.[13,14] Stem cells mainly involved in regeneration work .

Dental pulp stem cells (DPSCS)

They were highlighted by Gronthos in 2000 from the cameral and root canal pulp of a 3rd molar.[15] Like bone marrow stem cells pulpal stem cells are large, with a big central nucleus and a large cytoplasm. Moreover, DPSCs have a 30% higher proliferation rate than bone marrow stem cells and a better growth potential. DPSCs can be reprogrammed in multiple cells such as:

odontoblasts, osteoblasts, chondrocytes, myocytes, neurocytes, adipocytes, and corneal cells. DPSCs express some markers that can be used to identify and locate these as CD44, CD146, 3G5 and integrin β.[16]

Stem-cell from human exfoliated deciduous teeth (SHED)

The second kind of stem cell, SHEDs are isolated from deciduous teeth. These could be an excellent source of stem cell banking.[17] Both SHEDs and DPSCs express dentine sialophosphoprotein (DSPP).[18] These cells have the potential to induce bone and dentine formation and differentiation into other non-dental mesenchymal cell derivatives *in vitro*.[19] They have greater proliferation rates than DPSCs.[20]

Stem cells of apical papilla (SCAP)

These mesenchymal stem cells have a high proliferation potential which makes them suitable for dental tissue regeneration and root formation. They have specific STRO-1 and CD24 markers.[13]

Periodental ligament stem cells (PDLSC)

The periodontal ligament contains a specific population of stem cells, called PDLSC (PerioDontal Ligament Stem Cell) which are mesenchymal stem cells the origin of its formation.

PULP REVASCULARIZATION

Regeneration of the dental organ is still being studied, but the use of pulp stem cells in pulp revascularization is a topical issue. Pulp revascularization is a regenerative treatment of necrotic immature teeth that involves inducing the formation of a blood clot within the previously disinfected canal, by involving the recruitment of stem cells from the apical region. The objective of this therapeutic approach is to regenerate tissue comparable to pulp tissue and to reactivate dentinogenesis which has become non-existent following the necrosis of pulp tissue and subsequently allows the development of the root.[21]

The indication for pulpal revascularization is currently limited to immature teeth, but this treatment has been successful in mature teeth.[22] From the tissue engineering perspective, pulp regeneration of mature teeth have the advantage of restoring the neurovascular system of the root canals, which provides the tooth with an immune system to defend against the microbial defiance.[23]

The problem of the revascularization of mature teeth is that they have fewer progenitor cells than immature teeth, a difficulty in inducing bleeding because of the closed apex, a difficulty in disinfecting the root canals; the closed apex of mature teeth gives less chance to stem cells to migrate to the canals. [23,24] Pulp revascularization of mature teeth is related to the amount of progenitor cells, it depend of the aging of the tooth.[25]

OPERATIVE PROTOCOL

Two pulp revascularization techniques are found in the literature: one using calcium dihydroxide and another using a triple antibiotic paste for disinfection of pulp necrosis. Both are two- step procedure. Second step takes place two or three weeks aftr the first, only if the tooth is asymptomatic and if there is a visual reducing of the apical lesion. In pulp revascularization, at three months postoperative, the tooth is normally asymptomatic and after nine months later X-ray radiography shows an increasing thickness of dentinal walls and an apical closure can be seen radiographically. Root development and apical closure may be visible after three months.

INTRACANAL MEDICAMENT

Calcium Hydroxide

Ca(OH) 2 which is established as a good root canal disinfectant and stimulant for tissue repair (apexification) at the apex of infected immature teeth .In a 20 tooth case series report by chen et al, highlighted the protocol of root canal copious irrigtation with NaOCl and aqueous Ca(OH)2 paste placed in the coronal half of the root canal.
Bose et al showed that by using a Ca(OH)2 paste in this manner, in time, dentinal wall thickness could be increased by 53.8%. This was significantly greater than the 3.3% increase achieved when the paste was placed apical to that point.26

Triple antibiotic paste

Triple antibiotic paste consisting mixture of ciprofloxacin, metronidazole and tetracycline has been used as an intracanal medicament in majority of cases for 3-4 weeks.27 Since tetracycline causes discolouration, and hence double antibiotic paste containing ciprofloxacin and metronidazole have also been used.10 Modified triple antibiotic paste containing ciprofloxacin, metronidazole and cefaclor have also been suggested by ruparel et al.28

GUIDELINES FOR REVASCULARIZATION PROCEDURE

First visit

- Informed consent
- Local anaesthesia & Rubber dam isolation.
- Instumentation – Minimal or no instrumentation.
- Irrigation – Irrigation using 20ml of 1.5% NaOCl and 17% of EDTA solution using Sidevented needle.
  Intracanal medicament –Triple antibiotic paste for 3-4 weeks.
- Temporary seal using Cavit G.

Second visit

- Local anaesthesia without vasoconstrictor & Rubber dam isolation
- Irrigation using 17% EDTA
- Initiation of bleeding by over instrumentation
- Scaffold - PRP or PRF or CGF
- Cervical barrier using MTA or Biodentine
- Double seal using Composite
- Follow up – 3,6,9,12,24 and 48 months.
  Failure – Apexification procedure using Calcium hydroxide or MTA

FACTORS INFLUENCING REVASCULARIZATION

Factors affecting revascularization are injury type, type of fracture, presenceof infection or necrosis, periodontal status,presence of periapical lesions,vitality status, age of patient and health status of patient..[11] Disinfective protocol and good coronal seal also influence revascularization.[29,30,31,32,33] In addition, it is the blood clot irrespective of scaffold that is very important for revascularization. [34] Some clinicians have recommend the use of an anesthetic without a vasoconstrictor when trying to induce bleeding. [33] Also, young patients have shown considerable degree of success rates when compared with older since the number of circulating stem cell concentrations in older patients might be lower. [35]

Merits of Revascularization

Root canal revascularization via blood clotting is an easy and simple clinical approach done with presently available materials and iunstruments[36] Continued progressive thickness of dentinal walls, root development., and positive response to thermal pulp testing. [31] Can be seen a comparative study between revascularization induced maturogenesis and conventional apexification found the former to be advantageous. [37]

Drawbacks of Revascularization

The reliance on patient's compliance to carry out the procedure in multiple visits and the lack of long term follow-up studies makes revascularization procedure a supplement but not a substitute to the already existing treatment protocols like apexogenesis, apexification, or partial pulpotomy.[11] Also, the concentration and composition of the progenitor/stem cells entrapped in the fibrin clot is unpredictable, particularly in older patients and may lead to disparity in the results.[35]

DISUSSION

The success of pulp revascularization mainly lies on three factors: like root canal disinfection, presence of scaffold (blood clot) and hermetic seal[2]. Cehreli et al studied, even if the number of cases is not sufficient to be statistically significant, it can be noticed that some patients have regained tooth sensitivity (vitality) after treatment. That was observed only in no instrumentation treatment cases.[39]

Regenerative endodontic techniques may enhance continued root development[40] and, therefore, offer an alternative approach to the management of traumatized immature permanent teeth with pulp necrosis and periradicular infection.[41,42] A growing body of evidence supports the possibility of residual viable pulpal tissue in the wide root canal or apical region of necrotic immature teeth, which may survive the infection and allow continued apical development.[43,44,45] Stem cells from the apical papilla may also survive infection, because of their proximity to the periapical tissues.[46,44,45] Following proper endodontic disinfection, these cells may differentiate under the influence of surviving epithelial cells of Hertwig's root sheath and initiate continued root development.[46,45]Once the regenerative process is induced, the presence of a wide apical foramen and root canal enhances the ingrowth of small blood vessels and regenerated tissues.[46]

CONCLUSION

Revascularization is considered as a reparative process rather than regenerative process.As the nature of tissue inside the pulp canal is not completely known or understood so it is better to do revascularization only when other conventional treatment procedure like apexification, apexogenesis and partial pulpotomy fails

REFERENCE

1. Zhang w and. Yelick P. C. Vital pulp therapy-current progress of dental pulp regeneration and revascularization. Int J Dent. 2010.

2. Vijayaraghavan R, Mathian VM, Sundaram AM, Karunakaran R, Vinodh S,Triple antibiotic paste in root canal therapy.J pharm bioallied sci 2012;4(2):230-33

3. Thomson A , Kahler B, Regenerative endodontics—biologically-based treatment for immature permanent teeth: a case report and review of the literature, Aust Dent J. 2010;55 (4):446–52.

4. Reynolds K , Johnson J. D , Cohenca N . Pulp revascularization of necrotic bilateral bicuspids using a modifid novel technique to eliminate potential coronal discolouration: a case report,Int Endod J. 2009;42(1):84– 92.

5. Nosrat A, Seifi A, Asgary S. Regenerative endodontic treatment (revascularization) for necrotic immature permanent molars: a review and report of two cases with a new biomaterial.J Endod. 2011;37(4):562–67.

6. Rafter M. Apexification: a review. Dent Traumatol. 2005;21:1-8.

7. Torabinejad M, Chivian N. Clinical applications of mineral trioxide aggregate. J Endod. 1999;25:197–205.

8. Cvek M. Prognosis of luxated non-vital maxillary incisors treated with calcium hydroxide and filled with gutta-percha: a retrospective clinical study. Endod Dent Traumatol. 1992;8:45–55.

9. Iwaya SI, Ikawa M, Kubota M. Revascularization of an immature permanent tooth with apical periodontitis and sinus tract. Dent Traumatol. 2001;17:185–87.

10. Thibodeau B, Trope M. Pulp revascularization of a necrotic infected immature permanent tooth: case report and review of the literature. Pediatr Dent. 2007;29:47–50.

11. Garcia-Godoy F, Murray PE. Recommendations for using regenerative endodontic procedures in permanent immature traumatized teeth. Dent Traumatol. 2012;28:33-41

12. Mjor IA, Sveen OB, Heyeraas KJ. pulp-dentine biology in restorative dentistry Part 1: normal structure and physiology. Quintessence Int Berl Ger. 2001;32:427-46

1 3. Prockop DJ, Gregory CA, Spees JL. One strategy for cell and gene therapy: Harnessing the power of adult stem cells to repair tissues Proc Natl Acad Sci. 2003; 1:11917-23.

14. Alrahabi MK, Ali MM. Root canal revascularization. Pak J Med Sci. 2017;31:426.

15. Gronthos S, Mankani M, Brahim J, Robey PG, Shi S. Postnatal human dental pulp stem cells (DPSCs) in vitro and in vivo. Proc Natl Acad Sci. 2001;97:13625-30.

16. Cordeiro MM, Dong Z, Kaneko T, Zhang Z, Shi S. Dental pulp engineered with stem cells from human exfoliated deciduous. J Endod. 2008;34:962-69.

17. Vakhrushev IV, Suzdaltseva YG, Burunova VV, Karalkin PA, Lupatov AY. Mesenchymal cells of the decidual tooth pulp: Cytophenotype and initial evaluation of possibility of their use in bone tissue engineering. Bull Exp Biol Med. 2010;149:161-166.

18. Botelho J, Cavacas MA, Machado V, Mendes JJ. Dental stem cells: Recent progresses in tissue engineering and regenerative medicine. Ann Med. 2017;49:644-51.
19. Miura M, Gronthos S, Zhao M, Lu B, Fisher LW. SHED: stem cells from human exfoliated deciduous teeth. Proc Natl Acad Sci. 2003;100:5807-12.

20. Abdullah MF, Ponnuraj KT, Mokhtar KI. DPSCs and SHED in tissue engineering and regenerative medicine. Open Stem Cell J. 2013;4:1-6.

21. Carmen L, Asunción M, Beatriz S, Rosa YV. ZGv in immature permanent teeth with necrotic pulp and apical pathology: Case series. Case Rep Dent. 2017.

22. Ghoddusi J, Forghani M, Parisay I. New approaches in vital pulp therapy in permanent teeth. Iran Endod J. 2014;9:15-22.

23. Komabayashi T, Zhu Q. innovative endodontic therapy for anti-inflammatory direct pulp capping of permanent teeth with a mature apex. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2010;109: 75-81.

24. Mahmoud SH, El-Negoly SA, Zaen El-Din AM, El-Zekrid MH, Grawish LM. Biodentine versus mineral trioxide aggregate as a direct pulp capping material for human mature permanent teeth: A systemic review. J Conserv Dent JCD. 2018;21:466-73.

25. Kahler B, Chugal N, Lin LM. Alkaline materials and regenerative endodontics: A review. Materials (Basel). 2017;10:1389.

26. Bose R, Nummikoski P, Hargreaves K. A retrospective evaluation of radiographic outcomes in immature teeth with necrotic root canal systems treated with regenerative endodontic procedures. J Enod. 2009;35(10):1343-1349.

27. Banchs F, Trope M. Revascularization of immature permanent teeth with apical periodontitis: new treatment protocol? J Endod. 2004;30:196-200.

28. Ruparel NB, Ruparel FB, Hargreaves KM. Effect of intracanal medicament on stem cells from apical papilla. J Endod. 2012;38(10):13-57.

29. Rule DC, Winter GB. Root growth and apical repair subsequent to pulpal necrosis in children. Br Dent J. 1966;120:586-90.

30. Iwaya SI, Ikawa M, Kubota M. Revascularization of an immature permanent tooth with apical periodontitis and sinus tract. Dent Traumatol. 2001;17:185-7.

31. Banchs F, Trope M. Revascularization of immature permanent teeth with apical periodontitis: New treatment protocol? J Endod. 2004;30:196-200.

32. Chen MY, Chen KL, Chen CA, Tayebaty F, Rosenberg PA, Lin LM et al. Responses of immature permanent teeth with infected necrotic pulp tissue and apical periodontitis/abscess to revascularization procedures. Int Endod J. 2012;45:294-305.

33. Petrino JA, Boda KK, Shambarger S, Bowles WR, McClanahan SB. Challenges in regenerative endodontics: A case series. J Endod. 2010;36:536-41.

34. Thibodeau B, Teixeira F, Yamauchi M, Caplan DJ, Trope M. Pulp revascularization of immature dog teeth with apical periodontitis. J Endod. 2007;33:680-9.

35. Amler MH. The age factor in human extraction woundhealing. J Oral Surg.1977;35:193-7.

36. Murray PE, Garcia-Godoy F, Hargreaves KM. Regenerative endodontics: A review of current status and a call for action. J Endod. 2007;33:377-90.

37. Aggarwal V, Miglani S, Singla M. Conventional apexification and revascularization induced maturogenesis of two non-vital, immature teeth in same patient: 24 months follow up of a case. J Conserv Dent. 2012;15:68-72.

38. Hoshino E , Takushige T. LSTR 3Mix-MP method-better and effient clinical procedures of lesion sterilization and tissue repair (LSTR) therapy. Dent Rev. 1998;666:57–106.

39. Hoshino E, Kurihara-Ando N, Sato I. In-vitro antibacterial susceptibility of bacteria taken from infected root dentine to a mixture of ciproflxacin, metronidazole and minocycline . International Endodontic Journal. 1996;29(2):125–130.

40. Murray PE, Garcia-Godoy F, Hargreaves KM. Regenerative endodontics: a review of current status and a call for action. J Endod. 2007;33(4):377-90.

41. Cotti E, Mereu M, Lusso D. Regenerative treatment of an immature, traumatized tooth with apical periodontitis: report of a case. J Endod. 2008;34(5):611-6.

42. Petrino JA, Boda KK, Shambarger S, Bowles WR, McClanahan SB. Challenges in regenerative endodontics: a case series. J Endod.2010;36(3):536-41.

43. Jung IY, Lee SJ, Hargreaves KM. Biologically based treatment of immature permanent teeth with pulpal necrosis: a case series. J Endod. 2008;34(7):876-87.

44. Sonoyama W, Liu Y, Yamaza T, Tuan RS, Wang S, Shi S et al. Characterization of the apical papilla and its residing stem cells from human immature permanent teeth: a pilot study. J Endod. 2008;34(2):166-71.

45. Huang GT, Sonoyama W, Liu Y, Liu H, Wang S, Shi S et al.The hidden treasure in apical papilla: the potential role in pulp/dentin regeneration and bioroot engineering. J Endod. 2008;34(6):645–51.

46. Chueh LH, Ho YC, Kuo TC, Lai WH, Chen YH, Chiang CP et al . Regenerative endodontic treatment for necrotic immature permanentteeth". J Endod. 2009;35(2):160-4.

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REVIEW OF MULTI AVULSION MEDIA

Abstract

Avulsion is a common type of injury damaging the periodontal ligament, pulp and the alveolar bone. Avulsed permanent teeth can survive following replantation. Periodontal ligament (PL) cells are required for healing of avulsed teeth following treatment. However, the long-term fate of replanted teeth is unpredictable; it is dependent on various factors, such as the time interval between avulsion and replantation, extra-alveolar storage period, the vitality condition of pulp or periodontal tissues. To achieve good prognosis following treatment, use of an appropriate interim transport medium is advocated. The present review focus the various available storage media for avulsed teeth.

Keywords: Avulsion, Storage media, Trauma

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INTRODUCTION

Trauma to the teeth can result in crown or root fractures, luxation injuries or avulsion. Avulsion is the complete displacement of tooth from the socket. It is a complex injury affecting the pulp, periodontal ligament and the alveolar bone. However, post- traumatic tooth avulsions constitute 0.5%–16% of all traumatic injuries of permanent anterior teeth.[1] The ideal situation is to replant an exarticulated tooth immediately after avulsion because the extraoral time is a determining factor fort successful treatment and for a good prognosis. However, it is not always feasible to replant the tooth immediately that may be due to several factors like; the person's conscious state, lack of first aid knowledge, informed consent issue at the scene of accident. Thus, extra oral time interval always exist for replantation before patient reaches to dental office. This leads to desiccation of the root surface, increasing the risk of loss of vitality of the periodontal ligament (PDL) cell.[2] When immediate replantation is not possible, the tooth should be stored in an appropriate transport media to maintain viability. The suitable use of storage media is an main factor affecting the prognosis of avulsed teeth following replantation. Storage media should produce conditions that nearly match the original alveolar socket environment. A storage medium is physiological solution that closely replicates the oral environment to help preserve the vitality of PDL cells following avulsion.[3]

Ideal Requirement for a Storage Medium

An ideal storage media should have osmolarity and pH closer to physiological condition to maintain the viability of PDL cells. It should not produce any antigen- antibody reaction. It should be readily available at the site of accident so that the tooth can be immediately placed into it. It should have a longer shelf life. It should have anti-inflammatory and antimicrobial properties, which reduces inflammation and replacement resorption. It should have an antioxidant property which will protect the cells from oxygen radical- mediated damage.[4]

VARIOUS TYPES OF STORAGE MEDIA USED FOR AVULSED TEETH

There are many solutions that have been proposed and/or tested as storage media for avulsed teeth. The following were identified and reviewed as a result of the literature search: Hank's balanced salt solution (HBSS), Eagle's medium (EM), milk, ViaSpan, Gatorade, propolis, tooth rescue box (Dentosafe), conditioned medium, contact lens solution, tap water, egg white, saliva, normal saline, ORS, and coconut water.[5] The search for a single, ideal storage medium, i.e, capable of maintaining PDL and pulp cell viability, while presenting clonogenic capacity, antioxidant property, no or minimal microbial contamination, compatible physiological pH and osmolality, high availability, ready

accessibility, and low cost is one of the main interests of dental trauma research.

TAP WATER

Tap water is an unacceptable storage media for avulsed teeth due to the least desirable results as it has bacterial contamination, hypotonicity, and non-physiological pH of 7.4–7.79 and osmolality of 30 mOsmol Kg.[6]

SALINE SOLUTION

Normal saline is a solution of 0.90% w/v of NaCl and osmolality of 280 mOsm/kg and despite being compatible to the cells of the PDL, it lacks essential nutrients, such as magnesium, calcium, and glucose, which are fundamental to the normal metabolic needs of the cells of the PDL.[7] Moreira-Neto et al and Pileggi et al evaluated the viability of cultured cells and found 55% of living cells after 4 hours storage and 20% of mortality of cells after 45 minutes storage.[8] Hence, normal saline appears to be suitable for short-term storage of avulsed teeth for about 2 hours, however, it is potentially damaging if the cells are stored for longer than this. Consequently, saline is not an adequate medium, however, it may be employed for short period of time, although, other storage media are not immediately available and when required for a short period of time.[7]

Saliva

Saliva is a readily available, natural storage medium. Despite this fact, due to the presence of substances like enzymes and bacteria and its non-physiologic osmolarity, which can exert harmful effects on the PDL cells, this can at best be used as an interim storage medium (no longer than 30 minutes).[9]

MILK

Due to its physiologic osmolarity and nutritive value, milk is considered an acceptable interim transport medium for the avulsed teeth. Its clinical efficacy is considered equivalent to HBSS for maintaining the vitality of the PDL cells of an avulsed tooth for an extended period of time (up to 6 h).[10] Marino et al.[11] conducted a study to determine the ability of long shelf life milk to serve as a temporary storage medium for the maintenance of PDL cells viability on avulsed teeth, which shows that low-fat content in milk and chilled milk had shown better results in maintaining the viability of PDL for a longer time of period. However, the main drawback is the presence of antigens that may interfere with the reattachment process.

HANK'S BALANCED SALT SOLUTION

HBSS is considered as the gold standard and is often used as a comparison reference medium to deduce the clinical efficacy of other media. It is a sterile, physiologically balanced isotonic salt solution. The American Academy of Endodontics has accepted HBSS as an acceptable medium for avulsed teeth because of its capability to maintain vitality and proliferative capacity of PDL for an extended period of time (up to 48 hours).[9] It is superior to other media in preserving the vitality and viability of PDL cell and has shown the highest mitogenicity for PDL cells after eight hours and 24 hours.10 It contains the sodium chloride, D-glucose, potassium, calcium chloride, and magnesium sulfate anhydrous. Its both pH (7.4) and osmolarity (280 mOsmol/kg) are ideal.[12]

COCONUT WATER

Coconut water is a biologically pure, sterile and natural isotonic fluid that is mainly available in tropical countries. It is rich in amino acids, proteins, vitamins and minerals and thus is readily consumed to replenish lost body fluids, electrolytes and sugars. Coconut water as a promising medium for avulsed teeth and has shown it to be superior to HBSS and milk in maintaining the viability of PDL cells.[13] The activity of coconut water is concentration dependent Coconut water that is 100% concentrated is more effective storage media than coconut water that is 50% diluted. Coconut water from mature fruits performs better than from young fruits.[14]

VIASPAN

The ViaSpan is a cold transplant organ storage medium and it has been very effective for storing avulsed teeth. It has an osmolality of 320 mOsm/kg and its pH is around 7.4 at room temperature, which is ideal for the cellular growth.[15] Generally, ViaspanR is considered as a medium close to ideal, but the limited access to it, especially at the moment of the accident, makes it difficult to use.[11]

EAGLE'S MEDIUM

Eagle's Medium composition is L-Glutamine, Penicillin, Streptomycin, Nystatin and calf serum .[16] Eagle's medium has relatively high viability, mitogenic and clonogenic capacity up to 8 hours of storage at 4◦C. Eagle's medium is less effective than milk or Hank's balancedsaltsolutionwhenstoragetime24hrs.

GATORADE

Gatorade is a brand of sports-themed food and beverage products manufactured by PepsiCo and distributed in over 80 countries it consist of a mixture of water, sodium, sugar, potassium, phosphate, and lemon juice. As for osmolality, because of Gatorade is hypertonic, it can make cells lose water. Gatorade preserves more viable cells than tap water but fewer than all other media, both at room temperature and on ice.[17]

EGG ALBUMIN

Egg albumin is considered as a good choice because of its high protein content, vitamins, water, lack of microbial contamination and easy accessibility. It has better cell viability and higher incident of PDL healing as compared to milk. It is observed to be an excellent medium for up to ten hours with the principle advantage being its availability.[18]

GREEN TEA EXTRACT

Green tea extract (GTE) have significantly anti-inflammatory, antibacterial effects. Hwang and Park investigated the efficacy of GTE as a storage medium for avulsed teeth and found that there was no difference in the PDL cell viability between GTE and HBSS medium, whereas GTE showed higher viability than milk, water, and commercial green tea. Therefore, GTE could be a suitable alternative storage medium for avulsed teeth.[19]

EMDOGAIN (ENAMEL MATRIX DERIVATIVE, EMD)

Emdogain is extracted from developing embryonic enamel of porcine origin and contains matrix proteins. Studies have shown that it can influence the migration, attachment, proliferative capacity and biosynthetic activity of PDL cells.[20] It has also been used in antiresorptive-regenerative therapy along with topical glucocorticoids and systemic doxycycline. Thus, it is a recommended therapeutic agent for the management of avulsed permanent teeth.[21]

TOOTH RESCUE BOX

Dentosafe (Miradent, Germany) is the commercial name of a tooth rescue box containing special cell culture medium which is a combination of amino acid, vitamins, and glucose. It has demonstrated the maintenance of vitality of PDL cells for 48 h at room temperature. If unopened, this medium has a shelf life of 3 years. The use of this system is self-explanatory and simple to understand for layperson.[22] Avulsed teeth can be stored in the tooth rescue box for a longer duration, and its early availability can result in an excellent healing prognosis after replantation.[23]

CONTACT LENS SOLUTIONS

They are comprised of a fatty acid monoester and a cationic antimicrobial component. Subsequent studies showed that the solutions for keeping contact lenses were worse than saline solution, milk, and HBSS. The presence of preservatives in its formula was harmful to the cells of the PDL and therefore, they are not recommended.[15]

PROPOLIS

Propolis is good storage medium for the maintenance of cellular viability of the PDL of avulsed teeth. Propolis is a sticky resin that seeps from the buds or bark of trees, chiefly conifers. It consists of the following components: Resin (rich in flavonoids) (45–55%), waxes and fatty acids (23–35%), essential oils (10%), pollen proteins (5%), and other organic compounds and minerals. Propolis has antiseptic, antibiotic, antibacterial, antifungal, antiviral, antioxidant, anticarcinogenic, antithrombotic, and immunomodulatory properties. It can be considered as a favorable storing medium as it maintains cellular viability of the PDL, besides being antimicrobiotic, anti-inflammatory, and antioxidant.[24]

CONCLUSION

The success of dental reimplantation depends on the existence of viable cells on the periodontal ligament, which are able to proliferate on the reimplantations taking place within up to 30 minutes or transporting the tooth in an adequate storage medium for dental reimplantation. However, appropriate storage media can help in maintaining the viability of PDL cells and can lead to successful replantation of avulsed teeth. None of the storage media fulfill the ideal properties completely. All storage media have been shown to lose their clinical efficacy with time. So HBSS as the most optimal transport medium for avulsed teeth, followed by milk. However, a variety of new media like propolis, tender coconut water, milk and egg albumin have also been proposed as potential alternatives to HBSS. The natural products can act as appropriate storage media because of their cost-effectiveness and potential to maintain the viability of PDL cells for longer durations. In addition, the natural products are easily available at the site of injury which can enhance the prognosis of avulsed tooth and reimplantation.

REFERENCE

1. Andreasen JO. Etiology and pathogenesis of traumaticdental injuries. A clinical study of 1298 cases. Scand J Dent Res 1970; 78:329–42.

2. Treatment of non-vital permanent incisors with calcium hydroxide. III. Variation of occurrence of ankylosis of reimplanted teeth with duration of extra-alveolar period and storage environment. Odontol Revy, 1974; 25: 43-56.

3. Leeelavathi L, Karthick R, Leena SS, Aravindha BN. Avulsed tooth – A review. J Biomed Pharmacol 2016;9:847-50.

4. Navin HK, Veena A, Rakeshv CB, Prasanna KB. Advances in storage media for avulsed tooth: A review. Int J Pre Clin Dent Res 2015;2:41-7.

5. Udoye CI, Jafarzadeh H, Abbott PV. Transport media for avulsed teeth: a review. Aust Endod J 2012 Dec; 38(3):129-136.

6. Mackie IC, Worthington HV. An investigation of replantation of traumatically avulsed permanent incisor teeth. Br Dent J 1992;172:17-20.

7. Bazmi BA, Singh AK, Kar S, Mubtasum H. Storage media for avulsed tooth – a review. Ind J Multidis Dent 2013;3(3): 741-749.

8. Blomlof L, Otteskog P, Hammarstrom L. Effect of storage in media with different ion strengths and osmolalities on human periodontal ligament cells. Scand J Dent Res. 1981;89:180-187

9. Ashkenazi M, Marouni M, Sarnat H. In vitro viability, mitogenic and clonogenic capacities of periodontal ligament cells after storage in six different media. Endod Dent Traumatol 1999;15:149-56.

10. Marino TG, Liewehr FR, Mailhot JM, Buxton TB, Runner RR, McPherson JC, et al. Determination of periodontal ligament cell viability in long shelf-life milk. J Endod 2000;26:699-702.

11. Schjott M, Andreasen JO. Emdogain Does not prevent progressive root resorption after replantation of avulsed teeth: A clinical study. Dent Traumatol 2005;21:46-50.

12. Gopikrishna V, Thomas T, Kandaswamy D. A quantitative analysis of coconut water: a new storage media for avulsed teeth. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008; 105: 61-65.

13. Souza BD, Lukemeyer DD, Reyes-Harmona JF, Fellip WT, Simoes CM, Fellipe MC. Viability of human periodontal ligament fibroblast in milk, Hank's balanced salt solution and coconut water as storage media. Int Endod J 2011;44:111-5.

14. Franklin S. Weine. Endodontic Therapy. 6th edition. St Louis: C) V. Mosby Company. 2004.

15. Goswami M, Chaitra TR, Chaudhary S, Manuja N, Sinha A. Strategies for periodontal ligament cell viability: an overview. J Conserv Dent, 2011; 14: 215-220.

16. Sigalas E, Regan JD, Kramer PR, Witherspoon DE, Opperman LA. Survival of human periodontal ligament cells in media proposed for transport of avulsed teeth.Dent Traumatol 2004;20:21-2.

17. Khademi A A, Saei S, Mohajeri M R et al. A new storage medium for an avulsed tooth. J Contemp Dent Pract 2008; 9: 25-32.

18. Malhotra N. Current developments in interim transport storage media in dentistry: an update. Br Dent J 2011Jul 8; 211(1):29-33.

19. Sculean A, Schwarz F, Becker J, Brecx M. The application of an enamel matrix derivative (Emdogain) in regenerative periodontal therapy: a review. Med Princ Pract 2007; 16: 167–180.

20. Wiegand A, Attin T. Efficacy of enamel matrix derivative (Emdogain) in treatment of replanted teeth - a systematic review based on animal studies. Dent Traumatol 2008; 24: 498–502.

21. Pohl Y, Filippi A, Kirschner H. Result after replantation of avulsed permanent teeth. Periodontal healing and the role of

physiologic storage and antiresorptive-regenerative therapy. Dent Traumatol 2005;21:93-101.

22. Filippi C, Krischner H, Filippi A, Pohl Y. Practicability of a tooth rescue concept- the use of a tooth rescue box. Dent Traumatol 2008;24:422-9.

23. Martin MP, Pileggi R. A quantitative analysis of Propolis: a promising new storage media following avulsion. Dent Traumatol 2004 Apr;20(2):85-89.

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THE ERA OF NANOTECHNOLOGY - A REVIEW ARTICLE

Abstract

Our expedition to create new technology and escalating demand for advances in diagnosing and treating modalities has led to the initiation of nanotechnology. Nanotechnology is the branch dealing with the biological, chemical and physical properties of various structures at nanoscale size. Using this technology, developments will take place in health, material sciences and biotechnology. In dentistry, Nanotechnology is becoming the most accepted area of doing research. This review article describes the essential concept of nanomaterials, recent innovations and their use in restorative dentistry. Nanotechnology is the prospect of dentistry, and with their advances there are ample of hopes placed in improving the health of dental patients.

Keywords: Nanotechnology, Nanomaterials, Nanofillers.

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INTRODUCTION

The term 'Nano' originates from a Greek word meaning "dwarf".[1]
It deals with manipulation of materials at nanoscale.[2,3]

The budding interest in this field is giving emergence to new field called Nanodentistry, which uses nanoscale structured materials for diagnosing and prevention of diseases which improvises human health. The nanodentistry works by making microsized nanorobots which uses definite mechanisms of motility to crawl in the course of human tissue with utmost accuracy, obtain energy and influence their environment, attain protected cytopenetration. They use mass techniques to observe, disrupt or modify nerve impulse passage in individual nerve cells.[4] We have therapeutic nanomaterials as shown in Fig 1.

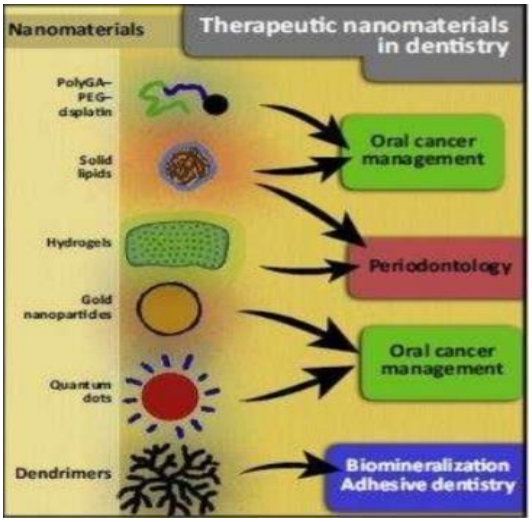

Fig 1

Nanotechnology will offer us the skill to organize atoms as we wish for and next to achieve valuable control of the organization of material.[5] Nanotechnology creates functional substances by domineering molecules on a separate basis. Nanoparticles have certain unique features, that their size is less significant than the crucial lengths which defines many physical events.[6] It is used in dentistry in various branches as shown in Fig 2.

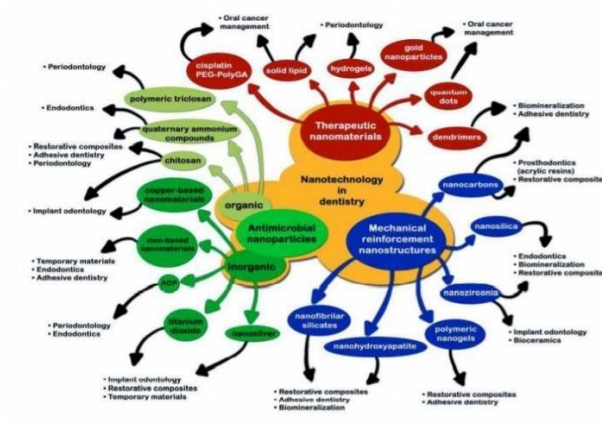

Fig 2

Approaches in nanotechnology:

Bottom-up approach: It arranges minor components into further intricate assemblies.[7] (Fig 3)

Top- Down approach: It produces minor components by using big ones in achieving exactness in structure and assembly.[7] (Fig 3)

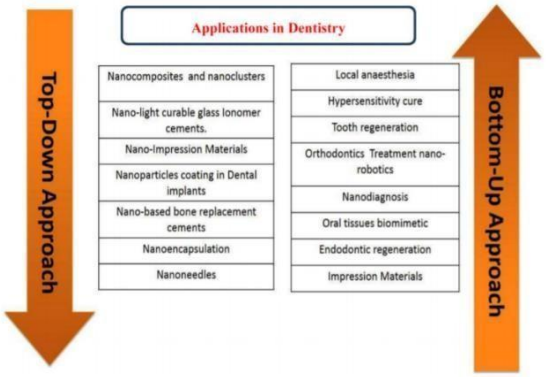

Fig 3

Functional approach: It seeks to develop components of a required functionality without considering their structure or assembly.[8]

Biomimetic Approach: It applies biomolecules for application in nanotechnology.[8]

Speculative approach: This approach gives more stress on societal involvement rather how these approaches could be created.[9]

VARIOUS USES OF NANOTECHNOLOGY:

I. OPERATIVE DENTISTRY:

1. Nanocomposites: They consist of Nanomeric and Nanoclusters fillers . Nanomeric fillers are monodispersive and nonaggregated.

It's Advantages:

- Superb properties of hardness and strength.
- Higher property of esthetics.
- Inferior polymerization shrinkage.
- Fine handling properties which allows most favorable placement and contouring.[10]

2. Nanobond: It is a nano particle toughened bonding system. It is prepared from the nano solutions containing similar nanoparticles. The nanofiller particles provide higher bond strength as they do not bunch and are even.[11]

3. Nanoionomer: These are the glass ionomer cement with bonded nanofiller properties which are enhanced via combining fluoroaluminosilicate glass and nanofiller clusters. The filler components improves the properties of the toughenedrestorative. When exposed to a topical fluoride source , it shows elevated fluoride release that is rechargeable. Moreover, the in vitro tests concluded that after acid exposure, the nano ionomer had the capability to form a caries inhibition zone . Clinical indications: Class I, III, V restorations, core build-ups and sandwich restorations. Advantages: splendid polish, exceptional wear resistance and esthetics.[12]

4. Nano - ceramic technology: These consist of a polysiloxane backbone. Inorganic part consists of methacrylic and siloxane whereas organic part consists of resin matrix which is mixed with particles. Their high-quality resistance to microcracks is due to the reinforcement effect of particles of nanoceramic. The propagating cracks are engaged by particles of nanoceramic.[13]

5. Impression Materials with nanotechnology: In this the nanofillers are entirely mixed with the material, ensuing a distinctive addition siloxane for impressions which has a improved flow, enhanced hydrophilic properties and superior precision. Nanostructure increases the fluidity of material, particularly under pressure.[14]

6. Local Anesthesia: In this there is a colloidal suspension containing millions of micrometre sized dental nanorobots. Within 100 seconds these nanorobots enters holes of dentinal tubules and then advance in the direction of pulp. Once it gets installed it closes down every kind of sensation in tooth which requires management. As the treatment gets completed, nanorobots are ordered to reinstate every sensation to renounce the power of nerve traffic.[3]

7. Pit & fissure sealants: These sealants mark an excellent resistance to wear and decreased contraction, reasonable ability of sealing and easy placement. It may lead to remineralization due to increased fluoride release.[15]

8. Hypersensitivity cure: These biological materials manufactured can particularly occlude dentinal tubules and thus providing fast and permanent cure for hypersensitivity. This alleviates anxiety and related pain within fraction of time after the application. These dental nanorobots occludes particular tubules within minutes, giving rapid and permanent cure to the patients.[3]

9. Nanorobotic dentifrice (dentifrobots): These are presented in mouthwash or toothpaste form. So when they make contact with with the surface of tooth, they spool above supra and subgingival surfaces, which causes removal of debris and organic matter.[3]

10. Nano reminerializing agent: Calcium Nanophosphate paste is used for bleached enamel. The crystals present in the paste forms "reservoir-like" deposit which helps in maintaining a state of supersaturation with the minerals present in enamel.[16]

11. Nanotech floss: The floss is ultra-thin, ultra-glide, entirely non-shredding with excellent tensile strength. The unique nano-structure allows addition of flavours and delivery of medications.[9]

12. Nanozone: This ozone based therapy provides powerful ozone. In sufficient amount it allows elimination of bacteria, that causes dental caries.[17]

13. Nanotechnology microscope: New generation of microscopes with deep probe detectors is becoming available. These probes the human body and reveals the out of sight matter. It is branded as Tera hertz radiation. This region in spectrum is present between the radio and light waves. These spot cavities in teeth.[18]

II. ENDODONTICS:

1. Antimicrobial agents containing nanoparticles: Nanoparticulates present with elevated antibacterial action. These have maximum surface density with charge, causing communication with the cell of bacteria. They disinfect and enhances antibacterial action of intra canal medicaments. Due to their antimicrobial property they are used for wound healing and treating biofilms. They remove non adherent and adherent bacteria and thus improves disinfection of root canal. Considerable antibacterial effectiveness is there against E. faecalis. For final rinsing of root canal, Nano care plus is used which has bacteriostatic effect. The nanoparticulates gets into the fissures and dental ducts due to their low surface tension. So as a result, there remain no chances for growth and development of bacteria after treatment.[19]

2. Nanotechnology based bone replacement materials: These generate "smart" materialswhich helps in restoring and regenerating tissues in the bone. Calcium together with phosphate materials bear superior properties, enhanced flow and blends with bone of the host. The grafts are osteo inductive, totally synthetic and porous. There are various hydroxyapatite nanoparticles which treats defects of bone. Also used in maxillofacial injuries which require grafts of bone, in cleft cases, surgeries in endodontics and in periodontal surgeries related to osseous defect.[9]

3. Nanotechnology based endodontic sealer: The most up-to-date development is endodontic sealer which is based on nanotechnology. These sealers reduces the infection by actively sealing the minute gaps. The sealer contains nanoparticles of calcium phosphate hydroxyapatite ranging from sizes 40-60nm. These rod shaped particles penetrate tubules of dentine, enters into accessory canals. It makes sure that all the places are successfully sealed.[20]

4. Nanotech Endo: This endodontic irrigation system is based on nanotechnology which is used in RCT procedure to clean the root canals. It ensures maximum safety and eliminates the disadvantages of traditional syringe. No manpower is required while operating this apparatus. This also prevents accidental outflow of fluids into oral cavity and past the apex of root.[17]

5. Nano tweezers and Nano needles: Nano tweezers will put together cell surgery achievable in the upcoming time and nano needles have been developed which are made up of stainless steel. These have blending of properties of austenitic and low alloyed ferritic steel.[21]

6. Nanotechnology based root end sealant: These provide greater bond strength and have good adaptability to the structure of tooth in comparison to conventional root end filling materials. These materials considerably reduces microleakage, seals the root end effectively, penetrate tubules of dentine and thus provides supplementary 'nano retention'.[22]

7. Nano-Brush: A novel applicator brush. It has the usual framework for entering into the root canal. It helps to eliminate pulp from the root chamber, cleans the debris and application of restorative materials against the inner surfaces of canal. It helps in deeper infiltration of sealers into tubules of dentine.[23]

8. Nanometric bioactive glass: By decreasing glass particle size and increasing surface area, antimicrobial efficacy is increased and thus can be used as dentin disinfectant.[24]

CHALLENGES TO OVERCOME:

Nanotechnology has enormous prospective to fetch benefits and sounds very promising to society over a wide array of applications, but still it faces many major challenges regarding certain issues:

1. Engineering challenges
   - Possibility of mass production technique.
   - Expenses for Fabrication upto the Delivery.
   - Manipulating the actions of various microscale robots concurrently.
   - Defined placing and assemblage of molecules.
   - Reasonably priced production techniques.

2. Natural challenges
   - Making biological friendly nanotechnology based material is not easy.
   - Biocompatibility of material.

3. Social challenges
   - Ethics
   - Acceptability by public
   - Safety of human beings

4. Environmental challenges
   - Modification by temperature
   - Modification by pH.[21]

CONCLUSION

The outlying prospective of nanotechnology is coming out to be significant and most stirring areas in science . The upcoming time holds an epoch where actions will take place by by means of nanotechnology materials which will encourage the idea of minimal invasive dentistry. Best possible use of nanotechnology will ease improvements in dentistry. Therefore with utmost care these advances should come up in a very safe manner.

REFERENCE

1. Drexler KE. Nanosystems: Molecular Machinery, Manufacturing and Computation. New York: John Wiley and Sons; 1992. p. 990-8.

2. Kaehler T. Nanotechnology: Basic concepts and definitions. Clin Chem 1994;40:17979.

3. Freitas RA Jr. Nanodentistry. J Am Dent Assoc 2000;131:1559-65.

4. Chandra Mouli PE , Manoj Kumar S , P arthiban S. Nanotechnology in Dentistry - A Review ,Int J Bio & Med Res , 2012; 3(2): 1550-1553.

5. Rieth M. Nano-Engineering – Studies and Conclusions Nano-Engineering in science and technology. 1st ed. Singapore: World Scientific Publishing Co. Ptc. Ltd; 2003. pp. 91–103.

6. Duke ES. Has dentistry moved into the nanotechnology era? Compend Contin Educ Dent. 2003;24:380–382.

7. Das S, Gates AJ, Abdu HA, Rose GS, Picconatto CA and Ellenbogen JC. "Designs for Ultra-Tiny,Special-Purpose Nanoelectronic Circuits". IEEE Transactions on Circuits and Systems I (11) 2007:2528-2540.

8. Rajan SS Rajan SS , Acharaya SR, Saraswathi V . Nanodentistry. Indian J.Sci.Res. 4(2) : 233-238, 2013.

9. Saravana KR, Vijayalakshmi R. Nanotechnology in dentistry. Indian J Dent Res 2006; 17:62-65.

10. Mitra SB, Wu D, Holmes BN. An application of nanotechnology in advanced dental materials. J Am Dent Assoc 2003; 134:1382-1390.

11. Khosla R. Nanotechnology in dentistry. Famdent Pract Dent Handb 2009; 9:69-84.

12. Madhurima M, Anitha S. Rao, Muralidhar T, Soujanya E. Nanodentistry: New buzz in dentistry. Eur J of Gen Dent 2013; 2:109-113.

13. S.S.Sasalawad, S.N.Naik, K.K.Shashibhushan, P.Poornima, Shivayogi M.H., N. M. Roshan. "Nanodentistry: The next big thing is small".IntJContempDentMedRev2014:1-6.

14. Patil M, Mehta DS, Guvva S. Future impact of nanotechnology on medicine and dentistry. J Indian Soc Periodontol 2008; 12:34-40.

15. Dwivedi S, Dwivedi CD, Chandra A, Sharma N. Nanotechnology - boon or bane for restorative dentistry; A Review. Int J Eng Sci Invent 2013; 2:1-5.

16. Galbiatti F, Lima V. Protective effect of calcium nanophosphate and CPPACP agents on enamel erosion. Braz.oral.res.2013; 27:463-470.

17. Nanotech Endo and Nanozon at IDS 2013 in Cologne.

18. Rajan MS. Nano: The Next Revolution. 1st ed. New Delhi: National Book Trust; 2011.

19. Shrestha A, Fong SW, Khoo BC, Kishen A. Delivery of antibacterial nanoparticles into dentinal tubules using high intensity focused ultrasound. J Endod 2009; 35:1028-1033.

20. Singh H, Markan S, Kaur M, Gupta G. "Endodontic Sealers": Current concepts and comparative analysis. Dent Open J. 2015;2(1): 32-37.

21. Chandki R, Kala M, N Kumar K, Brigit B, Banthia P, Banthia R.'Nanodentistry': Exploring the beauty of miniature. J Clin Exp Dent. 2012;4(2):e119-24.

22. Yuan Z, Peng B, Jiang H, Bian Z, Yan P. Effect of bioaggregate on Mineral associated Gene Expression in Osteoblast cells. J Endod 2010;36:1145-1148.

23. Denbur –Nano- Brush – Dentistry Today 2015.

24. Waltimo T, Brunner TJ, Vollenweider M, Stark WJ, Zehnder M. Antimicrobial effect of nanometric bioactive glass 45S5. J Dent Res.2007; 86:754-7.

Journal of Oral and Dental Health

SNEAK A "PEEK" INTO DENTISTRY: A REVIEW

Abstract

PEEK is a high-temperature thermoplastic, semi crystalline material with high melting temperature. The previous studies on properties of PEEK have revealed the superiority of PEEK material over the other materials and this made PEEK to be considered as a substitute for the other materials that are currently used in dentistry.

Even though greater advancements in dental materials have given dentistry most promising materials, yet each material remains short of being the ideal one. Oral conditions demand a material with good mechanical and biological properties in addition to aesthetics. At present polyether ether ketone (PEEK) is one such promising and viable material which due to its excellent properties, helps in restoring the lost orofacial tissues. The aim of this article is to review polyether ether ketone (PEEK), its significant properties and multiple dynamic uses in prosthodontics.

Keywords: PEEK, polyether ether ketone, aesthetics

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INTRODUCTION

Dental advancement is a ongoing continuous process that is happening around the world and to meet the development of technologies and advancement in dentistry, dental materials need to be improved. PEEK is one such available material that meet up all the possible requirements for a material to be useful one.
Polyetherethetketone (PEEK) is a synthetic, tooth coioured polymeric material that has been used as a biomaterial in orthopaedics for many years [1,2]. In Present world of aesthetics, metal free restorations are gaining popularity in medical and dental therapies. PEEK is one among the metal free restorations that has many potential uses in dentistry. Owing to its excellent properties, characteristics, it is gaining importance in oral implantology and prosthodontics [2]. PEEK based materials overcome the associated problems faced during titanium and its alloys use and thus can act as a viable substitute to titanium.
In the late 1990s, PEEK became an important high-performance thermoplastic candidate for replacing metal implant components, especially in orthopaedic and traumatic applications.

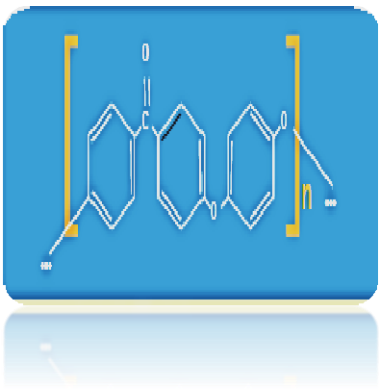
PEEK became an important high performance thermoplastic candidate for replacing metal implant components and being used in vertebral surgery as a material of the interbody fusion cage

PROPERTIES AND ADVENT OF PEEK:

PEEK is a semi-crystalline linear polycyclic aromatic thermoplastic material.

PEEK, a member of the poly-aryl-ether-ketone(PAEK) family, has an aromatic molecular backbone, with combinations of ketone and ether functional groups between the aryl rings.

This special chemical structure makes PEEK exhibit stable chemical and physical properties. In 1978 it was developed by a group of English scientists.



PEEK is a non allergic, white, radiolucent, rigid material which is resistant to most substances except concentrated sulfuric acid and wear resistance. It has low plaque affinity and great thermal stability upto 335.8◦c .young's elastic modulus and tensile properties are close to human bone, enamel and dentin3.

INDICATIONS:

1) As an implant material
2) As fixed partial denture material
3) As Removable partial denture material

1) As an implant material:

PEEK owing to resistance to degradation invivo, it was used as a biomaterial for long term dental implants (invibo Ltd, Thornton-cleveleys, UK).Since then PEEK has demonstrated to be a high performance thermoplastic polymer able to replace metallic implant components in the field of orthopadeics and traumatology[4]. PEEK implants has also been used in clavarial reconstruction[5].

Although the material of choice for endosseous implants is titanium and its alloys but due to its certain disadvantages like potential hypersensitivity to titanium and gradient difference between elastic modulus of titanium implant and bone, creates a need of another biocompatible material which will compensate the need for the same. Gradient difference in the modulus of elasticity between titanium implant and bone causes stress in implant bone interface during load transfer, which results in peri implant bone loss[6].

PEEK, substituted titanium as a biocompatible material for dental implants as its modulus of elasticity is closer to that of bone[7].So it provides a lesser stress shielding effect than titanium implants. In order to improve the mechanical and biological properties, a number of modifications have been attempted in PEEK materials.

a). Nano-structured PEEK surfaces
b). Bioactive PEEK nano- composites
c). PEEK implant abutments

Nano structured PEEK surfaces produced by etching with sulfuric acid and rinsing with distilled water induces an accelerated osseointegration compared to unmodified PEEK. However, it has been that there occurs a decreased initial bone formation when sulfonated PEEK is implanted in vivo which is due to formation and presence of residual sulfuric acid on the surface which can still be removed by rinsing the implants with acetone[8].

To produce *bioactive nano-composites*, nano-sized particles such as Tio_2, HAF and HAp instead of larger particles have been incorporated to PEEK using compression molding techniques and melt blending techniques. It provides many advantages such as increased bioactivity, better mechanical properties like superior tensile properties than Pure PEEK. Even with the incorporation of bioactive nanoparticles, the water-contact angle of nano composites does not decrease significantly when compared to pure PEEK[9].

Implant healing abutments are being constructed using *PEEK*. A randomized, controlled clinical trial conducted by Koutouzis et al suggested that there is no significant difference in the bone resorption and soft tissue inflammation around PEEK and titanium abutments[10]. A close match of elastic modulus of bone and PEEK surfaces reduces the stress shielding effects and encourage bone remodeling. Therefore, PEEK could prove to be a viable alternative to titanium in constructing implant abutments.

2) As fixed partial denture material:

Over the years, many materials used for fixed partial denture have evolved. Now a days, metal free restorations are becoming more important in dentistry because of increased esthetic requirements of the patient. Patients want to avoid incorporation of metallic material in the mouth. CAD-CAM designed composites and PMMA fixed dentures have superior mechanical properties compared to conventional fixed partial denture[11]. PEEK is another material that can be used an alternative to PMMA for CAD-CAM restorations. Three-unit PEEK fixed partial denture manufactured via CAD-CAM has been suggested to have a higher fracture resistance than pressed granular or pellet- shaped PEEK dentures[12].

3) As removable partial denture material:

There are many problems related to traditional materials for RPD construction. With advancement in polymer based materials and with the use of CAD-CAM systems, dentures can be constructed by using PEEK. Owing to the superior mechanical and biological properties of PEEK, it will not be surprising if dentures constructed from the polymer are routinely constructed in near future.

PEEK is also being used in the construction of a removable obturator. Nevertheless, more studies are needed to evaluate the efficacy of PEEK obturators compared to conventional acrylic prostheses.

CONCLUSIONS:

The PEEK material owing to its high quality mechanical properties, holds a very promising future in forthcoming era of dental sciences. Because of its various physical properties such as elastic modulus similar to bone and dentin, strength, rigidity and lightweight, the applications of PEEK has found its way in different clinical situations in dentistry. PEEK is a attractive material for producing CAD-CAM fixed and removable prostheses due to its superior mechanical properties compared to materials such as acrylic. Due to unavailability of a vast no. of long term clinical studies, the usage of PEEK polymer material has not got hike in dental practice. So the need of the hour is to make further researches and clinical trials to explore and get through this material in order to make most use of it and make further dental applications.

REFERENCE

1) Toth JM, Wang M, Estes BT, Scifert JL,Seim HB, Turner AS. Polyetherketone as a biomaterial for spinal applications. Biomaterials 2006;27:324-34

2) Kurtz SM, Devine JN. PEEK biomaterials in trauma, orthopaedic and spinal implants. Biomaterials 2007;28;4845-69

3) Lu T, Wen J, Quian S, Cao H, Ning C, Pan x. Enhanced osseointegration on tantalum-implanted

polyether ether ketone surface with bone-like elastic modulus. Biomater.2015;51:173-183

4) Sarot JR, Contar CM, Cruz AC, de Souza Magini R. Evaluation of the stress distribution in CFR-PEEK dental implants by the three dimensional finite element method.j Mater sci Mater Med. 2010;21:2079-2085.

5) Hansano MM, Goel N,DeMonte F. calvarial reconstruction with polyethetetherketone implants. Ann plast surg.2009;62:653-655.

6) Rui Ma and Tingting Tang, Current strategies to improve the bioactivity of PEEK, int. J. Mol. Sci. 2014, 15, 5426-5445.

7) A.D.Schwitalla, M.Abou-Emara, T.Spintig, J.Lackmann, W.D.Müller. Finite element analysis of the biomechanical effects of PEEK dental implants on the peri-implant bone; Journal of Biomechanics48 (2015)1–7.

8) Stawarczyk B, Beuer F, Wimmer T, Jahn D, Sener B, Roos M, Schmidlin PR. 2013. Polyetheretherketone—A suitable material for fixed dental prostheses. J Biomed Mater Res Part B 2013:00B:000–000.

9) Dr. Murali Ramamoorthi Dr. Vivek Verma Dr. Zeeshan Sheikh. Dental biomaterials and a novel composite of zirconia and poly ether ether ketone [PEEK] for dental implants; International dental journal of student's research, January 2015,volume 2,issue 4

10) Rui Ma and Tingting Tang. Current strategies to improve the bioactivity of PEEK, int. J. Mol. Sci. 2014, 15, 5426-5445.

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COMPARATIVE EVALUATION OF DIODE LASER AS AN ADJUNCT TO SCALLING AND ROOT PLANING FOR THE TREATMENT OF CHRONIC PERIODONTITIS: A CLINICAL STUDY

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Abstract

Introduction: Laser is an acronym for "light amplification by stimulated emission of radiation." They are being developed for a variety of uses in periodontal therapy. The diode laser in dentistry is used for treatment of diseased periodontal soft tissue, allowing significant bacterial reduction, and removal of the inflammatory products while creating excellent hemostasis. A flexible fiber optic delivery system allows the clinician easy and safe access around the periodontal pocket. The wavelengths are transmitted through water and are very poorly absorbed in apatite crystals, making them an excellent choice to use in a periodontally involved sulcus that has inflamed tissue and pigmented bacteria. This study was undertaken to evaluate the effectiveness of diode laser as an adjunct to scaling and root planning (SRP) in the nonsurgical treatment of chronic periodontitis.

Methods: In this study, 21 patients with moderate to severe chronic periodontitis were selected and divided in to control group (SRP) and test group (SRP + laser). Two months after the last scaling and laser radiation, indexes including gingival level (GL), bleeding on probing (BOP) and modified gingival index (MGI) were recorded and compared with baseline.

Results: Two months after the beginning of the study, all indices improved in both groups. The indices were not different between two groups except for BOP which was lower in laser group.

Conclusion: Based on overall improvement in parameters such as superiority of laser application in some indices, lack of thermal damage and gingival recession with the specific settings used in this study, the application of laser as an adjunctive treatment together with common methods is preferable.

Keywords: Periodontitis; diode Laser; choronic periodontitis

INTRODUCTION

Periodontitis is an inflammatory disease involving tooth supporting structures1. The main principle of periodontal therapy is elimination of bacterial deposits and niches by removing supragingival and subgingival biofilm2. Scaling and root planning is the common approach in the control of inflammation in non-surgical treatment modality3. But, conventional treatment fails in many situations especially in severe cases4. Several adjunctive treatment modalities have been developed to overcome these limitations5. Using lasers is one of these modalities6. Many studies have shown that in addition to common mechanical therapy or even in replacement of it, laser therapy can cause resolution of inflammation in gingival tissue7,8,9.

The diode laser is a soft tissue laser having a wavelength of 810 nm or 910–980 nm.[10] The laser beam aids in soft tissue curettage, sulcular debridement, has a bactericidal effect[11] and has no interaction with dental hard tissues. During irradiation a part of the laser energy scatters and penetrates into periodontal pockets, stimulating the cells of surrounding
tissues. This results in reduction of the inflammatory conditions, increased in cell proliferation, flow of lymph, improving the periodontal tissue attachment and marked reduction in postoperative pain.[12]

AIMS AND OBJECTIVES

1. To evaluate the effectiveness of diode laser on plaque index (PI), gingival index (GI), probing pocket depth (PPD), and clinical attachment level (CAL) in chronic periodontitis patients and to compare the outcome with scaling and root planning (SRP) alone

2. To evaluate the efficacy of diode laser on plaque microorganisms namely *Aggregatibacter actinomycetemcomitans* and *Prevotella intermedia*.

METHOD

In this single blind clinical trial study all participants provided informed written consent, and 21 patients with moderate to severe chronic periodontitis attended the department of Dentistry Anugrah Narayan Magadh Medical College and Hospital ,Gaya, Bihar, India having moderate to severe chronic periodontitis, at least 4 teeth in each quadrant, at least 4 sites with probing depth more than 4 mm and bleeding on probing as well as radiographic signs of alveolar bone loss were the inclusion criteria of this study. Exclusion criteria were systemic disease like bleeding disorders, epilepsy, mental deficiency, smoking and pregnancy. Oral health condition in all participants based on gingival level (GL), modified gingival index (MGI) and bleeding on probing (BOP) were recorded. Full mouth GL was recorded using Williams's periodontal probes. For determination of gingival inflammation, MGI was used, in which according to the severity of inflammation 5 scores from 0 to 4 around each tooth. The mean of these scores was used for each tooth. BOP was measured one minute after probing along gingival sulcus and recorded in percent of surfaces. At the end all the sites were randomly divided into two groups; Control group which only received SRP and Case group which received SRP with laser therapy. Oral hygiene instructions which included tooth brushing and flossing were given to all patients. At the last visit of scaling when the first phase of therapy was completed, laser therapy was randomly carried out in two quadrants (one of them in upper jaw and the other in the lower jaw) of the case group. Characteristics of the laser were 980 nm Diode laser with one watt power and a speed of 2 mm/s by a 400 µm fiber which was used in continuous mode. Laser beam was projected from the distal site of the selected quadrants while fiber was inserted into the depth of the sulcus. Lightening was from depth to the surface of sulcus with spiral movements. To prevent from excess heat production on the soft tissue surface, a 10s discontinuation was considered in the site where the duration of lightening was more than 30s. This procedure continued for both buccal and lingual surfaces to the anterior tooth in each quadrant. In the remaining quadrants as control sites, there was only pilot lightening of laser in the same way, but laser lightening was inactivated. After collecting all the data from patients who participated in all recall programs, Mann Whitney and Wilcoxon tests were exploited to analyze the data.

RESULT

Among 26 patients who participated in the study at the beginning, 21 patients attended all recall programs from which 11 were male and 10 were female with a mean age of 42.2 years. In overall 207 sites from these patients in both case and control groups were evaluated. Regarding GL, the result of the study showed a significant reduction in both case and control groups after treatment (P< 0.001). In other words, patients experienced gingival recession. Comparing GL between two groups after treatment, there was no significant difference. (Table 1).Two months after treatment both groups showed significant reduction in MGI (P< 0.001), while the difference between two groups was not statistically significant (Table 2).

This study showed that BOP in both groups had significant reduction after 2 months. Reduction of BI in test group was more than control group, also differences in treatment modality was statistically significant.

Table1: Mean gingival level before and after treatment in mm.

Group	Before	Before	Before	After	After	After	P-value
	median	mean	S.D	median	Mean	S.D	
Control	-0.5	-0.90	1.1	-1	-1.07	1.24	Less than 0.001
Test	-1	-0.93	1.12	-1	-1.05	1.20	Less than 0.001

Table 2:Mean MGI score before and after treatment

Group	Baseline	Baseline	Baseline	2months	2 months	2months	P-value
	Median	Mean	S.D.	Median	Mean	S.D.	
Control	2	1.49	0.82	1	0.66	0.71	Less than 0.001
Case	2	1.49	0.74	1	0.71	0.68	Less than 0.001

Table 3: Mean BOP before and after treatment in percent

Group	Baseline	Baseline	Baseline	2 months	2 months	2 months	P-value
	Median	Mean	S.D.	Median	Mean	S.D	
Control	68	63.24	41.12		35.43	41.47	Less than 0.01
Case	68	67.44	41.07		27.09	37.78	Less than 0.01

DISCUSSION

The remarkable difference between the two procedures in improving periodontal variables is attributable to the benefits from the use of diode laser in addition to the traditional procedures of SRP in the treatment of periodontal pockets (13, 14). They are:

- bactericidal effect;
- curettage effect;
- bio-stimulating effect.

Combining laser therapy with conventional procedures is in fact achieved a more effective decontamination of the pocket, with also a recolonization slower than sites treated only mechanically (15-19); some Authors attribute this phenomenon to clot formation in the pocket, that would act as a seal to it.Thanks to curettage effect, the laser eliminates the sulcular epithelium infected in a total and complete way than conventional methods of treatment with manual tools (20), without any kind of damage to the underlying connective tissue and reducing the bacterial load of Actinobacillus actinomycetemcomitans and Porphyromonas gingivalis (21), which easily penetrate within the sulcular epithelium. Furthermore there is scientific evidence on the direct antimicrobial effect of diode laser against levels of Targeted Periodontal Pathogens (22). According to Kreisler (2005) the greatest reduction in the degree of tooth mobility and probing depth in the group of patients who underwent SRP + laser therapy can be mainly attributed not to the killing of bacteria in periodontal pockets, but rather to the complete removal of infected sulcular epithelium, which leads to greater attack of the connective tissue (23). Furthermore, the removal of granulation tissue infected promotes the healing of connective tissue with a decrease in probing depth, gingival index and tooth mobility and a recovery of clinical attacks significantly higher compared to the initial preparation only (23-26); these results, in addition to being the best, are longer lasting and more stable over time (27). However, according to De Micheli (2011) the results of the two therapeutic procedures are similar with regard to plaque index and bleeding on probing, for which laser therapy does not lead to additional benefits (28). Also according to Dukic (2012) the results of the two treatments are similar in terms of plaque index, bleeding on probing and clinical attachment level: the addition of laser therapy showed a marked improvement in PD, but only in periodontal pockets of moderate depth (from 4 to 6 mm) (29). Finally, because of the biostimulant effect (29,30-32), laser therapy induces the acceleration of mitotic processes within the irradiated tissues, without causing structural and/or functional alterations. According to the studies of Benedicenti (2008), the laser would stimulate mitochondrial activity, with a production of intracellular ATP >22% in irradiated cells compared to those not exposed to radiant energy, resulting in a halving of the times of cell duplication (33). In an *in vitro* study of Soares et al. (2013)

has been demonstrated as low-level laser irradiation (LLLI) has a positive stimulatory effect on the proliferation of human periodontal ligament stem cells. This study was carried out on two healthy permanent third molars extracted due to surgical indication (34). Conlan (1996) found an increase of about 50% of the proliferation and differentiation of fibroblasts and collagen synthesis within the periodontal ligament (35), which process, according to Choi (2010) begins to manifest between the next 24- 48 hours to laser treatment, and intensifies especially after the 72 hours (36); all these reactions accelerate the healing process and encourages a speedy recovery in clinical attachment. The basic question in the present study will be whether this recommended protocol removes sulcular epithelium and inflammatory tissue of periodontal pocket? As we know positive effects of laser therapy on improvement of attachment depends on the characteristic of laser. Romanos et al in 2004 showed the effectiveness of 980 nm diode laser with the power of 2 and 4w in continuous mode with duration of 15s for each site on animals in removal of lining periodontal pocket. In a microscopic evaluation, they demonstrated that there is remnant of epithelial tissue in treated sites with hand instrument while in site treated with laser, the removal of sulcular epithelium and connective tissue was complete. However sites which were treated with 4w power showed signs of necrosis which could delay healing14. Kreisler et al evaluated laser therapy in invivo conditions with the power of 1w in continuous mode in duration of 10s for each site for the treatment of periodontitis. Results of their study indicated the safety of laser therapy as an adjunctive treatment to SRP. In this study, there was also more reduction in tooth mobility and probing depth in the case group which could be attributed to the removal of lining epithelium of periodontal pocket and improvement of connective tissue attachment11. According to the above contents in the present study, effects of diode 980 nm laser therapy as a laser assisted periodontal therapy, its antimicrobial effects and closed curettage in de-epithelialization of lining periodontal pocket as an adjunctive treatment after the first phase of periodontal therapy on gingival inflammation wereevaluated.

Gingival Level (GL):
The results of the present study showed significant reduction in gingival level in both groups. In fact we expected it because of removal of local stimulating factors and reduction of the severity of inflammation. Also, we don't have statistically significant differences between the two groups which confirm no harmless effect of recommended protocol on gingival tissue. Borajo et al in 2004 in the evaluation of adjunctive laser therapy with wavelength 980nm and the power of 2w using 200μm fiber in pulsed mode showed a significant reduction on gingival level, however according to the present study there wasn't any significant difference between case and control groups in gingival recession37.

Bleeding on Probing (BOP):
In periodontal studies repeated BOP in one site represents continuous pattern of periodontal destruction. Also, it can be attributed to periodontopathogens in subgingival microflora. So, not having BOP is an appropriate indicator for healthy periodontal tissue38. Conventionally, after the first phase of therapy we expected to have the elimination of BOP and improvement of clinical sign of inflammation. What is important in this study is the significant differences between case and control groups. In fact, we have more reduction in BOP in the case group in contrast to the control group which indicates the effect of laser therapy on subgingival microflora. Antimicrobial effects of laser with 1w power have been proved; these effects cause changes in subgingival microflora composition and reduce number of gram negative microorganisms. However this hypothesis needs microbiologic evaluation of subgingival plaque samples after laser therapy, but the recommended dose in the present study did not cause gingival recession and reduced BOP in comparison to control group. We can use this recommended protocol for improvement of gingival inflammation in maintenance session. For the anterior region in which surgical treatment can cause uneven gingival recession, laser therapy with the characteristic of this study is recommended as an alternative method
for surgical treatment. Borajo et al in 2004 have studied on 980 nm diode laser with the power of 2w as an adjunctive treatment to SRP in 6 weeks periods. Their results were in accordance with the present study in which BOP reduced in both groups but this reduction was more in the case group than the control group37. In contrast to the present study, Kreisler in 2005 and Kelbauskiene in 2007 didn't show any statistical significant differences between two groups of laser and conventional therapy. However, Kelbauskiene used Er.Cr:YAG and Kreisler used diode laser with the wavelength 890 nm with 2w power,39. Jensen in 2010 and Birang in 2010 studied the effects of Nd.YAG laser as an adjunctive therapy to SRP. They showed a BOP reduction in both groups, while there weren't any significant differences between two groups in these studies38, 40.

Modified gingival index (MGI):
MGI represents the severity of gingival inflammation such as redness and edema of gingival tissue. Patients in this study showed mild inflammation before treatment, involving the entire marginal and papillary unit. This inflammation reduced, to some part, in both groups after treatment. Although in the comparison between groups there weren't any statistically significant differences. Considering this point that it is in contrast to BOP which represents inflammation of internal lining of periodontal pocket, MGI displays inflammation of gingival margin and external lining of periodontal pocket; thus laser therapy causes reduction of inflammation in Diode (980 Nm) Laser on Gingival Inflammation internal lining of periodontal pocket in deep sites and reduction of BOP in the case group in contrast to the control group. This study showed that laser therapy has no effect on manifestation of inflammation in marginal external surface of gingiva. The result of Kreisler et al in 2005 regarding MGI by the use of 890 nm diode laser with the power of 2w was in accordance to the present study in which there wasn't any differences between the case and control groups11. Also, the results of Yilmaz et al in 2002 in using diode laser with a wave length of 685 nm and 30mw power in low level laser therapy were similar to the present study5

CONCLUSION

Diode laser can affect the reduction of BOP and have no negative effect on root surfaces and gingival recession. the adjunctive treatment with diode laser at a higher but clinically safe frequency (940 nm) at repeated regular intervals showed a better efficacy in ensuring a better periodontal health as compared to SRP alone. The results obtained in the present study were promising and prompt us to look further the role of repeated diode laser treatment in order to ensure better results of periodontal treatment.However, with a further evaluation on the optimization of both dose (frequency in nm) and frequency (number of treatments) in larger sample size and in varying simulations should be carried out in future for corroboration of results.

REFERENCE

1) Armitage GC. Development of a classification system for periodontal diseases and conditions. Ann Periodontol 1999;4:1–6.

2) Schwarz F, Sculean A, Beakdar M, Georg T, Reich E, Becker J. Periodontal treatment with an Er:YAG laser or scaling and root planning. A 2-year follow up split-mouth study. J Periodontal 2003;74:509-96

3) Yukna RA, Scott JB, Aichelmann-Reidy ME, LeBlanc DM, Mayer ET. Clinical evaluation of the speed and effectiveness of subgingival calculus

removal on single rooted teeth with diamond-coated ultrasonic tips. J Periodontol 1997;68:436- 42.

4) Euzebio Alves VT, de Andrade AK, Toaliar JM, Conde MC, Zezell DM, Cai S, et al. Clinical and microbiological evaluation of high intensity diode laser adjutant to nonsurgical periodontal treatment: a 6-month clinical trial. Clin Oral Investig 2013;17(1):87-95.

5) Yilmaz S, Kuru B, Kuru L, Noyan U, Arguan D, Kadir T. Effect of Galium Arsenide Diode Laser on Human Periodontal Disease: A Microbiological and Clinical Study. Lasers Surg Med 2002;30:60-6.

6) Sgolastra F, Severino M, Gatto R, Monaco A. Effectiveness of diode laser as adjunctive therapy to scaling root planning in the treatment of chronic periodontitis: a meta-analysis. Lasers Med Sci;2013;28(5):1393-402.

7) Van der Weijden GA, Timmerman MF. A systematic review on the clinical efficacy of subgingival debridement in the treatment of chronic periodontitis. J Clin Periodontol 2002;29 Suppl 3:55-71;

8) Schwarz F, Aoki A, Becker J, Sculean A. Laser application in non-surgical periodontal therapy: a systematic review. J Clin Periodontol 2008;35(8 Suppl):29-44.

9) Karlsson MR, Diogo Löfgren CI, Jansson HM. The effect of laser therapy as an adjunct to non-surgical periodontal treatment in subjects with chronic periodontitis: a systematic review. J Periodontol 2008;79(11):2021-8.

10) Goldstep F and Freedman G. Diode lasers for periodontal treatment: the story so far. J Oral Health 2009:45-6.

11) Yilmaz S, Kuru B, Kuru L, Noyan U, Argun D, Kadir T. Effect of gallium arsenide diode laser on human periodontal disease: A microbiological and clinical study. Lasers Surg Med 2002;30:60-61.

12) Gokhale SR, Padhye AM, Byakod G, Jain SA, Padbidri V, Shivaswamy S. A comparative evaluation of the efficacy of diode laser as an adjunct to mechanical debridement versus conventional mechanical debridement in periodontal flap surgery: A clinical and microbiological study. Photomed Laser Surg 2012;30:598-603.

13) Borrajo JL, Varela LG, Castro GL, Rodríguez-Nuñez I, Torreira MG. Diode laser (980 nm) as adjunct to scaling and root planing. Photomed Laser Surg. 2004 Dec;22(6):509-12.

14) LeBeau J. Laser technology: its role in treating and managing periodontal disease. Compend Contin Educ Dent. 2012 May;33(5):370-1.

15) Bach G, Neckel C, Mall C, Krekeler G. Conventional versus laser-assisted therapy of periimplantitis: a five-year comparative study. Implant Dent. 2000;9(3):247-51.

16) Gregg RH 2nd, McCarthy DK. Eight-year retrospective review of laser periodontal therapy in private practice. Dent Today. 2003 Feb;22(2):74-9.

17) Moritz A, Gutknecht N, Doertbudak O, Goharkhay K, Schoop U, Schauer P, Sperr W. Bacterial reduction in periodontal pockets through irradiation with a diode laser: a pilot study. J Clin Laser Med Surg. 1997 Feb;15(1):33-7.

18) Moritz A, Schoop U, Goharkhay K, Schauer P, Doertbudak O, Wernisch J, Sperr W. Treatment of periodontal pockets with a diode laser. Lasers Surg Med. 1998;22(5):302-11.

19) Saglam M, Kantarci A, Dundar N, Hakki SS. Clinical and biochemical effects of diode laser as an adjunct to nonsurgical treatment of chronic periodontitis: a randomized, controlledclinical trial. Lasers Med Sci. 2014 Jan;29(1):37-46.

20) Romanos GE, Henze M, Banihashemi S, Parsanejad HR, Winckler J, Nentwig GH. Removal of epithelium in periodontal pockets following diode (980 nm) laser application in the animal model: an in vitro study. Photomed Laser Surg. 2004 Jun;22(3):177-83.

21) . Kamma JJ, Vasdekis VG, Romanos GE. The effect of diode laser (980 nm) treatment on aggressive periodontitis: evaluation of microbial and clinical parameters. Photomed Laser Surg. 2009 Feb;27(1):11-9.

22) Gojkov-Vukelic M, Hadzic S, Dedic A, Konjhodzic R, Beslagic E. Application of a diode laser in the reduction of targeted periodontal pathogens. Acta Inform Med. 2013 Dec;21(4):237-40.

23) Kreisler M, Al Haj H, d'Hoedt B. Clinical efficacy of semiconductor laser application as an adjunct to conventional scaling and root planing. Lasers Surg Med. 2005 Dec;37(5):350- 5.

24) Angelov N, Pesevska S, Nakova M, Gjorgoski I, Ivanovski K, Angelova D, Hoffmann O, Andreana S. Periodontal treatment with a low-level diode laser: clinical findings. Gen Dent. 2009 Sep-Oct;57(5):510-3.

25) Caruso U, NastriL,Piccolomini R,d'ErcoleS, Mazza C, Guida L. Use of diode laser 980 nm as adjunctive therapy in the treatment of chronic periodontitis. A randomized controlled clinical trial. New Microbiol. 2008 Oct;31(4):513-8.

26) Giannelli M, Formigli L, Lorenzini L, Bani D. Combined photoablative and photodynamic diode laser therapy as an adjunct to non-surgical periodontal treatment. A randomized splitmouth clinical trial. J Clin Periodontol. 2012 Oct;39(10):962- 70.

27) Pejcic A, Kojovic D, Kesic L, Obradovic R. The effects of low level laser irradiation on gingival inflammation. Photomed Laser Surg. 2010 Feb;28(1):69-74.

28) De Micheli G, de Andrade AK, Alves VT, Seto M, Pannuti CM, Cai S. Efficacy of high intensity diode laser as an adjunct to non-surgical periodontal treatment: a randomized controlled trial. Lasers Med Sci. 2011 Jan;26(1):43-8.

29) Dukić W, Bago I, Aurer A, Roguljić M. Clinical Effectiveness of Diode Laser Therapy as an Adjunct to Non-Surgical Periodontal Treatment: A Randomized Clinical Study. J Periodontol. 2012 Oct 17.

30) Ejiri K, Aoki A, Yamaguchi Y, Ohshima M, Izumi Y. High frequency low-level diode laser irradiation promotes proliferation and migration of primary cultured human gingival epithelial cells. Lasers Med Sci. 2014 Jul;29(4):1339-47.

31) Passanezi E, Diamante CA, de Rezende ML, Greghi SL. Lasers in periodontal therapy. Periodontol. 2000. 2015 Feb;67(1):268-91.

32) Fujimura T, Mitani A, Fukuda M, Mogi M, Osawa K, Takahashi S, Aino M, Iwamura Y, Miyajima S, Yamamoto H, Noguchi T. Irradiation with a low-level diode laser induces the developmental endothelial locus-1 gene and reduces proinflammatorycitokines in epithelial cells. Lasers Med Sci. 2014 May;29(3):987-94.

33) Benedicenti S, Pepe IM, Angiero F, Benedicenti A. Intracellular ATP level increases in lymphocytes irradiated with infrared laser light of wavelength 904 nm. Photomed Laser Surg. 2008 Oct;26(5):451-3.

34) Soares DM, Ginani F, Henriques AG, Barboza CA. Effects of laser therapy on the proliferation of human periodontal ligament stem cells. Lasers Med Sci. 2013 Sep 7.

35) Conlan MJ, Rapley JW, Cobb CM. Biostimulation of wound healing by low-energy laser irradiation. A review. J Clin Periodontol. 1996 May;23(5):492-6.

36) Choi EJ, Yim JY, Koo KT, Seol YJ, Lee YM, Ku Y, Rhyu IC, Chung CP, Kim TI. Biological effects of a semiconductor diode laser on human periodontal ligament fibroblasts. J Periodontal Implant Sci. 2010 Jun;40(3):105-10.

37) Borrajo JL, Varela LG, Castro GL, Rodríguez-Nuñez I, Torreira MG. Diode laser (980 nm) as adjunct to scaling and root planing. Photomed Laser Surg 2004;22(6):509-12.

38) Jensen J, Lulic M, Heitz-Mayfield LJA, Joss A, Lang NP. Nd:YAG (1064 nm) laser for the treatment of chronic periodontitis: a pilot study. J Invest Clin Dent 2010;1:16–22.

39) Kelbauskiene S, Maciulskiene V. A pilot study of Er,Cr:YSGG laser therapy used as an adjunct to scaling and root planing in patients with early and moderate periodontitis. Stomatologija 2007;9(1):21-6.

40) Birang R , Behfarnia P, Yaghini J, Teimuri F, Jamshidi M. Evaluation of the Effects of Nd:YAG Laser Compared to Scaling and Root Planning Alone on Clinical Periodontal Parameters. J Periodontal Implant Dent 2010;1(2):25-8.

Journal of Oral and Dental Health

DUPLICATION OF PALATAL RUGAE IN COMPLETE DENTURES: A CASE REPORT

Abstract

For many years poorly formed palatal surface have been the rule rather than the expectation in denture service. For a good speech denture should act as an aid instead of a hindrance, for producing palatolingual sound, palatal rugae play a vital role. This article deals with a simple & inexpensive method for rugae duplication by carving palatine rugae in complete denture prosthesis.

Keywords:: palatal rugae, rugae duplication, palatolingual sounds,

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INTRODUCTION

A complete denture should fulfil four basic requirement esthetic, phonetics, efficiency & comfort as propagated by terrel 1 . But in these four requirements phonetics is the most neglected among them. Speech plays a pivotal role in human communication & this unique characteristic feature of human species differentiate them & make them superior over others. Palatal rugae play very vital role in phonetics. For production of palato-lingual sound contact between tongue and palate is necessary. The palatine rugae are stable & constant landmark in maxilla. It is unique & different in each person.

Fabrication of complete denture prosthesis by considering all four basic requirements & according to expectation of patient requires exploration beyond the limit of prosthodontics.

CASE REPORT:

A 52 year old male presented to the department Of Prosthodontics & Crown & Bridge with chief complaint of difficulty in chewing & speaking with old denture. (Fig.-1) on clinical examination we found the medical history was non-contributory. Extraoral examination revealed He has got straight profile with bilaterally symmetrical face and there is a decrease in the vertical dimension of the face in the lower third region of the face. And Past dental history revealed that he underwent for extraction due to loosening of teeth 6 years back. The sequence of loss of teeth is maxillary and mandibular posterior first then mandibular anteriors or at last maxillary anteriors. He was wearing denture since 4 years. Soft tissue examination reveals no lesions in buccal mucosa alveolar mucosa & tongue. Adequate alveolar bone support in maxilla but mild resorption is seen in mandible. (Fig.-2) on examination of old denture we found severely attrited tooth with suction cap in the palatal region. Patient expectation was related to his work he was a shopkeeper & he wanted to pronounce correctly or clear speech. Patient was habituated of taking tobacco. Various treatment procedures explained to the patient i.e. implant supported fixed prosthesis; implant supported removable prosthesis and conventional complete denture. Definitive treatment plan included fabrication of complete denture prosthesis with bilateral balanced occlusion and maxillary complete denture prosthesis is characterized with palatal rugae.

Fig 1: Extraoral view

Fig 2: Intraoral view

PROCEDURE

The steps for palatal rugae duplication :-

1.) Final impressions of the maxillary edentulous ridges are obtained, poured to get the final maxillary cast then palatalrugae were marked with a permanent marker .(Fig.-3&4)

2.) Application of separating medium has been done on the cast, using clear self cure acrylic resin a denture record base was made. The transparent record base will help us to visualize the rugae marking on the cast.(Fig.-5&6)

Fig-3 Final maxillary cast

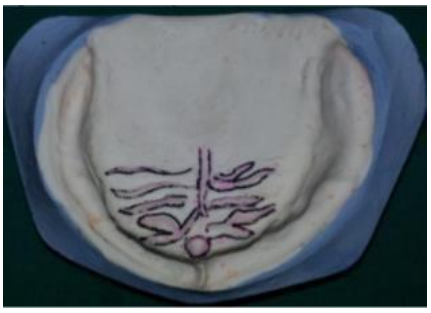

Fig-4 Rugae marked with permanent marker

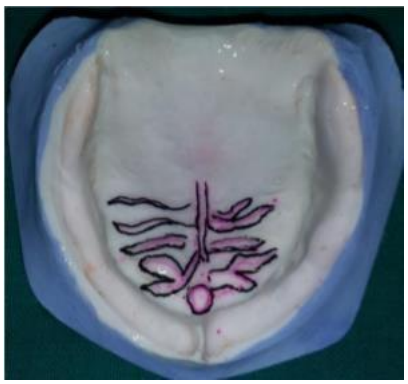

Fig-5 Application of separating medium

Fig.-6 Denture base fabricated with clear self cure resin

3.) Using a straight fissure bur, the rugae pattern was inscribed on the record base to create depth and width simulating that of natural rugae of the patient.(Fig.-7&8)

Fig-7 Straight fissure bur

Fig.-8 Rugae pattern inscribed on the record base

4.)Jaw relations recorded and trial denture verification were done.(Fig.9)

5.) Demounting of the maxillary cast from the articulator was done, addition silicone putty material was mixed and kneaded in the form of small threads which were adapted according to the patient's rugae pattern on the record base

Fig-9 Trial denture verification

Fig-10 kneaded putty thread adapted

6.)All ideal protocol was followed ,Flasking was done followed by dewaxing, During dewaxing removal of clear acrylic base plate along with the putty threads was done, in the counter flask negative replica of rugae is duplicated. Heat cure denture base material was used for packing and curing in the conventional manner was done.

7.) In the finished prosthesis the rugae pattern was duplicated. (Fig-11)

Fig-11 Finished prosthesis

DISCUSSION

Communication & Speech is most basic & essential human activity. Therefore, phonetics must be considered as the prime factors for the success of the dental prosthesis as well as mechanics & esthetics . 2 In order to deal with the problem of phonetics, the general mechanism of speech production and the specific mechanics of the production of sound units of dental interest must be understood. A working knowledge of this information enables the dentist to fabricate a denture with which speech is clearer, 3 and it gives him a series of phonetics tests useful in complete denture registration.
Few factors, namely. The correct vertical dimension, the occlusal plane, the contour of the palate, and the positioning of the anterior teeth, are common requirements for the production of most speech sounds. Therefore, the vertical dimension of' occlusion should be checked by the technique of Silverman.4 or by some other suggested method. Similarly, the occlusal plane should be checked phonetically with the labiodentals sounds. The contour of the palate should be restored to the same contour and bulk of material it possessed originally.

There are several methods has been suggested in the literature for improving the speech in patient with complete denture prosthesis. Rugae duplication is one of them. Palatal rugae can be characterized and incorporated in the maxillary denture by different methods.

1. Rugae duplication using putty impression technique.
2. Rugae duplication using dental floss.
3. Rugae duplication using tin foil.
4. Rugae duplication using clear acrylic resin & addition silicon impression materials.

The procedure of electroplating to form metal palate that duplicates patient palate is limited in that it does not apply impression of maxillary cast to make custom acrylic resin pattern to capture patient anatomy.5 but there is need of additional impression or either duplication of cast. In this method missing palatal contour of denture teeth should be corrected at the time of wax up of trial denture. To modify palatal portion of maxillary denture use of palatogram has also been done but the process which is described here involves use of addition silicon putty impression materials and self cure acrylic resin. It can easily duplicate the width and thickness of rugae to an acceptable extent. It is cost effective because amount of putty used in this process is very less .This process is not technique sensitive because putty

can be moulded and shaped easily. The groove made by bur in denture base provides mechanical retention so there is negligible chance for displacement of putty from that area. It is stiff enough to withstand the denture curing process without undergoing distortion.

The rugae duplication in the finished prosthesis does not interfere in speech although it provides a important natural & biological accommodation to the tongue to the denture and contributes in taste perception.[6]

CONCLUSION

During fabrication of complete denture prosthesis phonetics is as important as other factors are however this factor is neglected by the clinician so far. Maybe due to long term adaptability by the patient. The rugae should always be incorporated in the complete denture without increasing the thickness in that region. It will eliminate the waiting and training period after denture insertion.

Patient consent was taken for use of the patient photograph for research purpose.

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REFERENCE

1. Terrel WH. Fundamentals important to good complete denture construction. J Prosthet Dent 1958;8:740-752

2. Rothman R. Phonetics consideration in denture prosthesis. J Prosthet Dent 1961; 11:214-223

3. Kessler, H. E. : Study of Tongue: Pattern Is Clue to Better Speaking Dentures, D. Survey 34:1015- 1017, 1958

4. Silverman. Hf. hi. Determination of Vertical Dimension by Phonetics, J. PROS. DKN. 6:465- 471. 19.56

5. Naqvi S, Dange SP, Khalikar SA. A simple method for patient's palatal rugae duplication in complete denture. Int J Prosthodont Restore Dent 2014;4(2):46-47

6. Mattoo k.et al.,Med. Res. Chrom.,2014, 1 (2), 150- 155

7. I.anda, J. S.: Practical Full Denture Prosthesis, T.ondon, 1954, Dental Ttems of Tntcrtst Publishing Co., pp. 31 l-329.

8. Scar! 1.. H. : Principles and Technics for Complete Denture Construction, St. Louis, 1940,The C.V. Mosby Company, pp. 313-322.

9. Allen, LR.: Improved Phonetics in Denture Construction, J. PROS. DEN. 8:753-763, 1958.

10. Garfunkel E Reproduction of the rugae in maxillary denture palate. J Prosthet Dent.747

11. Walker TJ Palate reproduction by the hydrocolloid method. J prosthet Dent 1954;4:54-66

12. Vijayaraghavan V. Chandni P A simple method for palatal rugae carving in complete dentures. J Indian Prosthodont Soc. 13(2):137-13

Journal of Oral and Dental Health

ENDODONTIC MANAGEMENT OF DEVELOPMENT ANOMALY CAUSING APICAL PERIODONTITIS: A CASE REPORT

Abstract

Talon cusp is a prominent accessory cusp-like structure projecting from the cingulum area or cementoenamel junction (CEJ) of the maxillary or mandibular teeth in both primary and permanent dentition. Etiology is not known completely but genetic and environmental factors are thought to be effective. The management and treatment outcome of a talon cusp depends on its size, presenting complications and patient cooperation. While smaller in size, it is usually asymptomatic and requires no treatment. However, larger in size it may cause various clinical problems necessitating individualized treatment modalities; thus early diagnosis is important for this anomaly. In this case report a successful endodontic management of a periapical lesion in permanent mandibular premolar incisor tooth associated with a talon cusp is presented with clinical and radiographic findings.

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INTRODUCTION

Dens evaginatus (DE) is an odontogenic developmental abnormality that can be defined as a tubercle or protuberance from the involved surface of the affected tooth consisting of an outer layer of enamel, a core of dentin, and may contain a slender extension of pulp tissue.

Fracture and abrasion of the DE may cause pulp infection and necrosis, while in adolescents, fracture and abrasion of the DE can also lead to immature tooth root development. Meanwhile, an immature root development, always holds a blunderbuss shape that fails to limit the compaction material in the canal, which makes it diffi cult to fill the canal effi ciently during root canal therapy[1]. Other than that when a young permanent tooth suffers a trauma, before root completion it results in blunderbuss canal. In such cases, the absence of a natural constriction at the end of the, In such cases, the absence of a natural constriction at the end of the root canal makes control of filling materials difficult because of the lack of an apical constriction, an alternative to standard root canal treatment, apexification or root-end –closure, has been advocates (Seltzer, 1988) Apexification can be defined as a 'method to induce a calcific barrier in a root with an open apex or the continued apical development of teeth with incomplete roots and a necrotic pulp' (American Association of Endodontists, 2003). [2,3]. Recently, some studies have shown that mineraltrioxideaggregate(MTA) based biodentine can be used in single visit apexification treatments for teeth with large canals and an open apex in adults [1]. However, for a long time, information about the definite clinical eff ect of apexification of open apex teeth of adult patients by using calcium hydroxide [Ca(OH)2] has been lacking. [4,].

In 2013, Costa et al. [5] reported a successful application of apexification at the maxillary lateral incisorofan adult patient, while in 2015, Caliskan and Kaval [3] published a manuscript that documented Ca(OH)2 treatment that eff ectively established spontaneous hard tissue barrier in the upper central incisors of three adult patients. These are the only currently available studies that showed the effi cacy of apexification in adults, which are limited in the maxillary incisors. Here, we reported a case that successfully used Ca(OH)2 treatment to induce apex closure in a second premolar of an adult patient with long-term chronic apical periodontitis. [6,7]

(a)

(b)

(c)

(d)

(e)

(f)

CASE REPORT

A24-year-old male patient complained of a sinus tract located in the buccal part of gingiva of the mandibular right posterior area for 2 years. The patient experienced spontaneous pain in his right posterior region of the mandible which vanished. At the time of presentation he was asymptomatic but gave history of swelling and pus discharge which subsided without any medication. His medical history was non-contributory. Clinical examination revealed discolored permanent mandibular right premolar (# 45) which showed no tenderness on percussion and palpation. The tooth showed a negative response to the cold test with Endo Ice and hot test with heated base plate gutta-percha, sensitivity to percussion, and no mobility, whereas there was no significant periodontal pocket around Radiographic examination revealed an immature root with a blunderbuss apex and a periapical shadow with the size about 4mm*3mm . Thus, the clinical diagnosis of tooth #45 was pulp necrosis with chronic periapical periodontitis. [Figure.a,b]. After rubber dam isolation, a conventional endodontic access opening was done under local anesthesia and initial working length was predicted by using paper point method, Then radiograph was taken and working length was confirmed. Gentle instrumentation was done with #80 H-file in circumferential manner. The pulp chamber was abundantly irrigated with 3% hydrogen peroxide and 0.9% saline until no significant hemorrhagic secretion was noticed. As the tooth had a blunderbuss apex, accurate root canal length cannot be measured by electronic root canal length measurement devices; thus, the length of the canal was measured with an X-ray by placing a #40 gutta-percha in the canal and measuring the length of the gutta-percha. The canal was carefully dried with paper point, and a little cotton pellet was put into the canal as drainage. One week later, the patient reported no symptoms since the first appointment. There was no hemorrhage, no pus discharge upon reentry, and the $Ca(OH)_2$ paste mixed with silicone oil was placed into the root canal. Glass-ionomer cement was used to seal the access (Figure (c)). After three months from the first $Ca(OH)_2$ treatment, the patient remained completely asymptomatic, and the patch on the buccal part was disappeared.

The IOPA (X-ray) showed $Ca(OH)_2$ absorption in the canal (Figure (b)). After removing the $Ca(OH)_2$ paste by 0.9% saline, a thin hard barrier was detected, while an open apex was still detectable by X-ray in the treated tooth (Figure (c)). Therefore, a second injection of $Ca(OH)_2$ paste was applied and the access was closed with glass-ionomer cement similar to the initial treatment. Seven months after the first $Ca(OH)_2$ treatment (four months after the second treatment), periapical radiography demonstrated the absorption of $Ca(OH)_2$ paste, significantly narrowed root canal, obviously established root-end barrier, and progressively healed periapical bone with minor radiolucency around the apex (Figure (d)). An apical probing with a #40 K-file was used to confirm the apical barrier, and there was no exudate drainage evident. Then, the canal was washed, dried, and filled with gutta-percha (Figure (e)). The tooth was rebased with glass-ionomer cement and sealed with composite resin. An intraoral examination done two years after the composite resin sealing showed tooth #20 without discoloration and disappearance of the patch in the buccal gingiva .The patient did not return for subsequent follow-ups.

DISCUSSION

Talon cusp is an uncommon developmental dental anomaly characterized by an accessory cusp-like structure mostly projecting from the cingulum area or cementoenamel junction of anterior teeth [8]. Development of teeth is a complex process, making it more vulnerable for many developmental anomalies either in histodifferentiation or morphodifferentiation stages. The etiology of the talon cusp is not clear, several theories have been suggested for their occurrence. The most accepted hypothesis is that this may be a result of an outfolding of enamel organ or hyper productivity of the dental lamina during the morphodifferentiation stage of tooth development [9,10]. Defect occured during morpho-differentiation stage of odontogenesis, can influence shape and size of the tooth without disturbing the function of ameloblasts and odontoblasts [11,12,13]. To consider this projection as a talon cusp, it must extend at least one millimetre or more beyond CEJ [14]. Hattab et al. [15] classified talon cusps as: type I (talon), a morphologically well-delineated additional cusp that extends at least 50% of the distance from the CEJ to the incisal

Successful treatment of open apex depends on the formation of a type of barrier by cells that migrate from the healing periradicular tissues to the apex and differentiate under the influence of specific cellular signals for secreting a cementum osteodentin (bone like) organic matrix [16]. For a decade, the placement of calcium hydroxide within the root canal space has been the standard treatment option to stimulate apical barrier in a developing root with a necrotic pulp. Despite of its advantage for the apexification procedure, calcium hydroxide therapy has some typical disadvantages that include long treatment time (3–21 months), unpredictability of apical closure, difficulty in patient follow up [17] . In addition, because of treatment duration the canal is may susceptible to reinfection because it is covered by a temporary seal and also the thin dentinal walls were susceptible to fracture during treatment. Therefore, the more research required for procedures and materials that may allow for continued apical closure in teeth with immature apices. An

alternative method to long term apexification procedure is to use an artificial apical barrier that allows immediate obturation of the canal.

Other treatment option to $Ca(OH)_2$ for apexification is using an artificial apical barrier with MTA that allows for immediate obturation of the canal. This procedure has slowly gained popularity among clinicians because of its short treatment time. Since clinical success and apical barrier formation were used to assess the efficacy of the treatment provided with $Ca(OH)_2$ and MTA, there was no statistical significance among the two drugs [18]. In addition, thin dentinal walls still present a clinicalproblem

for MTA treatment. Erdem and Sepet [19] suggested that MTA failure in complete healing are due to the unusual width and shape of the canal, difficulties in disinfecting the canal and dentinal tubules, and the porous structure of the apical calcified barrier. Therefore, MTA cannot replace apexification using $Ca(OH)_2$ because of the lack of long-term efficacy, expensive procedural costs, an unrealistic requirement of technology and facilities, and unknown undifferentiated short-term effects [20]. Many other materials have also been used for apexification, but none has truly replaced $Ca(OH)_2$ due to the lack of clinical success [21]. There are also reports about the use of revascularization [423], stem cell regeneration [22-26], and even irrigation with copious amounts of 2.5% NaOCl [24,25,26]. butcases are limited and lack long-term evidence.

In summary, our current case report further demonstrated that $Ca(OH)_2$ can lead to apex closure even if the tooth had a long-term chronic apical periodontitis [25], supporting the hypothesis that apexification can also be applied to adults and not limited to maxillary anterior teeth. Systematic study with more samples and different tooth positions is needed to further confirm the efficiency of apexification with $Ca(OH)_2$ in adult patients.

REFERENCE

1. Pomeroy E. Labial talon cusps: a South American archaeological case in the deciduous dentition and review of a rare trait. Br Dent J. 2009;206(5):27782.

2. Seltzer S. 1988. Endodontology: Biologic Considerations in Endodontic Procedures, Lea & Febiger: Philadelphia, 2nd Edition, 17.

3. American Association of Endodontists, 2003. Glossary of Endodontic Terms, 7th edn.: American Association of Endodontists, Chicago..

4. Charland T, Hartwell GR, Hrischberg C and Patel R. 2013. An evaluation of setting time of mineral tri oxide aggregate and endosequence root repair material in the presence of human blood and minimal essential media, J Endod., 39,1071-1072

5. G. M. Costa, S. M. Soares, L. S. Marques, J. C. Gloria, and J. A. Soares, "Strategy for apexification of wide-open apex associatedwithextensiveperiapicallesioninaweakene droot," General dentistry, vol. 61, no. 3, pp. e2–e4, 2013

6. Askenas BG, Fry HR, Davis JW. Cervical enamel projection with gingival fenestration in a maxillary central incisor: report of a case. Quintessence Int. 1992;23:103-7.

7. Asokan S, Rayen R, Muthu M, Sivakumar N. Crown dilacerations of maxillary right permanent central incisor – a case report. J Indian Soc Pedo Prev Dent. 2004;22:197-200

8. Atkinson SR. The permanent maxillary lateral incisor. Am J Orthod. 1943;29:685-98.

9. Blumberg JE, Hylander WL, Goepp RA. Taurodontism: a biometric study. Am J Phys Anthropol. 1971;34:243-55.

10. Brook AH, Winter GB. Double teeth. A retrospective study of "geminated" and "fused" teeth in children. Br Dent J. 1970;129:123-30.

11. Chohayeb AA. Dilaceration of permanent upper lateral incisors: frequency, direction, and endodontic treatment implications. Oral Surg Oral Med Oral Pathol. 1983;55:519-20.

12. M. K. Caliskan and M. E. Kaval, "Endodontic management of immature teeth with spontaneous apical closure and periapical lesions: case series and review of the literature," Dental Traumatology, vol. 31, no. 4, pp. 324–327, 2015.

13. Deshpande A, Macwan C. Clinical management of rudimentary supernumerary tooth and pegshaped lateral incisor: a case report. RRJDS. 2013;1:1-4.

14. Echeverri EA, Wang MM, Chavaria C, Taylor DL. Multiple dens evaginatus: diagnosis, management, and complications: case report. Pediatr Dent. 1994;16:314-7.

15. Ezoddini AF, Sheikhha MH, Ahmadi H. The prevalence of dental developmental anomalies: a radiographic study. Community Dent Health. 2007;24:140-4.

16. Feichtinger C, Rossiwall B. Taurodontism in human sex chromosome aneuploidy. Arch Oral Biol. 1977;22:327-9.

17. Foran D, Komabayashi T, Lin LM. Concrescence of permanent maxillary second and third molars: case report of non-surgical root canal treatment. J Oral Sci. 2012;54:133-6.

18. Goldstein AR. Enamel pearls as contributing factor in periodontal breakdown. J Am Dent Assoc. 1979;99:210-1.

19. Gorjanovic-Kramberger K. Uber prismatische molarwurzeln rezenter und diluvialer Menschem. Anat Anz. 1908;32:401-30.

20. Guimarães CLA, Firoozmand LM, Dias Almeida J. Double teeth in primary dentition: report of two clinical cases. Med Oral Patol Oral Cir Bucal. 2008;13:E77-E80.

21. Gunduz K, Sumer M, Sumer AP, Gunhan O. Concrescence of a mandibular third molar and a supernumerary fourth molar: report of a rare case. Br Dent J. 2006;200:141-2.

22. Guttal KS, Naikmasur VG, Bhargava P, Bathi RJ. Frequency of developmental dental anomalies in the Indian population. European Journal of Dentistry. 2010;4:263-9.

23. Pomeroy E. Labial talon cusps: a South American archaeological case in the deciduous dentition and review of a rare trait. Br Dent J. 2009;206(5):27782.

24. Gupta R, Thakur N, Thakur S, Gupta B, Gupta M. Talon cusp: A case report with management guidelines for practicing dentists. Dental Hypotheses. 2013;4(2):67-9.

25. Özkan G, Toptaş A, Güneri P. The characteristics and occurrence of the talon cusps in Turkish population: a retrospective sample study. Surg Radiol Anat. 2016;38(9):1105-10.

26. M. Rafter, "Apexification: a review," Dental Traumatology, vol. 21, no. 1, pp. 1–8, 2005.

Journal of Oral and Dental Health

CU-SIL DENTURE - A PROSTHODONTIC REHABILITATION FOR REMAINING SINGLE TOOTH: A CASE REPORT

Abstract

In present day dentistry is about how to be more conservative and to preserve teeth, which will also help in preserving the residual alveolar ridge and the proprioceptive ability of the periodontium. Cu-Sil denture is a relatively simplified approach in the preservation of remaining few teeth thereby fulfilling all above purposes. It is a newer type of transitional denture. Cu-sil denture has holes that are joined with a rubber gasket which clasps the neck of natural tooth. On the other hand, it's a challenge to achieve patient's gratification in case where single posterior tooth present in maxillary arch. In this clinical report we will be discussing on the rehabilitation of a patient with Cu-Sil like denture for the partial edentulous maxillary arch and conventional complete denture for edentulous mandibular arch.

Keywords: Cu-Sil denture, conventional complete denture
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INTRODUCTION

De Van stated "the perpetual preservation of that which remains and not the meticulous replacement of that which has been lost." The prime focus of present-day dentistry is on how we can preserve natural teeth, in order to preserve alveolar ridge integrity and proprioceptive ability of periodontium. It also has positive psychological effect on patient. For patients with very few remaining teeth has treatment options like transitional dentures(Cu-sil dentures). Cu-sil is the simplest and the gentlest removable partial available. It is an acrylic, tissue-bearing appliance that includes a soft elastomeric seal that clasps the neck of every natural tooth, sealing out food and fluids, and cushioning and splinting everynatural tooth from the hard-acrylic denture base. Cu-sil dentures also require some special armamentarium and material in their processing phase. This case report presents an alternative technique to fabricate Cu-sil like dentures.[1]

A Cu-Sil denture is essentially a complete denture featuring a soft elastomeric gasket which clasps the neck of all the remaining natural tooth/teeth, thereby allowing to seal food and fluids, and facilitates cushioning and splinting of all the natural tooth/teeth from the hard-acrylic denture base. In this clinical report rehabilitation of a patient with Cu-Sil like denture for the partial edentulous maxillary arch and conventional complete denture for edentulous mandibular arch have been discussed.[2-4]

Indications for the Cu-sil overdenture

1) Any patient with mobile, isolated, or periodontally concerned teeth whose last resort seems to be an immediate full denture.
2) When natural maxillary teeth are to oppose a mandibular complete denture.
3) A patient who does not need to lose his remaining teeth, however, cannot be adequately treated with fixed or other removable partial dentures could be a Cu-sil denture candidate.
4) A patient with a number of remaining teeth whose mucous membrane, supporting bone, or general health, suggests a poor prognosis for complete dentures.

Advantages of Cu-sil overdentures

1) There is less time, effort and precision required in chairside and laboratory procedures. No special tooth preps or impression techniques are required.
2) Vertical dimension and original bite are automatically maintained.
3) The Cu-sil denture is more affordable since endodontic therapy is not needed. Extraction costs are also reduced.

4) Previous bone loss is rejuvenated. Tissue response is exceptional. Denture stability and retention are achieved even is only one or two teeth are retained.

5) Proprio-sensitivity is maintained, potential psychological impact is avoided, and less trauma is realized when patient is not rendered totally edentulous.

6) Cu-sil partial dentures eliminate clasps and preserve dentition. They stabilize, cushion and splint teeth with an elastomeric gasket that provides retention and seals out food. Stops trauma, stress, and wear to teeth caused by torque-inducing metal partials.

CASE REPORT

A 54-year-old male patient reported to the Department of Prosthodontics at Mithila Minority Dental College and Hospital, with the chief complaint of difficulty in chewing due to absence of teeth and wanted a replacement of missing teeth. His past dental history revealed extraction of teeth in both upper and lower jaw 9th months backs and didn't report any significant medical history. On Extraoral examination white patches were seen on face, hand and other body parts which he reported to be present since childhood and for that he has never taken medicine. On examining intra-orally it was found that the patient presented with only one tooth remaining in maxillary arch. 17 was immobile and had slight recession [Figure 1a-c]. The patient was advised for extraction of that single tooth but he was not willing for any other procedures apart from replacement of his missing teeth. So Finally, Cu-sil denture was planned in the maxillary arch and conventional complete denture in mandibular arch.

Fig 1(a)

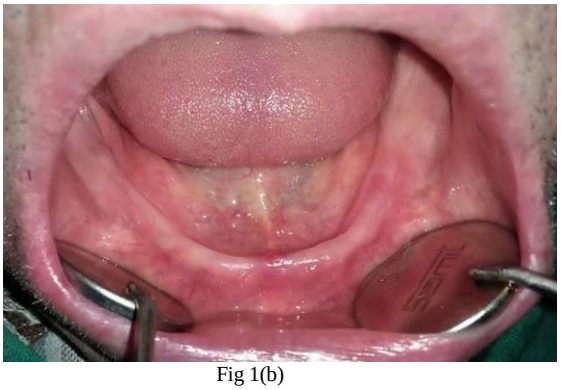

Fig 1(b)

Fig 1(a)(b) Pre-operative intra-oral photograph of maxillary and mandibular arch

Fig 1(a) Pre-operative photograph of a patient in occlusal view

PROCEDURE

Primary impression of maxillary arch was made with irreversible hydrocolloid impression material alginate (DPI) And mandibular arch impression was made with impression compound (DPI) [Figure2]. The study cast was obtained. Spacer was placed on the maxillary arch and tooth no. 17 was covered with double layer of modeling wax [Figure 3] and then the custom tray was made using auto-polymerizing acrylic resin. Conventional border molding was done with green stick compound (DPI) and impression was made with zinc oxide eugenol paste (DPI) and left in the mouth over which pickup impression was made using alginate in maxillary arch. The conventional border molding and final impression procedure for mandibular arch [Figure 4]. Secondary casts were made. Jaw relation recorded, try in done and denture processing was done in a conventional manner.

The denture was finished and polished. In the maxillary tooth no. 17 region space was created around the tooth in which acrylic- based soft liners were placed. The denture was again inserted in patient's mouth and held in position till it sets completely. Following setting of the material, denture was removed and excess was trimmed. The denture finishing and polishing was done,tofulfilpatient'scomfort[Figure5a-d].

Post-insertion instructions were given to patient. Denture hygiene explained to patients. The use of denture cleanser with antimicrobial agents was also explained. Patient consent was also taken for use of his photograph for any research purpose.

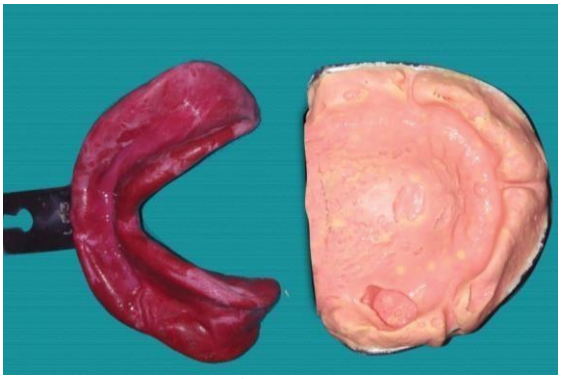

Fig 2 Primary impression of max. and mand. Arch

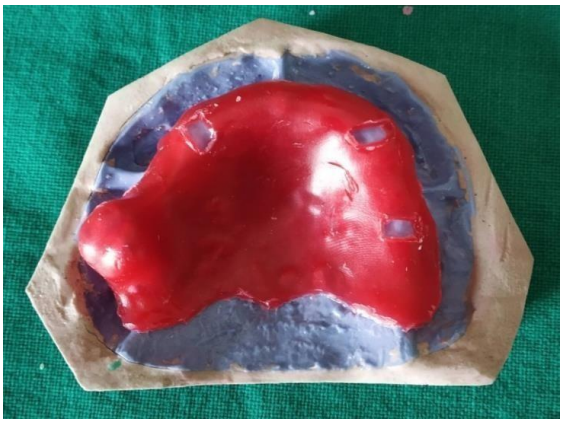

Fig 3. Double wax spacer on tooth

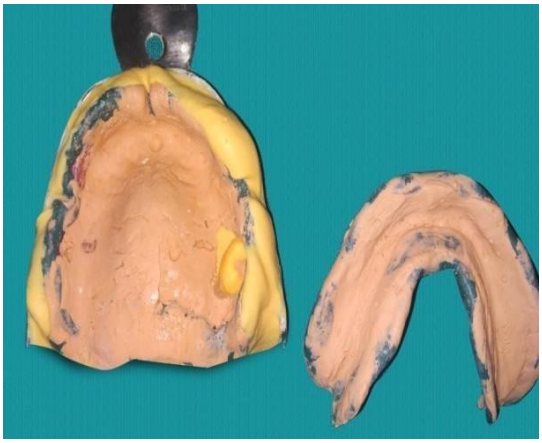

Fig 4 Secondary Impression

Fig 5 a. Cu-sil denture

Fig 5(b)

Fig 5(c)

Fig 5(b)(c). Cu-sil denture insertion in right lateral view and left lateral view.

Fig 5(d). Occlusal view and patient with smile.

DISCUSSION

Cu-sil dentures are designed to preserve the remaining natural teeth and in turn the alveolar bone. They have impact on retention and stability of dentures. Fabrication of Cu-Sil like dentures does not involve invasive procedures, tooth preparations, and extra patient visits. The chairside procedure described in this report increase the retention and stability of the removable prosthesis as well as at the same time, vertical occlusal dimension and proprioception are maintained by remaining natural tooth.

In addition, it offers the patient psychological satisfaction of retaining the natural teeth as they were. Attachment devices are avoided entirely. These dentures are associated with some disadvantage. If, the tooth is lost in future, existing denture can be changed to occupy its place. They function as an answer for single standing or isolated teeth present in dental arch. They are not indicated for patients with large number of teeth evenly distributed across the dental arch. The functional duration of soft liner used is short for 3 years. It needs frequent corrections. Entire gingival margin of remaining teeth is covered leading to plaque accumulation.[5-8]

CONCLUSION

Cu-sil like dentures serve as an alternative treatment for patients with very few remaining teeth. They rest on the soft tissues whereas offering a comfortable fit over existing, healthy tooth structures. An elastic gasket seals itself surrounding the cervical part of every tooth, thereby providing a stable and healthy fit. It promotes healthy stimulation to maintain alveolar bone. Considering the advantages and disadvantages of the technique, Cu-Sil like dentures have evolved to be a suitable treatment option for edentulous patients with very few remaining teeth. Due to its versatility in clinical applications, it one of the most successful designs available today. It does not limit the patient's choice to have an implant-supported prosthesis, whenever they are psychologically and financially prepared.

REFERENCE

1) Crum RJ, Rooney GE Jr. Alveolar bone loss in overdentures: A 5-year study. J Prosthet Dent 1978;40:610-3.

2) Bolender Z. Prosthodontic Treatment for Edentulous Patients. 12th ed. St. Louis, MO: Mosby; 2013. p. 6-23, 76-160, 190-208.

3) Zarb GA, Bolender CL, Hickey JC, Carlsson GE. Boucher's Prosthodontic Treatment Foredentulous Patients. 10th ed. St. Louis, MO: Mosby; 1997. p. 71- 99.

4) 2. Sheldon Winkler: Essentials of complete denture prosthodontics, 2nd ed.IshiyakuEuroAmericaInc.U.S.A. 22-34,384-402.

5) Ivy S. Schwartz and Robert M. Morrow: Overdentures- Principles and Procedures. The Dental Clinics of North America 1996: 40-1:169-94.

6) Carlsson GE. Clinical morbidity and sequelae of treatment with complete dentures. J Prosthet Dent 1998;79:17-23.

7) Norling BK, Reisbick MH. The effect of nonionic surfactants on bubble entrapment in elastomeric impression materials. J Prosthet Dent 1979;42:342-7.

8) Smith S, Heffler S, Freeland M. The next decade of health spending: A new outlook. The National Health Expenditures Projection Tea. Health Aff (Millwood) 1999;18:86-95.

Journal of Oral and Dental Health

MANAGEMENT OF ANKYLOGLOSSIA WITH DIFFERENT CLINICAL APPROACH- A SERIES OF CASE REPORT

Abstract

The frenum is a membranous fold that attaches the lip and the cheek to the alveolar mucosa, the gingiva, and the underlying periosteum. The frenum may affect and detoriate the gingival health when they are attached too closely to the gingival margin, either due to an interference in the plaque control or due to a muscle pull.The purposes of this report is to describe ankyloglossia, its clinical significance, and the comparison of various treatment approaches.

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INTRODUCTION

Tongue-tie or ankyloglossia is a congenital anomaly or defect of oral cavity which restricts the mobility of the tongue tip and is caused by unusually short , thick lingual frenulum,which is a membranous structure connecting the undersurface of the tongue to the floor of the mouth.[1]

Ankyloglossia is categorized various degree of severity from mild cases characterized by thick mucous membrane bands to totally ankyloglostic child. In ankyloglossia thick mucous membrane bands restricts tongue movements and prevent the tongue from touching the anterior palate. This may affect an infantile swallowing and hamper the progression to an adult –like swallowing which can result in an open bite deformity.[2]

The first notice of ankyloglossia often done by the parent or the primary care giver. The most suitable time for a child's first dental visit is early, it is important and required from a pediatric dentist to be familiar with all possible pathologies occurring during this early period of life. The parents of infants and toddlers often notice in their child a "tonguetie" consult immediately to their doctor or pediatric dentist for a advice and help. Treatment options such as observation, speech therapy, frenotomy without anesthesia and frenectomy under general anesthesia have all been suggested in the literature. [3,4]

CASE REPORT

Case Number 1- A 10 years old female patient reported to the department of pediatric and preventive dentistry with a chief complain of difficulty in protrusion and lifting of tip of the tongue (Figure 1).

Figure 1

Case Number 2- A 11 years old male child reported to the department of pediatric and preventive dentistry with a chief complain of missing teeth (Figure 2).

Figure 2

Case Number 3- A 8 years old male child reported to the department of pediatric and preventive dentistry with a chief complain of difficulty in speech (Figure 3)

Figure 3

CLINICAL ASSESSMENT

All cases were assessed clinically by Kotlow's criteria (Table 1, Figure 4) by comparing with the normal range of motion of tongue .[3] Another assessment tool is Hazelbaker's assessment tool (Table 2) comparing the movement and appearance of tongue.[5] Speech analysis was done to analyse the defect.[6,7]

When came to the diagnosis of ankyloglossia, patient parents were informed about the defect, its consequences and the various type of surgical approaches for the treatment of same. Hematological investigations of the patients were done and found within normal range. Informed consent were obtained from the parents. The three cases were treated with three different modalities that is case 1 with conventional scalpel technique, case 2 with electrocautery and case-3 with soft tissue laser.

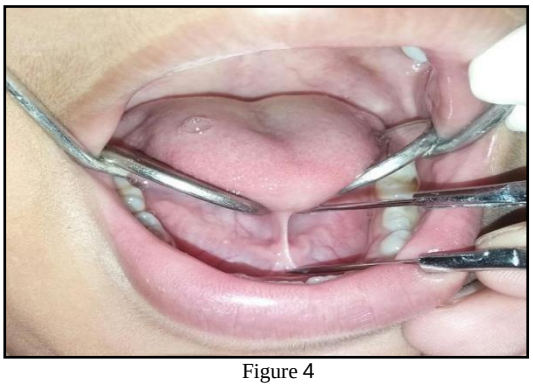


Figure 4

TABLE 1- Kotlow's classification

Type	Movement of the tongue
Clinically acceptable, normal range of free Tongue movement	Greater than 16 mm
Class 1 Mild ankyloglossia	12 to 16 mm
Class 2 Moderate ankyloglossia	8 to 11 mm
Class 3 Severe ankyloglossia	3 to 7 mm
Class 4 Complete ankyloglossia	less than 3 mm

TABLE 2- Hazel baker Assessment tool for appearance and function of the tongue.

Appearance	Function
Appearance of tongue lifted	Lateralization
2: Round or square 1: Slight cleft in tip apparent 0: Heart or V shaped	2: Complete 1: body or tongue but no tongue tip 0: none
Elasticity of frenulum	Lift of tongue
2: Very elastic 1: Moderately elastic 0: Little or no elasticity	2: Tip to mid-mouth 1: Only edges to mid-mouth 0: Tip stays at lower alveolar ridge or Rises to mid-mouth only with jaw Closure
Length of lingual frenulum when tongue Lifted	Extension of tongue
2:>1 cm 1:1 cm 0:< cm	2: Tip over lower lip 1: Tip over lower gum only 0: Neither of the above, or anterior or Mid-tongue humps
Attachment of lingual frenulum to tongue	Spread of anterior tongue
2: Posterior to tip 1: At tip 0: Notched tip	2: Complete 1: Moderate of partial 0: Little or none
Attachment of lingual frenulum to inferior alveolar ridge	Cupping
2:Attached to floor or mouth or well below ridge. 1:Attached just below ridge. 0:Attached at ridge	2: Entire edge, firm cup 1:Side edges only, moderate cup 0:Poor or no cup
	Peristalsis
	2: Complete, anterior or posterior. 1: Partial, originating posterior to tip. 0: None or reverse

14= perfect score, 11=Acceptable if appearance score is 10, frenectomy if function score <11 and appearance score<8

CLINICAL MANAGEMENT

First case was done with conventional scalpel approach, topical anesthesia applied to ventral surface of tongue following with block anesthesia. Tw hemostat was placed to clamp the frenum, incision was given above and below the hemostat to incise the frenum completely. Suture was placed, patient called after seven days.(Figure 5)

Second case was done with electrocautery after application of anesthesia. Frenum incised, suture placed, patient called after seven days.(Figure 6)

Third case was done with soft tissue laser(Biolase laser), anesthetic application done. Frenum was released from top to bottom of frenal attachment in a continuous mode. Post-operative instructions was given patient called after seven days.(Figure 7)

In all cases,after seven days suture were removed. Speech of the patient was analysed, post-operative tongue movement exercises were told to the patients.

RESULTS

Significant improvement in ankyloglossia was observed, free tongue movement increased from 9,11 and 11mm to 13,14 and 14mm respectively in case first second and third.

Operative time: Amongst all the technique laser takes minimum time followed by electrocautery and then by convention scalpel technique.

Bleeding: Intervention by laser and electrocautery were bloodlessas compared to convention scalpel technique.

Suturing: Suturing done in case of convention scalpel technique and electrocautery while in laser suture was not given.

Pain: Amongst the three approaches pain was maximum in blade approach followed by electrocautery then by laser.

Post-operative medication: In blade approach antibiotics and analgesics were given, in electrocautery and laser only analgesics were given on sos.

Edema: No edema seen in laser and electrocautery while it was seen in scalpel technique.

Wound contracture and scarring: Wound contracture and scarring is maximum in conventional scalpel technique followed by electrocautery and laser.

DISCUSSION

Definition of ankyloglossia comprises of description as well as absolute measurements.

Measurement include the length of the lingual frenulum when the tongue is lifted and the length of free tongue.[8]

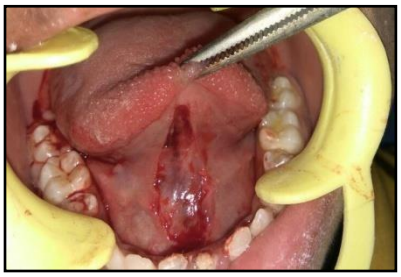
According to Wallace, functional definition includes a condition in which the tip of the tongue can not be protruded beyond the edge of the lower incisor teeth. Indentation found at the ventral aspect of tongue due to attemted protrusion of the tongue.

Complete ankyloglossia is an extremely rare condition in which extensive fusion of the tongue to the floor of mouth occurs.[9]

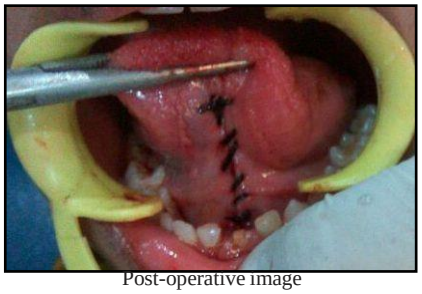
CONCLUSION

This case reports shows that amongst all the three treatment modalities for lingual frenectomy
Laser and electrocautery provides better patient perception related to post-operative pain, edema, post-operative medication and operating time than that obtained by conventional scalpel technique.

Pre-operative image



Operative image



Post-operative image

Figure: 5 Treatment of case 1 with conventional scalpel technique

Pre-operative image

Operative image

Post-operative image

Figure: 6 Treatment of case 2 with electrocautery approach

Pre-operative image

Operative image

Post-operative image

Figure: 5 Treatment of case 3 with laser

REFERENCE

1) Messner AH, Lalakea ML. The effect of ankyloglossia on speech in children. Otolaryngology-Head and Neck Surgery. 2012;127(6):539–45.

2) Horton CE, Crawford HH, Adamson JE, Ashbell TS. Tongue-tie. The Cleft palate journal. 1969;6:8–23.

3) L. A. Kotlow, "Ankyloglossia (tongue-tie): a diagnostic and treatment quandary," *Quintessence International*, vol. 30, no. 4, pp. 259–262, 1999.

4) Entnet.org [Internet] American Association of otolaryngologist: head and neck surgery: fact sheet, 2012, http://entnet .org/HealthInformation/Ankyloglossia.cfm.

5) A. K. Hazelbaker, The assessment tool for lingual frenulum function (ATLFF): use in a lactation consultant private practice [thesis], Pacific Oaks College, Pasadena, Calif, USA, 1993.

6) H. E. Darshan and P. M. Pavithra, "Tongue tie: from confusion to clarity-a review," International Journal of Dental Clinics, vol. 3, pp. 48–51, 2011.

7) N. Ketty and P. A. Sciullo, "Ankyloglossia with psychological implications," ASDC Journal of Dentistry for Children, vol. 41, no. 1, pp. 43–46, 1974.

8) R. V. Johnson, "Tongue-tie—exploding the myths," *Infant*, vol. 2, pp. 96–99, 2006.

9) J. Ballard, C. Chantry, and C. R. Howard, "Guidelines for the evaluation and management of neonatal ankyloglossia and its complications in the breastfeeding dyad,"Academy ofBreastfeeding

Medicine, 2004, http://www.bfmed.org/Media/Files/ Protocols/ankyloglossia.pdf.

Journal of Oral and Dental Health

MANAGEMENT OF EARLY CHILDHOOD CARIES- A CASE REPORT

Abstract

In early childhood caries, there is rapid and early pulpal involvement and severe destruction of maxillary anterior teeth and posterior teeth occures. Treatment of such caries represents a challenge to paediatric dentists especially, when teeth are grossly carious. When chid come to the dentist most of the coronal structure of tooth is destroyed. This case reports challenging task of a Case of early childhood caries patients with mutilated maxillary incisors restored with a strip form composite restorations. The present case reports describes the oral rehabilitation of a child with ECC whose dentition was restored with techniques using composites, omega loop formed with stainless steel wire and strip crown.

Keywords: Early childhood caries, Composite, Strip crowns

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INTRODUCTION

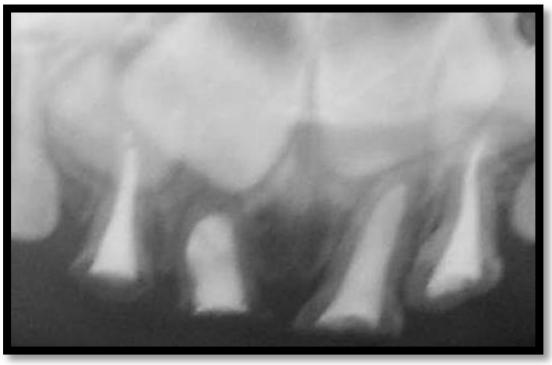
Early childhood caries (ECC) is still most prevalent diseases in children worldwide. ECC does not only affect children's oral health, but also the general health of children[1,2]. ECC is defined as the presence of one or many decayed, missing, or filled tooth surfaces in primary tooth in a child at 71 months of age or younger than that. It has unique characteristics in clinical appearance such as rapid development of caries, which affects a number of teeth after they emerge in oral cavity. The lesions involve tooth surfaces that are less prone to caries development. There are various terminologies which is used synonymously to ECC such as nursing bottle caries, rampant caries, nursing caries, baby bottle caries, prolonged nursing habit caries and milk bottle syndrome. ECC is a multi-factorial disease that occurs as a outcome of these factors with each other like microorganisms having cariogenic potential, exposure to fermentable carbohydrates through inappropriate feeding practices. ECC is a health condition found among children living in socially disadvantaged communities in which malnutrition is a social and health disparity [3,4].

ECC is known to be a multi-factorial disease. Sugary food and beverages can lead to a dysbiotic state of the microbial composition may lead to caries. ECC is also known as "baby bottle caries," feeding practices are noticed as main risk factor developing ECC [5,6,7]. Here, the upper incisors and molars are affected at first, followed by the molars ofthe lower jaw and finally thelowerjawincisors[8]. Children having habit of sleeping with bottles which is filled with milk containing sugars are at high risk for developing ECC. As a consequence of drinking during night time, without clearance of sugars, the oral bacteria will produce lactic acid rapidly, demineralizing the enamel [9,10]. However, unemployment and migration background, found as risk factors for spatial disparities in ECC [11]. Apart from these factors there are certain factors which are very important that ultimately increases the risk of developing ECC such as irregular toothbrushing and/or toothbrushing without supervision of parents or caregivers [12].

CASE REPORT

CASE 1

A three and half year old child patient accompanied by the mother reported to the department of paediatric and preventive dentistry.(mithila minority dental college and hospital), chief complaint of discolored and decayed teeth which were asymptomatic. The mother was concerned with the change in colour associated cavitation on the teeth. Intraoral examination revealed carious teeth associated with loss of coronal structure i.r.t 51, 52, 61, 62 and grossly decayed 74,84. A Provisonal diagnosis of chronic irreversible pulpitis was made.



pre-op a) intraoral photograph showing loss of 2/3rd coronal structure i.r.t 51,52,61,62.

b) pulpectomy done i.r.t 51,52,61,62

c) intraoral clinical photograph showing omega loop cementation done in upper incisor.

d) try in of strip crown.

CASE 2

a) intraoral photograph showing early childhood caries

b) intraoral clinical photograph showing omega loop cementation done.

c) tooth restored with composite using strip crown

d) happy patient satisfied with the treatment

CASE 3

a) intraoral photograph showing early childhood caries.

b) iopar showing obturation of 51,52

c) tooth restored with composite using strip crown.

DISCUSSION

The premature loss or grossly decayed primary anterior teeth due to ECC may compromise patient's self-esteem, embarrass and psychologically traumatize a young child. It can also affect nutritional intake, oral development and lead to malocclusion. The untreated decayed teeth may result in pain and infection which lead to damage to the developing permanent tooth and feelings of personal inadequacy. Restorative treatment modalities for early childhood caries are related to stage of advancement of lesions. When there is severe loss of coronal tooth structure, short posts are placed inside the canal after endodontic treatment to give retention, provide stability to the reconstructed crown, and withstand masticatory forces in function. In the restoration of the anterior teeth, esthetics and mechanical resistance to fracture are of great importance for obtaining a long-lasting result, which can be attained through reinforcement with omega loop made up with stainless steel wire.

There are various indications for strip crowns like extensive decay in the primary anterior teeth, teeth showing discoloration, teeth which is malformed or fractured, and as a covering for the teeth after pulp therapy procedure. There are certain situations where strip crown is contraindicated like primary teeth with severe decay that there is not sufficient tooth structure for retention and bonding, cases with deep overbites, and in children with periodontal disease[13,14]

CONCLUSION

The composite strip crown is the most esthetic of all the restorations available to the clinician for the treatment of severely decayed primary incisors It was easy to perform, low cost and benefited the child immediately. There is excellent parental satisfaction for the treatment of primary incisors with huge or multi-surface caries with bonded resin composite strip crowns.

REFERENCE

1) Naidu R, Nunn J, Donnelly-Swift E. "Oral health-related quality of life and early childhood caries among preschool children in Trinidad, " BMC Oral Health, 2016;16(1):128.

2) Filstrup SL, Briskie D, Dafoneca M, Wandera LL, Inglehart MR, ¨Early childhood caries and quality of life : child and parent perspective," Pediatric Dentistry, 2003;25(5):431-40

3) De Grauwe A, Aps JK, Martens LC. Early childhood caries (ECC): what's in a name? Eur J Paediatr Dent (2004);5(2):62–70.

4) Feldens CA, Giugliani ER, Duncan BB, Drachler Mde L, Vitolo MR. Long-term effectiveness of a nutritional program in reducing early childhood caries: a randomized trial. Community Dent Oral Epidemiol (2010) 38(4):324–32. doi:10.1111/j.1600-0528.2010.00540

5) Righolt AJ, Jevdjevic M, Marcenes W, Listl S, "Global-Regional and country level economic impacts of dental disease in 2015," J dent Res, 2018;97(5):501-07

6) Anil S, Anand PS, "Early childhood caries: prevalence, risk factors, and prevention," Frontiers Pediatrics, 2017;5:157

7) Feldens CA, Rodrigues PH, DeAnestacio G, Vitolo MR, Chaffee BW, Feeding frequency in infancy and dental caries in childhood: in prospective cohort study, Int. dent. J, 2017;68(2):113-21

8) Wyne AH, "Early childhood caries: nomenclature and case definition," Community Dent. Oral Epedemilol,1999;27(5):313–15

9) Colak H, Dulgergil CT,Dall M,Hamidi MM,"Early childhood caries update: a review of causes, diagnoses, and treatments," J Natural Sci., Biology, and Medicine, 2013; 4(1):29–38

10) Avila WM, Pordeus IA, Paiva SM, Martins CC, "Breast and bottle feeding as risk factors for dental caries: a systematic review and meta-analysis," PLOS One, 2015;10(11)

11) Meyer F, Karch A, Schlinkmann KM , "Sociodemographic determinants of spatial disparities in early childhood caries: an ecological analysis in Braunschweig, Germany," Community Dent. Oral Epidemilol,2017; 45(5):442–48

12) Prakash P, Subramaniam P, Durgesh BH, Konde S, "Prevalence of early childhood caries and associated risk factors in preschool children of urban Bangalore, India: across-sectionalstudy,"E J Dent.,2012;6,(2):141-52

13) Abu-Hussein M ., Watted N ., Abdulgani Azz ., Abu-Shilabayeh H. ; Anterior dental esthetics in primary teeth; International Journal of Public Health Research 2015;4(1),25-36 03

14) Webber DL, Epstein, NB., Wong JW., Tsamtsouris A.,A method of restoring primary anterior teeth with the aid of a celluloid crown form and composite resins. Pediatr Dent,1979, 1(4), 244-46.

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FREE GINDIVAL GRAFT TO CHANGE THE GINGIVAL PHENOTYPE: CLINICAL CASE REPORT CONNECTIVE TISSUE GRAFT FOR AUGMENTATION OF KERATINIZED TISSUE AT LOWER INCISOR: A CASE REPORT

Abstract

Plaque accumulation may cause gingival recession especially at sites with a thin periodontal biotype and difficulty in tooth cleaning. This gingival defect may in the long term progress without treatment and lead to losing teeth. In this case a 32-years-old woman consulted for modification of her marginal gingiva at lower incisors. Adequate sanitation and motivation led to regression of periodontal disease and reduce gingival inflammation. Due to the thin gingival biotype and sensitivity progression at the lower incisor patient was prepared for periodontal plastic surgery. Thin gingival dimensions indicates the use of free gingival auto graft Augmentation to correct the defect increase keratinized tissue and prevent tissue loss. The use of free gingival graft as a predictable therapy increases width and thickness of the marginal keratinized tissue.

Keywords: Gingival; Keratinized; Augmentation.

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INTRODUCTION

The presence of an adequate zone of gingiva is considered critical for the maintenance of gingival health and for the prevention of progressive loss of connective tissue attachment.[1] The study by Lang and Loe regarding the significance of gingiva for periodontal health concluded that "two mm of keratinized gingiva is adequate to maintain gingival health" and this expression has been widely quoted as definition as to what constitutes an adequate width of gingiva for the maintenance of periodontal health. The importance of attached gingiva has also been acknowledged by Goldman and Cohen in 1979 who gave a "tissue barrier" concept and postulated that a dense collagenous band of connective tissue retards and obstructs the spread of inflammation better than does the loose fiber arrangement of the alveolar mucosa.

They recommended increasing the zone of keratinized attached tissue to achieve an adequate tissue barrier (thick tissue) thus limiting recession as a result of inflammation.[2] A thick keratinized attached gingiva is capable to withstand the stresses of mastication, tooth brushing, trauma from foreign objects, tooth preparation associated with a crown and bridge, subgingival restorations orthodontics inflammation and frenum pull as well as prevent the apical spread of plaque-associated gingival lesions.4 This can be achieved by mucogingival surgical techniques which are designed to provide a functionally and esthetically adequate zone of keratinized attached gingival.[3] Three major parameters are associated with increased susceptibility to gingival recession: thin gingival tissue; muco-gingival conditions; and inflammatory periodontal diseases. It's suggested that gingival recession occurs primarily as a consequence of periodontal diseases. The presences of specific periodontal pathogens cause connective tissue attachment loss that may be manifested with gingival recession at all tooth surfaces of keratinized attached gingiva. First described by Bjorn (1963) free gingival grafts have been widely used in the treatment of certain mucogingival problems like lack of attached gingiva and gingival recession.[4] By using this technique, attached gingiva can be increased in a very predictable way. Furthermore, the results obtained using this procedure has been reported to be stable.

A keratinized tissue augmentation procedure aims to provide qualitative changes to the soft tissues apical to the gingival margin especially in the absence of keratinized tissue

CASE PRESENTATION

A 32-years-old woman reported to the department of periodontics and implantology, Mihila minority dental collage and hospital Bihar, with chief complaint of thin gingiva and sensitivity. She consulted to the dep. for a modification of her marginal gingiva in lower incisors (Figure 1). According to the questioning, the patient did not show any general problem and no drug intake was reported. Due to the progressive buccal gingival thinning of lower ant.., region (31,32,41,42) associated with frenal pull and the root hypersensitivity was related. The goal of muco-gingival

surgery as curative periodontal therapy was to increases the keratinized gingiva and secure to prevent further gin. recession.

Fig 1- Thin attached attached gingival wrt lower anterior

CLINICAL MANAGEMENT

The initial periodontal therapy was done. The non-surgical treatment started with scaling and root planning and completed with systemic anti-infective therapy. Adequate sanitation and oral hygiene aimed to regression of bleeding on probing and to stabilize periodontal disease at recall

The surgery started with peri buccal and intra buccal mouth rinse with antiseptic solution. After administration of local anesthesia the recipient site was prepared by making an initial stab incision just at the mucogingival junction with a No. 15 blade with the continuation of incision both horizontally and apically. After that, removed the residual alveolar mucosa at the mucogingival junction and tinfoil template was placed to establish the size of donor tissue. Tinfoil was placed at donor site at maxillary palate and outline was marked and the graft was dissected (Fig. 2). After that graft was placed at recipient site and secured with sutured and a periodontal dressing was used over the surgical sites (Fig. 3). The suture was removed after 10 days and wound healing was normal and at the interval of 3 months, the width of the attached gingiva was found (Fig. 4)

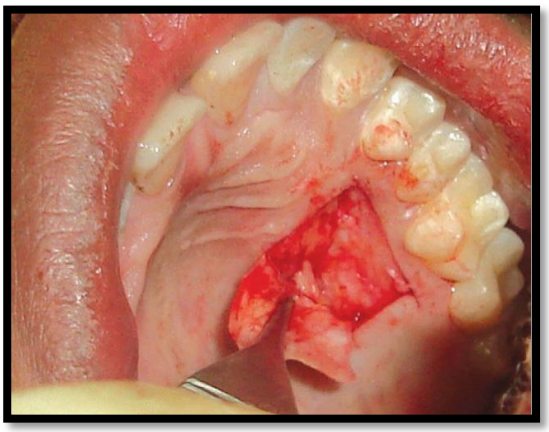

Fig 2- Harvesting graft from the palate.

Fig 3- Graft secured with sutures at the recipient site

Fig 4- Three month post-operatively.

RESULTS

Patient come to the department after 10 days suture rmoval was done and satisfactory kiretinized tissue width was gain wrt 31,32.41.42(fig 4) .

DISCUSSION

Mucogingival therapy includes increasing the dimensions of the gingival tissues to stop or prevent recession, to facilitate plaque control, and to improve aesthetics and to reduce or eliminate root sensitivity.[1] More recently a lot of emphasis has also been laid on the soft tissue biotype and its influence as either an etiology or modifying factor leading to recession. Broadly, two extreme tissue biotypes have been described, namely, "thin tissue biotype" characterized by a thin, highly scalloped gingival margin and slender teeth and "thick tissue biotype"characterized by slightly scalloped gingival margin and relatively shorter and wider teeth. A tendency towards greater and more stable soft tissue regain following crown lengthening procedures has been observed around teeth with relatively thicker tissue biotype.[5]

REFERENCE

1) Saygun Isyl, Karacay Seniz, Ozdemire Atilla, et al. Multidisciplinary treatment approach for the localized gingival recession: a case report. Turk J Med Sci. 2005;35:57e63.

2) Lang NP, Loe H. The relationship between the width of keratinized gingiva and gingival health. J Periodontol. 1972;43: 623e627.

3) Cohen Edward. Mucogingival Surgery. Atlas of Cosmetic and Reconstructive Periodontal Surgery. 3rd ed. Hamilton: BC Deker Inc; 2006:45.

4) Bjorn H. Free transplantation of gingiva propria. Sven Tandlak Tidskr. 1963;22:684e689

5) R. T. Kao and K. Pasquinelli, "Thick vs. thin gingival tissue: a key determinant in tissue response to disease and restorative treatment," *Journal of the California Dental Association*, vol. 30, no. 7, pp. 521–526, 2002

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COMPARISON OF OPEN AND CLOSED REDUCTION OF CONDYLE FRACTURE

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Abstract

Aims & objective: - The aim of this prospective randomized study was to compare operative and conservative treatment of displaced condylar fractures of the mandible.

Methods and patients: Out of a total of 20 randomized patients from Buddha institute of dental science & hospital Patna, 20 patients with mandibular condylar process completed the study and were evaluated. All fractures were displaced, being either angulated between 101 and 451 or the ascending ramus was shortened by more than 2 mm. The follow-up examinations 6 weeks and 6 months following treatment included evaluation of radiographic measurements, clinical, functional and subjective parameters including visual analogue scale for pain and the Mandibular Function Impairment Questionnaire index for dysfunction.

Results: Correct anatomical position of the fragments was achieved significantly more often in the operative group in contrast to the closed treatment group. Regarding mouth opening/lateral excursion/protrusion, significant (p ¼ 0.01) differences were observed between both groups (open 47/16/7mm versus c losed 41/13/5mm). The visual analogue scoring revealed significant (p ¼ 0.03) differences with less pain in the operative treatment group (2.9 open versus 13.5 closed).

Conclusion: Both treatment options for condylar fractures of the mandible yielded acceptable results. However, operative treatment, irrespective of the method of internal fixation used, was superior in all objective and subjective functional parameters

Keywords: condyle fracture, approach- access, Reduction- open & closed;Side – effect

INTRODUCTION

Mandibular fractures are frequent in facial trauma, and 25–35% of them involve the condyle. Condylar fractures are classified according to the anatomic location (intracapsular and extra capsular) and according to the degree of dislocation of the articular head[(2)].

Fracture of the condylar process of the mandible present a special problem which has to be treated with care. Many of these fractures go undetected, possibly leading to such after effects as arthropathy, myoarthropathic dysfunction and, if the affected patients are at growing age, temporomandibular ankylosis or facial deformities occur due to a retardation & deviation of facial growth[(1)].

There are two principal therapeutic approaches to these fractures: Closed and Open. Therapeutic decision-making between the options of open reduction and internal fixation (ORIF) versus closed reduction and mandibulomaxillary fixation (MMF) for fractures of the condylar process of the mandible[(3)].

In line with the basic principles of trauma surgery regarding open reduction and internal fixation of displaced fractures, open surgical management has been recognized to be best for fractures of the body of the mandible and of the midface for more than three decades. However, for moderately displaced condylar fractures, closed reduction with rigid or elastic Maxillomandibular fixation is still frequently selected[(4)]. The reasons for this may be the difficult surgical access to the condylar area and the frequently difficult repositioning of the proximal fragment.

Notwithstanding the kind of therapy, clinical treatment aims at pain reduction, re-establishment of occlusal contacts and posterior facial heights with symmetrical gonial angles, and functional restoration of the temporomandibular joints (TMJ)[(5)] (mouth opening [MO] greater than 40 mm, minimal lateral deviation at maximum MO, unrestricted lateral and protrusive movements).

According to several reports, the results of conservative treatment of condylar fracture are satisfactory. Surgery has also been reported to yield good results. However , many authors do not recommend using surgical methods[(1)].Functional therapy is adopted most frequently, since it permits early mobilization and adequate functional stimulation of condyle growth (in growing subjects) and bone remodelling (in all subjects)[(4-6)].

Furthermore, Delaire recommends functional therapy in cases of both high and lower condylar fractures, regardless of

displacement. The results of functional therapy described in the literature are generally good. The condylar fractures treated non-surgically had restoration of the anatomy without important functional or aesthetic consequences. In contrast, surgical treatment is indicated primarily for adults with displaced fractures or with dislocation of the condylar head[5]. However, there is no consensus on the therapeutic approach & hence there is a need to compare the treatment outcomes of management of condyle fracture by open & closed technique.

Recently, we switched from a functional approach to the open technique, to avoid aesthetic and gnathologic problems related to functional methods[7-9]. In this study, we compared the results that we obtained in a homogenous sample of surgically treated condylar fractures with those for a group of patients with similar fractures treated with functional therapy at our institute.

MATERIALS AND METHODS

The study sample for the present prospective, randomized clinical trial was derived from the population of patients presenting to the Division of Oral and Maxillofacial Surgery, BIDSH, PATNA,BIHAR India from AUGUST 2013 to JANUARY 2016,
for evaluation and management of condylar fractures with or without associated mandibular fractures. The study enrollment inclusion criteria included displaced unilateral subcondylar fractures or condylar neck fractures, a degree of deviation between the condylar fragment and the ascending ramus of 10° to 45° either medially or laterally on the poster anterior view of the mandible, and patient age older than 18 years. The exclusion criteria were condylar head fractures, insufficient dentition to reproduce normal occlusion, inability to undergo general anesthesia, any associated midface fractures, any history of temporomandibular joint (TMJ) dysfunction, and a history o occlusal disturbances or skeletal malocclusion. The included patients were divided into 2 groups. Group B patients were treated with closed treatment and rigid Maxillomandibular fixation for 2 weeks followed by elastic Maxillomandibular fixation for 2 weeks, which was extended if needed. The associated fractures in group B were treated by ORIF. Group A patients were treated with ORIF using either 1 or 2 miniplate or delta plate osteosynthesis followed by elastic Maxillomandibular fixation for 2 weeks. Depending on the level of the fracture, retromandibular approach was used for ORIF. The patients were assessed for the maximal interincisal opening, protrusive movements, lateral excursion movements on the fractured and nonfractured sides, anatomic reduction of the condyle on radiography, pain in the TMJ, and malocclusion. Malocclusion and pain in the TMJ were assessed according to the patient's complaint. Malocclusion was considered only if the patient complained of occlusal discrepancies postoperatively. The quantification of malocclusion and pain in the TMJ were not considered. The anatomic reduction of the fractured condyle was observed by tracing the radiographs postoperatively. Parameters such as the maximal interincisal opening, protrusive movement, and lateral excursion movement on fractured and nonfractured sides between the 2 groups were compared statistically using the

Fig: 1- Retromandibular approach to the open reduction (group A patient)

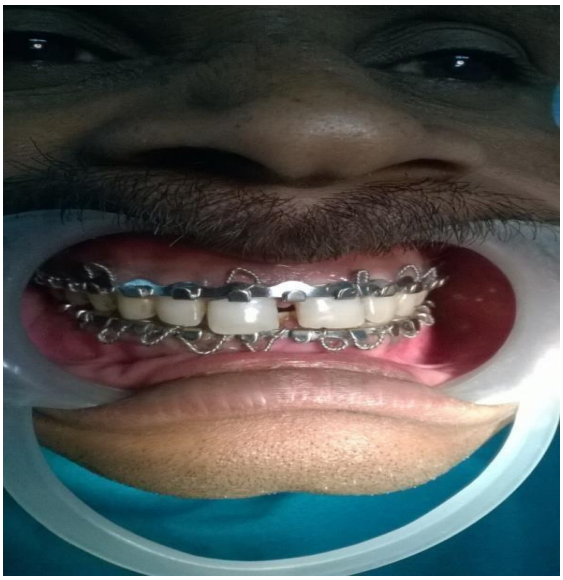

Fig: 2 - patient in group B with IMF

independent *t* test. Parameters such as the anatomic reduction of the condyle, pain in the TMJ, and malocclusion between the 2 groups were compared statistically using the test.

RESULTS

Twenty patients with mandibular condylar fracture (unilateral or bilateral) requiring open reduction & internal fixation or closed reduction & Maxillomandibular fixation were included in the present study. Patients were randomly divided into two equal groups of 10 patients each. Group A patients underwent osteosynthesis using delta plates while Group B patients underwent Maxillomandibular fixation.

Table 1 Graph 1 illustrates the gender distribution of subjects of the present study. Out of 20 patients 85% were males.

Table 2 sample distribution, graph 2 illustrates the age distribution of patients included in the present study. Out of 20 patients, 60.2 % corresponded to the age group of 15-30 year. Road traffic accident, 80% was the leading cause of fracture followed by fall 13.3% and interpersonal violence 6.7% . The operative delay ie. the time interval between trauma and surgery ranged from 30% in 1 week, 23% within 2 weeks and only 20% within 3 days.

The parasymphysis of mandible alone or in combination with condylar fracture was the most commonly involved site ie 60% , followed by parasymphysis and angle combination account for 16.7% and symphysis fracture 16.7%. The number of fractures in an individual with mandibular fracture. 46.7% of the patients had only one fracture, 26.7% of the patients had two fracture site and rest 26.7% of the patients had 3 fracture.
The preoperative dentition of the patients with mandibular condylar fracture. Out of 20 patients, all 100% where dentulous. Table 3 sample distribution graph 3 illustrates the preoperative occlusion of the mandibular fracture patients. Out of 20 patients 43%(n=8) had deranged occlusion and in 63% (n=12) the preoperative occlusion was maintained.

Table 6 illustrates the pre-operative kind of fracture . Out of 20 patients 6 patients with neck fractures without dislocation, 7 patient with neck fracture with dislocation, 4 patients with lower condylar fractures without dislocation, 3 patients with lower condylar fractures with dislocation.

The preoperative clinical examination of patients with mandibular fracture with history of loss of consciousness. Out of 20 patients 25 %(n=5) give the history of loss of consciousness. In comparison the group of closed functionally treated diacapitular mandibular, condylar fractures displayed the largest condylar angle of an average 80.6%. In the group B, the mean reduction in condylar height of 7 mm corresponded to a height reduction of 8.2% when compared to the normal side (Fig. 4). After closed functional treatment, considerable malalignment (notably in the anterior–posterior direction), distinctive changes in condylar form (flattening of the articular condylar surface) and resorption of the fractured condyle were frequently seen (Table 5). A re-modelling process was observed in only one third of the cases. Characteristic condylar deformations were the so-called bifid condyle and loose bodies in the joint with an anterior – posterior malalignment of 5-8 mm in the sagittal plane , however improvement in the fragments position compared to the pre-operative position.

Fig 3:- Post – operative mouth opening after closed reduction

The preoperative assessment of condylar fracture with associated other fractures. 17% of the patients with mandibular fractures had bilateral condylar fracture, 83% had unilateral opposite side condylar fracture .

The mode of anaesthesia used, surgical approach and maxillomandibular fixation required extraorally & intraoperative respectively in patients with mandibular condylar fracture. 100% of the patients were treated under general anaesthesia. Out of 20 patients 50%(n=10) were treated through extraoral approach and all 50% required maxillomandibular fixation intra operatively. the postoperative requirement of maxillomandibular fixation in both the groups. immediate postoperatively in group A out of 10 patients 80%(n=8) did not require MMF whereas in group II all of 10 patients only required MMF . After 1 month 100% in both group I and group II did not require MMF. In comparison among both the groups with respect to requirement of MMF at immediate & one month postoperative period were found statistically not significantwhenFisher'sexacttestwasapplied.

Table 1 :- pre- operative & post operative clinical examination of group A patients with respect to Radiographic investigation

		Mean	N	Std. Deviation	Std. Error Mean	p value of WSR
Pair 1	fragment displacement x ray pre op	8.30	10	2.584	.817	0.000*
	fragment displacement x ray post op	.50	10	.707	.224	
Pair 2	lateral medial clemetschitisch pre op	9.40	10	3.565	1.127	0.000*
	lateral medial clemetschitisch post op	.80	10	.919	.291	
Pair 3	superior inferior OPG pre op	9.20	10	3.190	1.009	0.000*
	superior inferior OPG post op	.90	10	.876	.277	
Pair 4	pain pre op	8.10	10	.738	.233	0.399#
	pain immed	7.70	10	1.059	.335	
Pair 5	pain pre op	8.10	10	.738	.233	0.000*
	pain 3 days	1.80	10	1.033	.327	
Pair 6	pain pre op	8.10	10	.738	.233	0.000*
	pain 15days	.10	10	.316	.100	
Pair 7	pain pre op	8.10	10	.738	.233	0.000*
	pain 1 month	.00	10	.000	.000	
Pair 8	pain immed	7.70	10	1.059	.335	0.00*
	pain 3 days	1.80	10	1.033	.327	
Pair 9	pain immed	7.70	10	1.059	.335	0.000*
	pain 15days	.10	10	.316	.100	
Pair 10	pain immed	7.70	10	1.059	.335	0.000*
	pain 1 month	.00	10	.000	.000	
Pair 11	pain 3 days	1.80	10	1.033	.327	0.011*
	pain 15days	.10	10	.316	.100	
Pair 12	pain 3 days	1.80	10	1.033	.327	0.000*
	pain 1 month	.00	10	.000	.000	
Pair 13	pain 15days	.10	10	.316	.100	0.343#
	pain 1 month	.00	10	.000	.000	
Pair 14	swelling vertical pre op	12.4380	10	.63122	.19961	0.008*
	swelling vertical post op	13.610	10	.7724	.2442	
Pair 15	swelling hor preop	23.580000	10	2.0778194	.6570642	0.027*

		Mean	N	Std. Deviation	Std. Error Mean	p value of WSR
Pair 1	fragment displacement x ray pre op	8.30	10	2.584	.817	0.000*
	fragment displacement x ray post op	.50	10	.707	.224	
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	lateral medial clemetschitisch post op	.80	10	.919	.291	
Pair 3	superior inferior OPG pre op	9.20	10	3.190	1.009	0.000*
	superior inferior OPG post op	.90	10	.876	.277	
Pair 4	pain pre op	8.10	10	.738	.233	0.399#
	pain immed	7.70	10	1.059	.335	
Pair 5	pain pre op	8.10	10	.738	.233	0.000*
	pain 3 days	1.80	10	1.033	.327	
Pair 6	pain pre op	8.10	10	.738	.233	0.000*
	pain 15days	.10	10	.316	.100	
Pair 7	pain pre op	8.10	10	.738	.233	0.000*
	pain 1 month	.00	10	.000	.000	
Pair 8	pain immed	7.70	10	1.059	.335	0.00*
	pain 3 days	1.80	10	1.033	.327	
Pair 9	pain immed	7.70	10	1.059	.335	0.000*
	pain 15days	.10	10	.316	.100	
Pair 10	pain immed	7.70	10	1.059	.335	0.000*
	pain 1 month	.00	10	.000	.000	
Pair 11	pain 3 days	1.80	10	1.033	.327	0.011*
	pain 15days	.10	10	.316	.100	
Pair 12	pain 3 days	1.80	10	1.033	.327	0.000*
	pain 1 month	.00	10	.000	.000	
Pair 13	pain 15days	.10	10	.316	.100	0.343#
	pain 1 month	.00	10	.000	.000	
Pair 14	swelling vertical pre op	12.4380	10	.63122	.19961	0.008*
	swelling vertical post op	13.610	10	.7724	.2442	
Pair 15	swelling hor preop	23.580000	10	2.0778194	.6570642	0.027*
	swelling hor post op	25.080	10	1.3604	.4302	

There was a statistically significant difference seen between various variables when comparison was done ($p<0.05$) except for variables like pre operative pain and immediate pain ($p>0.05$) and pain on 15 days and 1 month was similar.

Table 2 :-pre- operative & post operative clinical examination of group B patients with respect to Radiographic investigation

		Mean	N	Std. Deviation	Std. Error Mean	p value of WSR
Pair 1	fragment displacement x ray pre op	7.40	10	2.875	.909	0.000
	fragment displacement x ray post op	2.00	10	1.491	.471	
Pair 2	lateral medial clemetschitisch pre op	7.90	10	2.644	.836	0.000
	lateral medial clemetschitisch post op	1.40	10	1.174	.371	
Pair 3	superior inferior OPG pre op	4.00	10	3.399	1.075	0.004
	superior inferior OPG post op	1.20	10	1.229	.389	
Pair 4	pain pre op	5.60	10	.843	.267	0.000
	pain immed	8.00	10	.816	.258	
Pair 5	pain pre op	5.60	10	.843	.267	0.591#
	pain 3 days	5.70	10	.823	.260	
Pair 6	pain pre op	5.60	10	.843	.267	0.000
	pain 15days	1.80	10	1.033	.327	
Pair 7	pain pre op	5.60	10	.843	.267	0.000
	pain 1 month	.00	10	.000	.000	
Pair 8	pain immed	8.00	10	.816	.258	0.000
	pain 3 days	5.70	10	.823	.260	
Pair 9	pain immed	8.00	10	.816	.258	0.000
	pain 15days	1.80	10	1.033	.327	
Pair 10	pain immed	8.00	10	.816	.258	0.000
	pain 1 month	.00	10	.000	.000	
Pair 11	pain 3 days	5.70	10	.823	.260	0.000
	pain 15days	1.80	10	1.033	.327	
Pair 12	pain 3 days	5.70	10	.823	.260	0.000
	pain 1 month	.00	10	.000	.000	
Pair 13	pain 15days	1.80	10	1.033	.327	0.000
	pain 1 month	.00	10	.000	.000	
Pair 14	swelling vertical pre op	9.000000	10	.8406347	.2658320	0.001
	swelling vertical post op	7.770000	10	.3198958	.1011599	
Pair 15	swelling hor preop	20.880000	10	1.9589113	.6194621	0.119#
	swelling hor post op	19.130000	10	2.2764739	.7198842	

There was a statistically significant difference seen between various variables when comparison was done ($p<0.05$) except for variables like pre operative pain and pain at 3 days ($p>0.05$) and mean pre op and post op horizontal swellings were similar.

Table 9 graph 9 illustrates the comparison of occlusion in group I and group II postoperatively. On immediate post operatively in group B occlusion was maintained in 87% (n=13) and in group A occlusion was maintained in 93%(n=14) of the patients. On 1st month postoperatively the occlusion was maintained in 93% of the patients in both the groups. On 2nd month and 6th month postoperatively occlusion was maintained in 100% of the patients in group I as well as in group II. In comparison among both the groups with respect to occlusion on immediate , 2nd month and 6th month postoperatively were not found to be statistically significant when Fisher's exact test was applied.

DISCUSSION

Many factors must be considered when deciding whether to perform open or closed treatment of condylarprocess fracture. In adult patients, treatment possibilities vary according to the location and dislocation of the fracture. Non-surgical treatment may be indicated in intracapsular fractures of the condylar head. In comminuted bicondylar fractures in panfacial trauma, which generally includes a decreased height of the posterior face, treatment should be surgical. ZIDE & KENT[1] described the classical absolute and relative indications for surgical reduction in 1983; however, the indication for surgical therapy in relation to the dislocation angle in monocondylar fractures is still under discussion. Several authors suggest surgical therapy, in cases of unilateral fractures in adults, when the dislocation is more than 45^0 to the ramus axis in a frontal view or when the condylar head is dislocated from the glenoid fossa . WIDMARK[2]et al indicate surgical treatment when the dislocation is greater than 30^0 with respect to the longitudinal axies, in both lateral and frontal projections, or when shortening of the ramus of at least 5 mm (as seen radiographically) accompanies the dislocation. In such cases, although non-surgical therapy generally obtains good dental occlusion, it often does not permit complete restoration of mandibular movements. According to LINDAHL[3], persistent dislocation of the condylar fragment must be considered one of the principal causes of masticatory functional disorders following condyle fractures in adults.

The review of Silvennoinen[4] et al. of problems related to non-surgical treatment of disarticulated condylar fractures reports a 17.4% incidence of occlusal disturbance or marked opening deviation. These functional complications, which were attributed to reduction in ramus height or to condyle dislocation from the fossa, suggest adopting open reduction. Hidding[5] et al. compared patients treated surgically and non-surgically, and found no substantial functional difference, although the comparison showed a deviation in opening in 64% of the patients treated with non-surgical therapy and in only 10% of surgically treated patients. Furthermore, lateral movements were limited in the former group, but not in the latter. Anatomic restoration of the mandibular ramus was successful in 95% of surgically treated patients (approx. 10% deviation from normal angulation of the condyle), while in non-operated patients radiological analysis showed incorrect positioning of the condyle in 93% of cases. Worsaae & Thorn[6] demonstrated that, in adults, non-surgically treated dislocated subcondylar fractures produced more complications compared to those treated with open reduction. Finally, Takenoshita[7] compared 16 cases of condylar fracture treated surgically with 20 cases that were treated non-surgically (average follow-up was approximately 2 years) and found no significant functional differences between the two groups. However, it should be noted that the first group in this study included fractures with more severe dislocation and displacement. From our experience, non-surgical management of condylar fractures produces good restoration of jaw movement. However, lateral protrusion movements and morphologic alterations of the ramus have been less satisfactory. Moreover, we have observed that reduced ramus height can cause asymmetry of the jaw and aesthetic proble

Statistics associated with mandibular condylar fracture

The commonest occurance of maxillofacial injuries among males (85%) in the age group of 15-30 years. Which reflects more socially active life led by this age group, is in agreement with the study of fridrich L et al (2002) and gabrielli cabriniAM et al (2003) which reported that more men (85%) were involved in maxillofacial injuries with the highest occurance among those in the 15-39 age group.

In this study majority of patients received trauma due to road traffic accidents (80%) , followed by fall (10%) , violence(10%). In our study, majority of patients were given definitive management within the time lapse of 1 week or 2 week after injury. condyle of mandible alone or in other sites was the most commonly involved sites.

Occlusion

Postoperative two patients in group A and four patients in group B had slight occlusal discrepancy which were successfully corrected by guiding elastics with selective girding in three case. The occlusal discrepancy was seen as a result of the imbalance between the muscular activities of the muscles of mastication after trauma and due to the edema at the TMJ region postoperative. by using guiding elastics this problem was solved. This incidence of occlusal discrepancy was compared between the two groups and the results showed no statically significant difference.

Pain

Pain associated with the procedure was recorded for group A and group B patients during various follow up stages based on a visual analogue scale. on the 3rd post operative day in group A 40% (N-8) patients had mild pain and 60% (n- 12) had moderate pain

Post- operative MMF

Another controversy involves the supplementation of miniplate fixation with intermaxillery fixation/ elastics. Many surgeons felt that miniplate fixation/ delta plate

In this study, there was no difference greater than 2 mm between maximum intercuspation and centric relationship (MI-RC) in the surgically treated group. This difference was marked in the non-surgically treated group, despite the partial compensation derived from progressive flattening of the fossa. The physiological MI-RC distance obtained in surgical patients produced more pleasing aesthetic (symmetry of the lower border and mandibular angles) and occlusal results, owing to the absence of posterior premature contact in lateral and protrusive movement. Our results suggest that, in the long term, incomplete anatomical restoration in non-surgical methods can cause facial asymmetry and inclination of the occlusal plane, as well as functional occlusal problems, such as premature contact in protrusion and lateral protrusion. Moreover, non-surgical treatment, even correctly performed, is lengthy, requires continuous adjustment of the elastics applied to the arch bars, and is more uncomfortable for the patient than open reduction and rigid fixation. Conversely, the relative simplicity of the surgical technique, the absence of complications or negative results (except minimal skin scarring), the faster and better recovery rates, the shorter duration of MMF, and the easier functional therapy, have encouraged us to adopt the surgical approach for borderline cases, such as slightly dislocated or displaced fractures. Patients treated by closed techniques have a disruption in the continuity of their mandible that is as large as the amount of displacement of their fractured condylar process. It should therefore not be surprising that such patients would have a malocclusion. In fact, it is amazing that they do not have malocclusions more. Studies in the literature that have examined the incidence of malocclusion in patients with condylar process fractures treated by closed techniques show great variability. The Chalmers Lyons Study listed only 1 of 118 patients (0.8%) as having a malocclusion. The previously mentioned study by Worsaae and Thorn had a 28% incidence of malocclusion in patients treated by a closed technique. Silvennoinen et al12 examined 92 dentate adult patients with unilateral condylar process fractures (subcondylar or neck) that were treated closed and found that malocclusion developed in 12 patients (13%), necessitating prolonged treatment, averaging 4.6 months. All patients required some form of occlusal rehabilitation, including grinding, functional training, prothetics, and orthognathic surgery. Similar to what we found, patients with fractures of the neck of the condylar process suffered malocclusion to a greater extent than patients with subcondylar fractures. It is probable that the patients treated by open reduction in our study would have had more malocclusions had they been treated using the closed technique. Table 8 suggests that patients treated for more displaced condylar process fractures by closed means are more prone to development of malocclusion than when there is less displacement. Because the initial displacement of the condylar processes was greater in the sample treated by open reduction , it would follow that had they been treated by the closed technique, they would have developed more malocclusions. By treating such patients with open surgery, the initial displacement is corrected, restoring a relatively normal architecture to the mandible. In spite of the findings of this study, other factors must be considered when planning treatment for patients with fractures of the condylar process. Surgical morbidity is the principle concern. Open reduction and internal fixation of condylar process fractures is a delicate operation in an area with many anatomic hazards. One therefore must always weight the potential benefits of open treatment against the potential morbidity that accompanies open surgery. This article presents the results of only 1 outcome measure— dental occlusion. It did not present data on surgical morbidity, such as the character of the scars, damage to the facial nerve, or whether the malocclusions were clinically significant, and so forth, nor did it provide information on the time of surgery, duration of hospitalization, and costs of the 2 forms of treatment. Such information, and a host of other factors, are important when making treatment decisions for fractures of the condylar process.

CONCLUSION

Within the intrinsic limits of this retrospective investigation, and reflecting the literature, inferior condylar neck fractures seem to benefit from ORIF by an extra oral approach which offers immediate mouth opening with very low complications (no nerve palsy, no visible scars). For the fixation of the fracture two miniplate or delta plates seem to be more appropriate than intermaxillery fixation. The treatment of high condylar neck fractures seems also to benefit from ORIF. The retromandibular/transparotid approach shows the best results although the value and advantages of the intermaxillery fixation. The best type of treatment for fractures of the condylar fractures is still a matter of debate. Perhaps sub classifications for this type of fracture including the grade of dislocation or displacement and the anatomical site may answer this question in future trials.

REFERENCE

1) Olaf sandner ,conservative & surgical treatment of condylar fracture of the temporomandibular joint int. journal of oral & maxillofacial surgery 1974

2) G. De Riu, U. Gamba, M. Anghinoni, E. Sesenna:A comparison of open and closed treatment of condylar fractures: a change in philosophy. Int. J. Oral Maxillofac. Surg. 2001;

3) Matthias Schneider, Francois Erasmus, Klaus Louis Gerlach, Eberhard Kuhlisch, Richard A. Loukota, Michael Rasse, Johannes Schubert, Hendrik Terheyden, and UweEckelt,Open Reduction and Internal Fixation Versus Closed Treatment and Mandibulomaxillary Fixation of Fractures of the Mandibular Condylar Process:2008 American Association of Oral and Maxillofacial Surgeons

4) M. Hlawitschka, R. Loukota, U. Eckelt: Functional and radiological results of openand closed treatment of intracapsular (diacapitular) condylar fractures of the mandible. Int. J. Oral Maxillofac. Surg. 2005

5) Anil Kumar Danda, M.R. Muthusekhar, Vinod Narayanan, Open Versus Closed Treatment of Unilateral Subcondylar and Condylar Neck Fractures: A Prospective, Randomized Clinical Study2010

6) Marcy L. Nussbaum, Daniel M. Laskin, Best,Closed Versus Open Reduction of Mandibular Condylar Fractures in Adults:A Meta-Analysis2008 American Association of Oral and Maxillofacial Surgeons 2008

7) C. A. Landes, R. Lipphardt: Prospective evaluation of a pragmatic treatment rationale: open reduction and internal fixation of displaced and dislocated condyle and condylar head fractures and closed reduction of non-displaced, non-dislocated fractures. Part II: high condylar and condylar head fractures. Int. J. Oral Maxillofac. Surg.2005 International Association of Oral and Maxillofacial Surgeons. Published by Elsevier Ltd.

8) Uwe ECKELT, Matthias SCHNEIDER, Francois ERASMUS, Klaus Louis GERLACH, Open versus closed treatment of fractures of the mandibular condylar process–a prospective randomized multi-centre study Journal of Cranio-Maxillofacial Surgery (2006) 34, 306–314r 2006 European Association for Cranio-Maxillofacial Surgery

9) Edward Ellis and Gaylord Throckmorton Facial Symmetry After Closed and Open Treatment of Fractures of the Mandibular Condylar Process 2000 American Association of Oral and Maxillofacial Surgeons 2000

10) Edward Ellis III, Patricia Simon, and Gaylord S. Throckmorton, Occlusal Results After Open or Closed Treatment of Fractures of the Mandibular Condylar Process _ 2000 American Association of Oral and Maxillofacial Surgeons 2000

11) Meike Stiesch-Scholz, Stephan Schmidt, and André Eckardt, Condylar Motion After Open and Closed Treatment of Mandibular Condylar Fractures *2005* American Association of Oral and Maxillofacial Surgeons J Oral Maxillofac Surg 2005

12) Edward Ellis III, and Gaylord S. Throckmorton, Bite Forces After Open or Closed Treatment of Mandibular Condylar Process Fractures© 2001 American Association of Oral and Maxillofacial Surgeons 2001

13) Edward Ellis III. David McFadden, Patricia Simon, and Gaylord Throckmorton, Surgical Complications With Open Treatment of Mandibular Condylar Process Fractures2000 American Association of Oral and Maxillofacial Surgeons doi: /joms.2000.8734

14) Matthias Hlawitschka,, and Uwe Eckelt, Assessment of Patients Treated for Intracapsular Fractures of the Mandibular Condyle by Closed Techniques*2002* American Association of Oral and Maxillofacial Surgeons J Oral Maxillofac Surg 2002

15) Takenoshita Y , OKA M , ISHIBASHI. Comparison of functional recovery after nonsurgical and surgical treatments of condylar fractures. J Oral MaxillofacSurg 1990: 1191–1195.

16) WIDMARK G, BAGENHOLM T, KAHNBERG KE, LINDAHL. Open reduction of subcondylar fractures. Int J Oral Maxillofac Surg 1996: 107–111.

17) WORSAAE N , THORN JJ. Surgical versus nonsurgical treatment of unilateral dislocated low subcondylar fractures. J Oral Maxillofac Surg 1994: 353–360.

18) ZIDE MF, KENT JN. Indications for open reduction of mandibular condyle fractures. J Oral Maxillofac Surg 1983

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