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JIDAK

Jan.- Apr. 2023, Volume 5, Issue 1

JOURNAL OF INDIAN DENTAL ASSOCIATION - KOCHI



INDIAN DENTAL ASSOCIATION

KOCHI BRANCH



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Jan.-Apr. 2023, Volume 5, Issue 1

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Journal of Indian Association of Kochi Branch (JIDAK) is the official scientific publication of Indian Dental Association, Kochi Branch. It is a peer-reviewed journal published quarterly in e-format as well as print format.

The journal invites manuscripts from dental and other allied health sciences. It publishes manuscripts under categories of Original Research, Review and Case Reports.

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FOREWORD

It is with a substantial sense of pride that I am writing this foreword for the first quarterly Journal of Indian Dental Association Kochi (JIDAK) for the year 2023. The journal has been in E- format since 2019.

The journal will include scholarly articles and research papers by dedicated dental doctors on advanced developments in dentistry and their practical applications.

JIDAK has opened up many queries for those who would like to keep themselves abreast of the times. I have no qualms about the journal's impact on international researchers, dental practitioners and students who relentlessly search for authentic bibliographic database.

I believe that this is yet another window of opportunity not only for academicians and clinicians in and around but also for all the professionals who would like to contribute their share of knowledge.

I seize this medium to personally congratulate JIDAK and the committed people working under the new Editor Dr. Joy Kurien for the success of the journal.

We are in a journey towards the highest level of indexing. Let us all pool our intellectual resources to take the quarterly to "fresh woods and pastures new" even beyond the frontiers of Gods own country.



Dr Winston George
President
IDA, Kochi

Secretary's Message

Dear IDA Kochiite,

It is quite surprising to observe that despite being so well connected these days, genuine communication often takes a back seat in our relationships. We are constantly in touch with each other - at a pace that is sometimes baffling.

Somehow, I am compelled to ask. Have we really touched each other's lives meaningfully? The truth is certainly hard to run away from.

JIDAK is our voice on a stage called the World. To make some noise is your choice. This first edition is resplendent with pages of intellect, intent and information. While it connects us as a family, it serves to showcase us in many special ways.

It is a proud reflection of the depth that we carry in our fraternal bonding and the immense responsibility we choose to uphold as professionals.

I am reassured that you will encourage it as a platform to blend your views, mend your thoughts and send your words of worth, in the future.

My warmest wishes are reserved for the Editorial Board in bringing life to these pages, even as I urge you to take a few moments to relish the fruit of their earnest efforts.

Yours sincerely,



Dr Brijitha Manoj
Hon Secretary
IDA Kochi

Chief Editor's Message

Dear Friends

It is with great honour, profound pleasure and anticipation that i take over the reigns of JIDAK.

JIDAK, primarily focuses on continuing the culture of research and publication in various areas of dentistry thereby sharing information and knowledge among the dental fraternity for the betterment of clinical practice.

The topics covered include original research articles, case reports, review of literature and newer advancements in the field of dentistry.

We welcome contributors to send us original articles that they feel will be useful for the practising dentists. We also welcome case studies and reports with credible results by practitioners, in their day to day practice which would be useful information to the dentist.

I would like to extend my heartfelt gratitude to the authors, the reviewers, my co editors, the executive committee of IDA Kochi, the soft ware team and the publishing house for the support and help rendered to make this issue happen.



Dr Joy Kurian
Chief Editor- JIDAK
IDA Kochi

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ABSTRACT

Background: Achieving a strong and durable bond between adhesive resins and dentin substrate is of critical importance for the longevity of bonded restorations. Different strategies have aimed to improve the bond durability by applying enzyme inhibitors as a pre-treatment before resin infiltration.

Aim: To evaluate the effect of different matrix metalloproteinase inhibitors on the microtensile bond strength of an Etch-and-Rinse and a Self-Etching adhesive to dentin after twenty-four hours and nine months of storage.

Methodology: Flat dentin surfaces were prepared on ninety-six extracted permanent molars and allocated into 2 groups of 48 teeth each. Sectioning was done perpendicular to obtain rectangular beams of approximately 1mm². Sticks with 1.0 mm² cross-section areas were generated by turning the tooth 90° and sectioning it again longitudinally. After light-curing of the bonding agent, the composite build-up (with Solare Sculpt Composite) was done in 2 mm increments. 1mm² beams were tested for microtensile bond strength after thermocycling.

Group 1 (24-hour storage group) and Group 2 (9 months storage group) had six subgroups each (Subgroups: 1-6 and 7-12), Subgroups 1, 7 (Control group): Optibond FL adhesive used with no MMP inhibitors, subgroups 2, 8: Optibond FL adhesive used with Chlorhexidine, subgroups 3, 9: Optibond FL adhesive used with Grape Seed Extract, subgroup 4, 10 (Control group): Solare Universal Bond adhesive used with no MMP inhibitors, subgroup 5, 11: Solare Universal Bond adhesive used with Chlorhexidine, subgroup 6, 12: Solare Universal Bond adhesive used with Grape seed extract.

The statistical analysis of the bond strength testing were done using Mann Whitney Test and Kruskal Wallis Test Mann Whitney Test was used to compare the mean Tensile Strength (in Mpa) between 02 study groups

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under each sub group. Kruskal Wallis test followed by Mann Whitney post hoc Analysis was used to compare the Mean tensile strength between 06 sub groups in each study group.

Results: The obtained data shows that Chlorhexidine when used with Self-Etching bonding agent showed maximum Microtensile Bond Strength as compared to the other samples, particularly the 24-hour storage samples showed higher bond strength when compared to 9-month storage samples. All the 9-month storage samples showed a steady decline in the microtensile bond strength particularly those with Self-Etch adhesive and no MMP inhibitor and also samples using Grape Seed Extract as an MMP inhibitor showed significantly low values.

Conclusion: Chlorhexidine improved the dentin bond strength of adhesives even after a 9-month storage period, particularly, the 24-hour storage samples showed higher bond strength when compared to 9-month storage samples. The bond strength of all adhesives reduce significantly over time.

Key words: Chlorhexidine, etch-and-rinse adhesives, grape seed extract, MMP inhibitors, Microtensile Bond Strength, self-etch adhesives.

Key Messages: MMP inhibitors could improve the Bond Strength of various adhesives.

INTRODUCTION

The long-term bond stability of bonded restorations is essential to their therapeutic effectiveness. Since the dentin bonding systems were first introduced to the market, their stability to the substrate and shelf-life have been viewed as possible limitations. Studies show dentin that has been resin-bonded are not be stable in the longrun.¹

Enzyme inhibitors have been applied as a pretreatment prior to resin infiltration or mixed with primers as part of various methods to increase the bond's durability.² Studies have shown that the bond strength decreased considerably less over time when 2% chlorhexidine, an MMP inhibitor, was applied to acid-etched enamel.³ Other MMP inhibitors include grape seed extract which when used in greater quantity, it causes collagen inter-microfibrillar cross links, changing the tensile strength characteristics of the dentin matrix.⁴

This study evaluates the effect of storage time and matrix metalloproteinase inhibitors like 2% Chlorhexidine(CHX) and 0.02% grape seed extract on bond strength of Optibond FL etch-and-rinse adhesive and Solare Universal Bond bonding agent to dentin.

Methodology:

A total of 96 extracted intact human molars were used which were caries-free. The molars were stored 4°C with 0.01% (w/v) thymol. The teeth were embedded in circular moulds with self-curing acrylic resin. A flat, mid-coronal dentin surface was prepared by means of a water-cooled, low-speed diamond saw and polished. A flat end cylindrical bur was used to remove half of the bucco-lingual dimension of the flat occlusal surface as measured by a calliper in order to achieve the standardised deep dentin level at 2mm. Sandpapers that were water cooled were used to create a normal smear layer.

The teeth were allocated randomly to test and control groups of the two adhesives. Half the teeth were separated for 24-hour Microtensile bond strength testing which was termed GROUP 1 whereas the remaining 48 teeth would be stored for 9 months (During the ageing period the samples were stored in artificial saliva at 37°C away from direct sunlight) following which Microtensile bond strength testing was done which was termed

GROUP 2. Bonding of dentin surfaces of all teeth of both groups was performed using an etch-and-rinse (Optibond FL, Kerr) adhesive or a self-etching adhesive (Solare Universal Bond) (Optibond FL, Kerr- Subgroups-1, 2 & 3-of GROUP 1; 7, 8 & 9 of GROUP 2; Solare Universal Bond Subgroups-4, 5 &6 of GROUP 1; 10, 11 & 12 of GROUP 2). The two adhesives were applied according to the manufacturer's instructions with or without the additional application of one of the different MMP inhibitor solutions: (1) 2%Chlorhexidine (V Consept-Chlorhexidine Gluconate Solution 2%, Vishal Dentocare Pvt Ltd) – Subgroups 2, 5, 8 & 11; (2) Grape seed extract (BRM Herbals, BRM) - Subgroups 3, 6, 9 & 12. The control groups without MMP inhibitor application were Subgroups 1, 4, 7 &10.

Application of MMP inhibitors:

The application of the MMP inhibitors, both 2% Chlorhexidine and Grape Seed extract, was done using a micro-brush for 60 seconds with slight rubbing motion and it was left undisturbed for a minimum of 30 seconds. The excess were removed using an absorbent paper, leaving the dentin surface moist. Two subgroups of each adhesive (Optibond FL, Kerr-Subgroups 1&7; Solare Universal Bond-Subgroups 4&10) were not treated with any MMP inhibitor.

Application on bonding agents:

For Optibond FL, Kerr application, the etchant was applied for 15 seconds, rinsed and blot dried. Primer was applied for 15 seconds in a scrubbing manner following which it was gently air dried. The adhesive was applied with brushing motion for 15 seconds and light cured for 20 seconds.

For Solare Universal Bond application, the bonding agent was applied onto the surface and left undisturbed for 10 seconds after the end of the application, then air dried for 5 seconds and light cured for 20 seconds without etching.

After light-curing of the bonding, a composite build-up (Solare Sculpt Composite) was made in 2 mm increments on every tooth and light-cured for 40 seconds.

The specimens which were divided into 2 groups of 48 teeth each and each group which were subdivided into 6 subgroups, were then,

after 24-hour storage in water at 37°C, sectioned perpendicular to the interface with a water-cooled diamond to obtain rectangular beams of approximately 1mm². Each tooth was fixed to the cutting device and split into several 1 mm thick slabs while being cooled by water. A diamond disc with a wear-resistant Ti-C coating was utilised for sectioning. Again, sticks with 1.0mm² cross-section areas were generated by turning the tooth 90° and sectioning it again longitudinally. The microtensile bond strength test was then performed on each specimen (Fig1).

Thermocycling was done to all the samples for 500 Cycles with a dwell time 30 Seconds at 5°C and 55°C.

All the samples were tested for MicroTensile Bond Strength after 24 hours and 9 months of aging period. During the ageing period the samples were stored in artificial saliva at 37°C away from direct sunlight.

GROUP 1- (n=48) is the 24-hour bond strength group. In this group, after the samples are restored with Solare Sculpt Composite and sectioned, Microtensile Bond Strength Test was done after 24 hours.

Sub-group 1-(n=8) (Control group- no MMP inhibitor): Teeth were bonded using an etch-and-rinse (Optibond FL, Kerr) adhesive

without using MMP inhibitors.

Sub-group 2- (n=8): After application of 2% CHX, these samples were bonded using an etch-and-rinse adhesive (Optibond FL, Kerr).

Sub-group 3- (n=8): After application of Grape seed extract, samples were bonded using an etch-and-rinse adhesive (Optibond FL, Kerr).

Sub-group 4- (n=8) (Control group): Teeth here were bonded using a self-etch adhesive (Solare Universal Bond) without using MMP inhibitors.

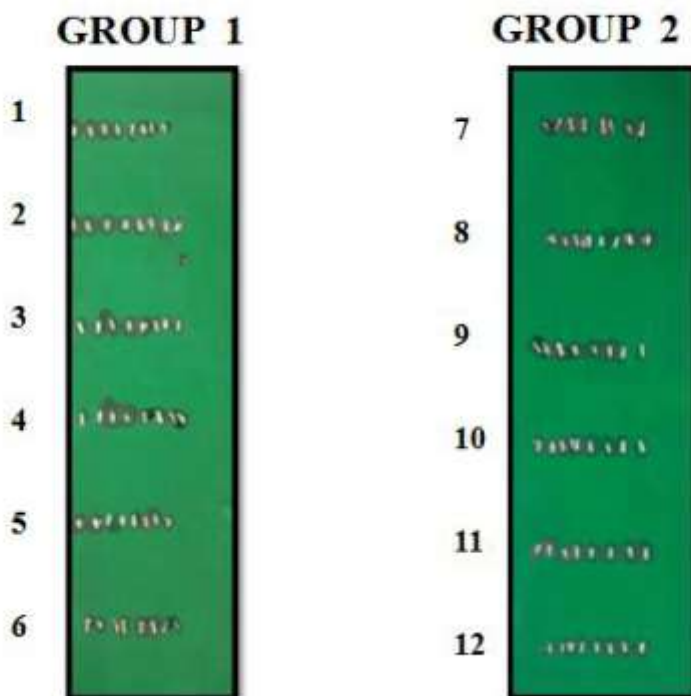
Sub-group 5- (n=8): After application of 2% CHX, samples were bonded using a self-etch adhesive (Solare Universal Bond).

Sub-Group 6- (n=8): After application of Grape seed extract, samples were bonded using a self-etch adhesive (Solare Universal Bond).

All the subgroups in Group 1 were Micro tensile Bond strength tested after 24 hours.

GROUP 2-(n=48): 9 month storage group. In this group, after the samples are restored with Solare Sculpt Composite and sectioned, Microtensile Bond Strength Test was done after 9months by storing in artificial saliva(Wet Mouth Liquid, ICPA Health Products Ltd) for 9

SECTIONING DONE TO OBTAIN 1mm² SAMPLES



months undisturbed at 37°C, away from direct sunlight.

Sub-group 7-(n=8) (Control group): Teeth were bonded using an etch-and-rinse (Optibond FL, Kerr) without the use of any MMP inhibitors.

Sub-group 8- (n=8): After application of 2% CHX, samples were bonded using an etch-and-rinse adhesive (Optibond FL, Kerr).

Sub-group 9- (n=8): After application of Grape seed extract, samples were bonded using an etch-and-rinse adhesive (Optibond FL, Kerr).

Sub-group 10- (n=8) (Control group): Teeth were bonded using a self-etch adhesive (Solare Universal Bond) without using MMP inhibitors.

Sub-group 11- (n=8): After application of 2% CHX, samples were bonded using a self-etch adhesive (Solare Universal Bond).

Sub-Group 12- (n=8): After application of Grape seed extract, samples were bonded using a self-etch adhesive (Solare Universal Bond).

The beams of Group 1 were tested immediately, while the beams of Group 2 were stored in artificial saliva at 37°C for 9 months and tested.

The tensile load of the beams were tested in a universal testing machine as shown in **Fig 2**. Each bonded beam was fastened to the testing device with acrylic adhesive at the conclusion of each time period, and it was then pushed to failure under tension using a universal testing machine (computerized software based, ACME



Fig 2: Microtensile bond strength testing in UTM

Engineers, India Model no: UNITEST 10) with a crosshead speed of 1mm/min. The broken beams were taken out, and the point of failure was marked. The bond strength values (MPa) were determined by dividing the imposed force (N) at the time of fracture by the bond area (1mm²).

Comparison of mean Tensile Strength (in Mpa) between 02 groups under different sub groups

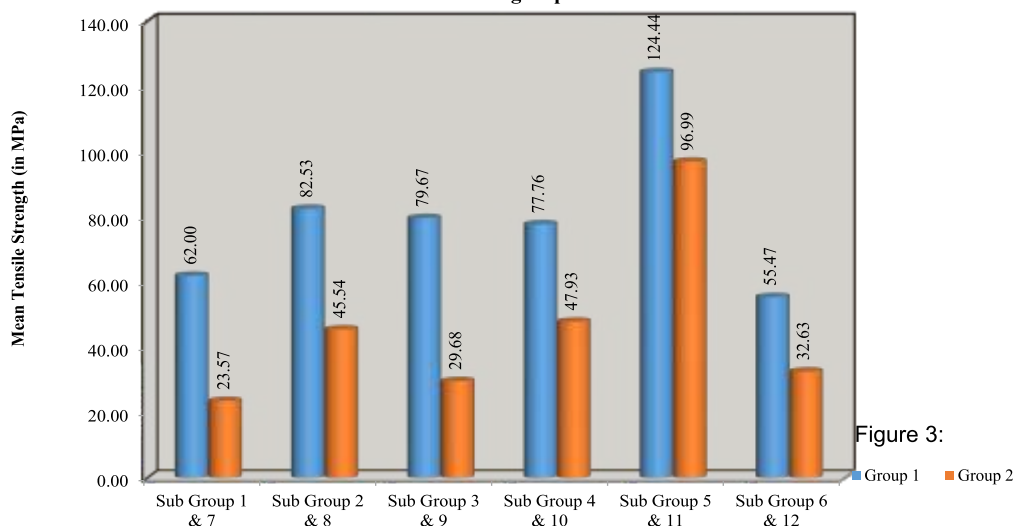


Figure 3:

Statistical Analysis:

The values were analyzed by the use of Mann Whitney Test and Kruskal Wallis Test using SPSS for Windows, Version 22.0, Armonk NY:IBM Corp. Mann Whitney Test was used to compare the mean Tensile Strength (in Mpa) between 02 study groups under each sub group. Kruskal Wallis test followed by Mann Whitney post hoc Analysis was used to compare the Mean tensile strength between 06 sub groups in each study group. The level of significance [P-Value] was set at P<0.05

Results:

The obtained data shows that Chlorhexidine when used with Self-Etching bonding agent (subgroup5) showed maximum Microtensile Bond Strength as compared to the other samples (Table1), particularly the 24-hour

storage samples(subgroup5) showed higher bond strength when compared to 9-month storage samples(subgroup11) (Tables 2,3). This was followed by the subgroup where Chlorhexidine was used along with Etch-and-Rinse adhesive at 24-hour storage time (subgroup2).

The Grape Seed Extract as an MMP inhibitor along with Self-etch Adhesive at 24-hour storage period followed by 24-hour stored Etch-and-Rinse samples without any MMP inhibitors and the 24-hour storage samples of Self-Etch adhesive without any MMP inhibitors also had high Microtensile Bond Strength values.

All the 9-month storage samples showed a steady decline in the microtensile bond strength particularly those with Self-Etch adhesive and no MMP inhibitor and also samples using Grape Seed Extract as an MMP inhibitor showed significantly low values.

Table 1:

Comparison of mean Tensile Strength (in Mpa) between 02 study groups under each sub group using Mann Whitney Test						
Sub Group	Group	N	Mean	SD	Mean Diff	P-Value
Sub Group 1	Group 1	8	62.00	7.17	38.43	0.001*
	Group 2	8	23.57	7.90		
Sub Group 2	Group 1	8	82.53	16.82	36.99	0.001*
	Group 2	8	45.54	7.23		
Sub Group 3	Group 1	8	79.67	13.02	50.00	0.001*
	Group 2	8	29.68	11.06		
Sub Group 4	Group 1	8	77.76	15.39	29.83	0.001*
	Group 2	8	47.93	8.68		
Sub Group 5	Group 1	8	124.44	31.62	27.45	0.06
	Group 2	8	96.99	9.69		
Sub Group 6	Group 1	8	55.47	10.80	22.84	0.002*
	Group 2	8	32.63	7.76		

* - Statistically Significant

Table 3:

Comparison of mean Tensile Strength (in Mpa) between 06 sub groups in study Group 2 using Kruskal Wallis Test						
Sub Groups	N	Mean	SD	Min	Max	P-Value
Sub Group7	8	23.57	7.90	13.7	34.7	<0.001*
Sub Group8	8	45.54	7.23	36.8	54.6	
Sub Group9	8	29.68	11.06	13.7	42.5	
Sub Group10	8	47.93	8.68	36.8	59.5	
Sub Group11	8	96.99	9.69	77.1	106.9	
Sub Group12	8	32.63	7.76	20.8	42.5	

* - Statistically Significant

Table 2:

Comparison of mean Tensile Strength (in Mpa) between 06 sub groups in study Group 1 using Kruskal Wallis Test						
Sub Groups	N	Mean	SD	Min	Max	P-Value
Sub Group 1	8	62.00	7.17	53.0	71.9	<0.001*
Sub Group 2	8	82.53	16.82	59.8	106.9	
Sub Group 3	8	79.67	13.02	63.0	97.7	
Sub Group 4	8	77.76	15.39	59.5	97.8	
Sub Group 5	8	124.44	31.62	92.2	165.9	
Sub Group 6	8	55.47	10.80	40.1	77.1	

* - Statistically Significant

DISCUSSION:

For bonded restorations to last a long time, an effective and durable bond between adhesive resins and dental substrates is essential.⁵

The hydrolytic breakdown of collagen matrix at the bonded area is carried out by cysteine cathepsins and matrix metalloproteinases, which are found in dentin. Long-term dentin bond strength needs to be preserved for the collagen matrix to remain intact.¹¹

Different strategies like the use of collagen cross linking substances and vitamins, utilizing protease inhibitors which can deactivate or block metalloproteinases, ethanol wet-bonding method modification of the bonding process before bonding, laser treatment of the substrate, using inorganic fillers and/or remineralizing chemicals to strengthen the resin matrix were aimed to improve bond durability. Proanthocyanidins (PA) which are organic compounds seem to have the power to control MMP function. They serve as MMP antagonists and aid in further

controlling MMP-mediated illnesses like periodontitis.¹² Proanthocyanidins, which are oligomers of monomeric flavan-3-ol molecules, are abundant in grape seeds. They could do this by using their antioxidant and radical-scavenging abilities.¹⁴

The cationic bisbiguanide chlorhexidine (CHX) is well-known for its antibacterial properties in dental care. The collagenolytic activity of MMPs has also been shown to be inhibited by CHX, which extends the bond between adhesives and dentin.¹³

Another important aspect to the improvement of adhesive properties is the type of bonding agent used. Optibond FL is a total-etch dental adhesive with only one light-curing step that provides a straightforward two-bottle or unidose delivery.¹⁶

In a study by Mortazavi et al., ClearFil SE and Optibond FL were used to evaluate the clinical performance of two adhesives when using the ethanol wet bonding method. After a year, none of the repairs in the groups had developed

caries, displayed minor flaws, or changed colour.¹⁷

The makers of Solare Universal Bond (GC Company) which is a self-etch adhesive assert that because of its distinct formulation, it has a stronger bond to enamel and dentin. While the increased concentration of phosphate ester monomer optimises etching, the dimethacrylate monomer enhances its permeability to enamel and dentin¹⁸. They contain acidic monomers that etch and prime simultaneously, hydrophilic monomers to enhance wettability, and hydrophobic bond resin monomers that infiltrate into the demineralized rough enamel or porous dentin surface, providing monomer conversion and strengthening of the tooth-resin interface. Hence, they reduce chairside time. Self-etch adhesives are preferred when restorations are supported by dentin, but etch-and-rinse adhesives are frequently favoured because phosphoric acid produces a more pronounced and retentive etching pattern on enamel.^{8,9}

The kind of composite used also plays an important role in adhesion. Solare Sculpt Composite (GC company), according to the manufacturers, combines GC's cutting-edge single dispersion nano-fillers with sophisticated light shattering technology to create a universally sculptable composite.¹⁹

In the current research, OptiBond FL® (Kerr Dental), an etch-and-rinse adhesive, and Solare Universal Bond (GC Company), a Self-Etch adhesive, were both employed along with Solare Sculpt Composite (GC Company).

In this research, freshly extracted molars were used because the effects of ageing on the samples made them less likely to have bond strength errors.¹⁵

Microtensile bond strength test was used as the benefits of using this testing technique include better area control, more efficient use of teeth, and improved stress distribution at the true interface. Because of the improved stress distribution at the actual interface, the technique's biggest benefit is the ability to only detect adhesive bond failures of materials with bonded surfaces of about 1 mm^{2,6,7}.

In order to replicate the clinical settings, artificial saliva was used in this research. In vitro experiments have demonstrated that artificial saliva can keep the bond between composite and dentin strong.¹⁵

Thermocycling was used in the current research to replicate oral conditions for 500 cycles with dwell times of 30 seconds at 5 and 55 °C prior to bond strength testing.¹⁵

Chlorhexidine here demonstrated the highest Microtensile Bond Strength compared to the other samples when combined with Solare Universal Bonding Agent. According to Stanislawczuk et al., a greater stability of hybrid layer may be seen even when chlorhexidine is present in self-etch adhesives or in the etchant agent, hence improving bond strength.²⁰

Resin-dentin bonds have been discovered to frequently fail 30-40% in 6-12 months. Dentin is known to contain MMPs, which are triggered by weak acids released by bacteria that cause tooth decay, as well as acid-etchants used in adhesive systems. In an effort to strengthen resin-dentin bonds by inhibiting endogenous MMPs in the dentin matrix, many clinicians now administer 2% Chlorhexidine for 60 seconds to acid-etched dentin during resin bonding. This approach is the only one that has been clinically validated; it is simple to use and is most likely to be the first to acquire wider acceptance.²⁰

In the present study, although Grape seed extract showed an increase in bond strength as it inhibited the activity of MMP-1 and MMP-9, the results are not statistically significant. It has been demonstrated to prevent demineralization of artificial root carious lesions and/or to hasten their remineralization. According to Xie et al., Grape seed extract may not only aid in the mineralization of the surface layer of the lesion but may also interact with the organic root dentin through the interaction of proanthocyanidin and collagen, stabilising the exposed collagen matrix.⁴

In comparison to using 10% sodium ascorbate, Srinivasulu et al. demonstrated that the application of 6.5% Grape seed extract to deep dentin greatly increased the shear bond strength values of composite to dentin. The higher number of collagen cross-links, which improved collagen stability, may be to blame for the increase in bond strength.¹⁷

It is well known that adhesive systems gradually lose their bond to dentin, and it is generally agreed that the degradation of the hybrid layer is connected to this reduction in bond strength. According to studies, the collagen fibril degradation may have a

detrimental long-term impact on the adhesive interface. The integrity of the collagen matrix must be maintained in order to increase the dentin bond's longevity.²¹

Storage time reduced the bond strength of several bonding agents, as demonstrated by Garcia et al. The main mechanism contributing to lower bond strength values is related to hydrolytic degradation of the adhesive polymer over time.¹⁰

With the exception of those groups using chlorhexidine as the MMP inhibitor, all of the 9-month storage samples demonstrated a consistent decrease in the microtensile bond strength, with Self-Etch adhesives showing a greater decline than etch and rinse adhesives.

CONCLUSION

The current study's findings confirm that using chlorhexidine with a self-etch adhesive, as opposed to etch and rinse, improves the bond strength of composites to dentin. With the exception of those groups using Chlorhexidine all the long-term storage samples showed decrease in the microtensile bond strength. Grape seed extract use may be advantageous for bond strength, but in-vivo studies are highly advised.

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MANAGEMENT OF ORAL SUBMUCOUS FIBROSIS WITH INTRA LESION INJECTION

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ABSTRACT

Oral sub mucous fibrosis (OSMF) is an oral precancerous condition. It is progressive affecting the entire oral cavity that causes a gradual reduction in mouth opening. The treatment for OSMF depends on the degree of disease progression and clinical involvement. The local injection of corticosteroids with hyaluronidase or placental extract is effective to some extent. However, a combination of steroids and topical hyaluronidase shows better long-term results than either agents used individually.

Key-words: OSMF, Intra lesion injection, Dexamethasone, hyaluronidase.

Key Messages : OSMF is a progressive disease of oral cavity with variety of clinical presentations at different stages of lesion. The treatment of choice for OSMF is combination of oral tablets and local injection followed by physiotherapy. It is safe, cheap and effective. Along with these treatment quitting of areca nut chewing and oral physiotherapy is must for all patients.

J Ind Dent Assoc Kochi 2023;5(1):17-21.

INTRODUCTION

According to Pindborg oral submucous fibrosis (OSMF) can be defined as an insidious chronic fibrotic disease that involves the oral mucosa and occasionally the pharynx and upper third of oesophagus. OSMF is characterized by stiffness of the oral mucosa causing trismus and inability to eat¹. Excessive consumption of spicy food, nutritional deficiencies like chronic iron and vitamin B complex deficiency and areca nut chewing are considered as the etiological factors of OSMF². The patient exhibit burning sensation while having spicy or acidic foods, reduced mouth opening, difficulty with speech, mastication and deglutition, vesiculation or ulceration of oral mucosa³.

Patient details:

A 61 year old male patient reported to the department of oral medicine and radiology

with a chief complaint of difficult for mouth opening and stiffness in his mouth since 6 months. Patient presented with burning sensation while eating spicy food with no other dermatological or systemic problem. He had the habit of chewing areca nut with tobacco and slaked lime since 30 years, four to five times daily.

Clinical Examination:

On intra oral examination, generalised dental stains were present. On inspection, blanching was seen in the right and left buccal mucosa, upper and lower labial mucosa, ventral aspect of the tongue and the palate (**figure 1-3**). The oral mucosa was white and pale with multiple diffuse areas of melanotic pigmentation. A reduced mouth opening was observed, with the interincisal width being 33 mm (**figure 4**). The uvula was appeared as shrunken (figure 3).



Fig:1. Blanching and diffuse melanotic pigmentations in the right and left buccal mucosa



Fig:2. Blanching and diffuse melanotic pigmentations in the upper and lower buccal mucosa

On palpation, the buccal mucosa was rubbery and inelastic. fibrous bands were present on right and left buccal mucosa and upper and lower labial mucosa. Considering the combination of clinical findings and deleterious habit, a provisional diagnosis of stage III OSMF was given.

Differential diagnoses:

Looking at the clinical signs and symptoms of

the disease such as difficulty in mouth opening, the differential diagnosis was given as localised scleroderma.

Investigation:

A incisional biopsy decided for confirming the histological features of the disease but the patient did not give the consent for it. Considering the history of having the habit of chewing areca nut along with tobacco and



Fig:3. Blanching in the ventral aspect of the tongue and hard and soft palate. The uvula was appeared as shrunken



Fig :4. Mouth opening reduced into 33 mm

slaked lime and the clinical signs and symptoms, OSMF was confirmed as final diagnosis.

Therapeutic intervention:

The patients were informed about the condition and its precancerous potential. The first step of treatment was motivating and counselling the patient and instructed to discontinue the use of areca nut with tobacco. Patient was explained about the procedure of intra lesion injection. He was treated by administration of hyaluronidase 1500 IU mixed in 1.5ml of dexamethasone and 0.5ml of lignocaine HCL injected intralesionally biweekly for 4 weeks.

Along with intralesion injection, Vitamin B complex capsules 500 mg once a day and antioxidant capsules once a day were given for 1 month to boost up the nutritional status of the patient. Oral physiotherapy that included ballooning exercises were advised to the patient.

Follow-up and outcome:

Treatment outcome assessed by measuring the mouth opening and analyse the burning sensation by visual analogue scale, in each week. Patient had a significant increase in mouth opening of 40 mm and his symptoms reduced significantly. Patient was examined regularly for two months after treatment.

DISCUSSION:

OSMF is a chronic, insidious disease that is associated with significant functional morbidity and an increased risk for malignancy³. Most common etiological factor of this disease include areca nut chewing, ingestion of chillies, genetic processes, immunological process and nutritional deficiencies⁴. The major areca nut alkaloids are arecoline, arecaidine, arecolidina, guayacoline and guacine. Arecoline, the most abundant alkaloid, might have cytotoxic effects on cells and is also demonstrated to promote collagen synthesis⁵. Here, in the present case, the patient had the habit of areca nut chewing along with slaked lime since 30 years.

According to Kakkar and Puri, for the purpose of treatment, the patients can be graded on the basis of the clinical condition⁶.

Grade I: Only blanching of oral mucosa without symptoms

Grade II: Burning sensation, dryness of mouth, vesicles or ulcer in the mouth without tongue involvement

Grade III: In addition of Grade II, restriction of mouth opening

Grade IV: In addition to Grade III palpable bands all over the mouth without tongue involvement

Grade V: Grade IV and also tongue involvement

Grade VI: OSMF along with histopathologically proven cancer.

According to Leena et al., patients treated with hyaluronidase had a quick reduction in burning sensation. But combined effect of dexamethasone and hyaluronidase long-term results was more significant than other modalities of management.

Conservative treatment like topical steroids, vitamins, antioxidants, and physiotherapy provides symptomatic relief. Intralesional injection of placental extracts is a better alternative for hyaluronidase, which acts by biogenic stimulation tissue⁷.

Hyaluronidase, an enzyme, could accelerate OSF by depolymerizing hyaluronic acid, reducing viscosity, and decreasing collagen formation⁸. The main treatment modalities are medical, surgical treatment, and physiotherapy. Despite the progress in understanding the pathogenesis, the treatment of OSF cure is significant^{9,10}.

CONCLUSION:

Increased collagen production and decreased collagen degeneration is the characteristic feature of OSMF. Injection of hyaluronidase with dexamethasone is an effective method of managing Grade III OSMF. It is a cost effective method of management. This case report is providing evidence-based support to prove the effectiveness of intra lesion injection in OSMF patient.

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NON-SURGICAL TREATMENT OF CLASS III MALOCCLUSION USING MICROIMPLANT IN AN ADOLESCENT PATIENT

ABSTRACT

Class III malocclusion has a multifactorial etiology involving both genetic and environmental causes. Microimplant-assisted rapid palatal expansion (MARPE) has been demonstrated successfully in maxillary expansion in late adolescence and adulthood. The maxillary advancement accompanied by expansion is frequently anticipated, which is beneficial for the treatment of Class III malocclusion. The dental and skeletal effects of maxillary protraction with a facemask are well documented in several studies [1– 5]. Although treatment in the late mixed or early permanent dentition can be successful, results are generally better in the deciduous or early mixed dentition

This case report describes the use of MARPE appliance to orthopedically correct a transverse maxillary deficiency in an adolescent patient whose growth was completed. This 14-year-old patient had a class III malocclusion and maxillary constriction with a bilateral posterior cross bite.

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J Ind Dent Assoc Kochi 2023;5(1):22-7.

INTRODUCTION

Class III malocclusion may occur as a result of skeletal or dental discrepancies and is a source of esthetic and functional impairment to the individual. Ellis and McNamara concluded that the most common combination of variables in an adult Class III malocclusion were a retrusive maxilla, protrusive maxillary incisors, retrusive mandibular incisors, a protrusive mandible, and a long lower facial height.⁶ In the last two decades, a combination of rapid maxillary expansion (RME) along with a facemask to protract the maxilla has become a standard protocol in the early management of cases with maxillary deficiency.

DIAGNOSIS

A 14 years and 5 months old female patient

came to the department with the chief complaint of forwardly placed lower front teeth and irregular bite. No relevant pre and post-natal history or family history was reported. On extraoral examination, patient had a concave profile with anterior divergence with potentially competent lips showing 100% incisor exposure on smile. Patient had acute nasolabial angle and protrusive lower lip. (Fig. 1)

On intraoral examination, patient had Class III molar relation with Class III Canine and Class III incisal relation with proclined upper anteriors. There was bilateral posterior crossbite seen with a reverse overjet of 4 mm. Mild upper and lower anterior crowding with constricted maxillary arch was present as seen in figure 2.

On OPG examination, full set of teeth were



Figure 1: Pre-treatment extraoral photographs



Figure 2: Pre-treatment intraoral photographs

present with tooth buds in relation to 18, 28, 38 and 48. (Fig: 3) Pre-treatment cephalogram showed CVMI stage 6 indicating completion stage. (Fig: 4)

Cephalometric analysis indicated skeletal Class III jawbase due to prognathic mandible and retrognathic maxilla with vertical growth pattern. It was confirmed through cephalometric analysis, that patient had proclined upper and lower incisors with protrusive lower lip and acute nasolabial angle.



Figure 3:
Pre-treatment
OPG



Figure 4:
Pre-treatment
lateral
cephalogram



Figure 5: Pre-treatment dental model

TREATMENT OBJECTIVES

- To improve the skeletal jaw relationship by advancing maxilla forward
- To correct posterior crossbite.
- To achieve well aligned maxillary and mandibular arches.
- To achieve positive overjet.

TREATMENT PLAN

As this patient who was in her late adolescence had constricted maxilla with bilateral posterior crossbite, Microimplant-assisted rapid palatal expansion (MARPE) was planned. The appliance design was planned in a way to engage two palatal micro implants in the anterior region of the palate. As the patient had a Class III incisal relation due to retrognathic maxilla, face mask therapy was planned in conjunction with MARPE to protract the anterior maxillary segment to create a positive overjet. For the lower arch, fixed appliance therapy was planned with the extraction of 42. Space closure of extraction space will be done to help achieve a positive incisal relation with an ideal overjet.



Figure 6: Banded MARPE appliance

APPLIANCE DESIGN

1. Microimplant-assisted rapid palatal expansion (MARPE)

MARPE consisted of a HYRAX expander with two guide holes on either side of the mid palatal suture, where two palatal micro implants were placed accurately. This was a banded expansion appliance extending on to the palatal surface of the premolars and molars. (Fig.6)

2. Face mask : On the buccal aspect, a hook was soldered on to the premolar and molar

bands to which the elastics from the protraction face mask was to be attached. (Fig. 7)

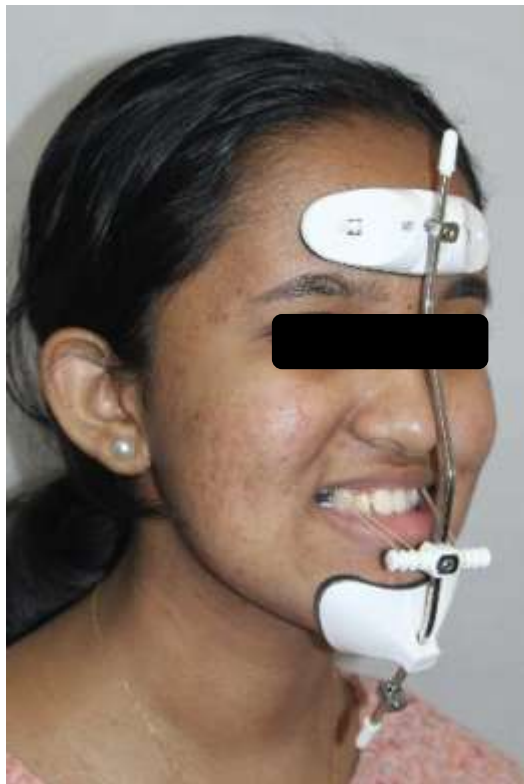


Figure 7: Face Mask

ACTIVATION PROTOCOL

Patient was advised to activate the expansion appliance by giving two turns a day; one turn in the morning and one turn in evening. Patient was advised to wear protraction face mask for a minimum of 14 hours per day.

TREATMENT RESULTS

Patient followed the advised activation protocol for the MARPE appliance and there was evident expansion seen in a duration of one month. Patient had developed midline diastema between upper central incisors by the end of one month of MARPE appliance therapy which was a clear clinical sign of the splitting of mid palatal suture and the transverse expansion achieved (fig.8). With the help of protraction face mask, positive overjet was achieved. After achieving the desired amount of upper arch expansion, the HYRAX screw was sealed. This was followed by fixed appliance therapy in lower arch with extraction of lingually placed 42. (fig.9)



Figure 8: Expansion achieved with MARPE and presence of midline diastema



Figure 9: Expansion ceased in upper arch and fixed appliance therapy in lower arch.

DISCUSSION

This case report describes the management of a Class III malocclusion with a constricted maxilla and bilateral posterior crossbite case using MARPE appliance in conjunction with protraction face mask. MARPE appliance helped in addressing the transverse malocclusion while protraction face mask resolved the sagittal discrepancies.

When young patients present skeletal discrepancy, use of a facemask (FM), with or without palatal expansion, is one of the traditional approaches. This approach often results in excessive flaring of the upper incisors by forward movement of maxillary dentition and an increase in the vertical dimension of the lower face by buccal tipping and extrusion of maxillary posterior dentition, especially in high-angle cases. In recent years, incorporating micro-implants (MI) with expansion and protraction devices in various ways, in order to avoid the unwanted dental side effects, resulted in significantly better outcomes. One popular application is the use of a micro-implant-assisted rapid palatal expander (MARPE), by incorporating the MI with an expansion device, in order to promote bone anchored expansion, and by applying FM force against MARPE, in order to promote bone anchored protraction.[7]

In this case, facemask/expansion therapy affected many areas of her dentofacial complex. Skeletal change was primarily a result of anterior and vertical movement of the maxilla. Rapid palatal expansion is always associated with slight buccal tipping and extrusion of the maxillary molars which was also noticed in this case. This posterior extrusion led to slight clockwise rotation of the mandible which can also be considered as a factor in achieving positive overjet.

CONCLUSION

This case report has shown that, MARPE with face mask therapy can be very helpful in managing borderline surgical skeletal Class III malocclusion cases in late adolescent age group so that the future need of surgical approach can be prevented. MARPE causes expansion of the entire midface. When MARPE is applied in combination with facemask,

almost negligible vertical side effects were observed, the existing antero-posterior dental compensation were reversed and the maxilla advanced efficiently in large magnitude.

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PREVALENCE OF GEOGRAPHIC TONGUE LESIONS IN THE POPULATION OF CUDDALORE DISTRICT – A CROSS SECTIONAL ANALYTICAL STUDY

ABSTRACT

AIM & OBJECTIVE: Tongue is considered as the mirror of overall health. Geographic tongue is a completely benign condition of the dorsum of the tongue characterized by irregular erythematous areas of depapillation bounded by slightly elevated, white keratotic band with an unknown etiology. The present study is aimed at identifying the prevalence of geographic tongue in Cuddalore district population.

METHODOLOGY: The required data for the study was collected from patients attending Rajah Muthiah Dental College and Hospital, Chidambaram during a time period of 25-01-2020 to 28-03-2020. A total of 260 patients with age group of 3-75 years were included in this study of which 105 patients were females and 155 were males.

RESULTS: A prevalence rate of 2.3% was reported with a female predominance. Geographic tongue was more common in age group of 21-60 years. An awareness rate of 16.67% was reported. Burning sensation was reported in 33.33% patients.

CONCLUSION: Geographic tongue doesn't require any specific treatment. Assuring the patient about the benign nature of the lesion is important.

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J Ind Dent Assoc Kochi 2023;5(1):28-34.

INTRODUCTION

Geographic tongue was first described by Reiter in 1831. It is also known as benign migratory glossitis / annulus migrans / lingual erythema migrans / exfoliation linguae areata / areata stomatitis migrans / wandering rash of tongue. It is a chronic, inflammatory oral lesion, immunologically mediated and with an unknown etiology. This lesion has been observed in various ages, and has no specific age and gender predilection (Richardson, 1968). It is a multifocal, circinate, irregular erythematous patches bounded by slightly elevated, white-coloured keratotic band (Assimakopoulos et al., 2002). It is characterized by periodic localized loss of papillae, especially the filiform papillae on the dorsum and the lateral border of the tongue (Pereira KM, Nonaka CF, Santos PP, Medeiros AM, Galvao HC, 2009).

Clinically Geographic tongue has erythematous areas surrounded by whitish border which tend to change location, pattern and size over time for which the lesion is termed as benign migratory glossitis. The whitish border of this lesion contains the mixture of keratin and neutrophils whereas the erythematous area characterizes the localized loss of papilla (Ishibashi M, Tojo G, Watanabe M, Tamabuchi T, Masu T, Aiba S, J Dermatol case rep. 2010).

Geographic tongue is usually asymptomatic (Greenburg and Glick, 2014; Ugar - Cankal et al., 2005). However, in some instances the person feels discomfort while taking hot and salty or spicy foods as well as alcoholic drinks in adults (Scully, 2004; Regezi et al., 2003). Severe symptomatic stage is characterized by mouth irritation, burning, sensing a foreign body or pain in the ears or submandibular lymph nodes on the same side (Waltimo, 1991 Salem et al., 1987; Sigal & Mock, 1992). It is characterized by exacerbation and remission periods and the severity of symptoms depends on the disease activity (Cawson et al., 2001). Though the etiology is unknown, person with a family history and allergy - like asthma (Barton et al., 1982), eczematous dermatitis (Regezi et al., 2003) and in those with a high level of serum immunoglobulin E are more prone to be affected by geographic tongue than other people. Geographic tongue has been categorized under non-habit-related lesions (S. Rohini, Herald J. Sherlin, Gifrina Jayaraj, 2020, Chennai).

The lesion is usually considered as the oral manifestation of psoriasis. Differential diagnosis includes candidiasis, lichen planus, erythroplasia, lupus erythematosus. All of these lesions can be discarded after the clinical and histopathological examination. Geographic tongue usually does not require any treatment (Assimakopoulos et al., 2002). Symptomatic treatment may require topical application of prednisolone, mouthwash containing anesthetizing compounds such as benzydamine, antihistamines like diphenhydramine or corticosteroids like betamethasone (Redman et al., 1972).

Presence of geographic tongue may alert the dental practitioner regarding any associated systemic conditions and can be a life saver by earlier diagnosis. Majority of the population in Cuddalore district would prefer to visit Rajah Muthiah Dental hospital to treat any of their dental problems. As there were no previous studies published on the prevalence of geographic tongue in Cuddalore District population, this study has been conducted to assess the prevalence of geographic tongue in Cuddalore District population and also to associate the lesion with age and gender.

METHODOLOGY:

In this descriptive cross-sectional analytical study, 260 patients attending the Department of Oral Medicine, Rajah Muthiah Dental College and Hospital, Chidambaram, were examined for the presence of geographic tongue. Patients with the age groups of 3 - 75 years were included in this study which was conducted between 25/01/2020 to 28/03/2020.

Ethical clearance from the Institutional Ethical Committee was obtained to conduct the study. The standard clinical intraoral examinations were done under artificial illumination on a dental chair, using a sterile mouth mirror. The study subjects were asked to open the mouth and protrude the tongue as much as possible. Patients unable to open their mouth like in case of trismus, non-cooperative patients and patients with ankyloglossia were not included in the study for the sake of patient comfort. Only patients who were willing to participate in

the study and those who gave informed consent were included in the study.

The required data were collected through examination and completing the questionnaire. The questionnaire involves five open ended and six closed ended questions. These questions were the name, age, gender, the OP no. of the patient and whether the lesion is present or not. If the lesion was present, the patients were further questioned about the awareness, duration, symptoms and discomfort (burning sensation, pain, and irritation during spicy food intake), any aggravating factors of the lesion and any treatment taken for the lesion. The questionnaire was entered in the Google forms app which has been specially designed for study purpose(<https://docs.google.com/forms/d/e/1FAIpQLSf2uHkWIvdjAdTilAPLCT5Zcs3AYuU0AHnMDHGllKpnDspM2A/viewform>). Patients were examined and the collected data were entered in the Google forms. Most of the patients were asymptomatic, while those with symptoms had complaints like burning sensation of tongue which further aggravates on intake of spicy food. None of the patients were under medication for the lesion examined.

STATISTICAL ANALYSIS:

The data was entered into the computer (MS-office, Excel) and was subjected to statistical analysis using the statistical package- SPSS ver-

sion 19.0 (IBM Corp. Ltd.) From the collected data, the frequency, percentages were calculated. The descriptive statistics of the key variables were reported. Chi square test was done to compare the presence of geographic tongue across different age groups and gender; and in those with burning sensation in the oral cavity. The significance level of $p < 0.05$ was considered as statistically significant.

RESULTS

A total of 260 patients were included as sample size in this study. This includes 59.61% (n=155) males and 40.38% (n=105) females. These patients were under different age groups, which includes 16.53% (n=43) were under 20 years, 51.92% (n=135) from 21 to 40 years, 26.92% (n=70) from 41 to 60 years & 4.61% (n=12) above 61 years (Table 1).

Among 260 patients geographic tongue was present in 2.3% (n=6) of patients out of which 33.33% (n=2) were males & 66.67% (n=4) were females. This shows a slight female predilection with a statistically non-significant p-value of 0.184. Geographic tongue was absent in patients below 20 years and above 61 years; it is evenly distributed among patients from 21 years to 60 years i.e., 50% (n=30) among patients from 21 to 40 years & 50% (n=3) among patients from 41 to 60 years ($p > 0.5$) (Table 2).

Table 1: Distribution of study participants

Demographic variables		n (260)	%
Age (years)	0-20	43	16.53
	21-40	135	51.92
	41-60	70	26.92
	61-80	12	4.61
Gender	Males	155	59.61
	Females	105	40.38

Table 2: Prevalence of Geographic tongue among study participants according to gender and age

Prevalence		n (260)	Prevalence (%)	p – value*
Present (Total)		6	2.3	--
Gender	Males	2	33.33	0.184
	Females	4	66.67	
Age (years)	0 – 20	0	0	0.471
	21 – 40	3	50	
	41 – 60	3	50	
	61 - 80	0	0	

*Chi-square test

Awareness about condition	n (6)	%
Yes	1	16.67
No	5	83.33

Table 3: Patients awareness about the condition/lesion (geographic tongue)

Among patients with geographic tongue, only 16.67% (n=1) of patient was aware of the lesion (Table 3).

Geographic tongue is often associated with other factors, one of which is burning sensation. It was reported in 33.33% of the study participants with geographic tongue. One male and one female patient, and also two patients aged between 21 to 40 years reported with a burning sensation while eating foods and this was statistically non-significant in (Table 4).

Table 4: Presence of burning sensation while eating foods

Burning sensation		n (2)	%	p-value*
Gender	Males	1	50	0.540
	Females	1	50	
Age (years)	0 – 20	0	0	0.083
	21 – 40	2	100	
	41 – 60	0	0	
	61 - 80	0	0	

*Chi-square test.

None of the patients reported the presence of psoriasis.

DISCUSSION

The present study is aimed at identifying the prevalence of geographic tongue among the patients attending Rajah Muthiah Dental College and Hospital, Chidambaram.

The results of this study indicated a prevalence of 2.3% for geographic tongue. This was in accordance with surveys conducted by S.Rohini et al in Chennai population (2020); Bhattacharya P T et al in West Bengal population (2016); Dhakal A et al in Nepal population (2017) and MUSAAD A H et al in Sudan population (2015) whose prevalence rate were 4%, 3.6%, 1%, 1.2% respectively. Few surveys indicated a comparatively high prevalence rate of 16.4% in India (Patil S, 2013, Jaipur, India), 17.7% in Iraq (Sabah F Mushatat, 2017, Iraq), and 14.3% in UAE (Maher AL Shayeb, 2020, UAE).

In this study, geographic tongue was more common in age group of 21- 60 years old patients. This was in line with surveys conducted by R.Krittika, K.R.Don (31-45years) in Chennai population; Arun Dhakal (21-40 years) in Nepal population; Aree Jainkittivong (above 29 years) in USA population. This was in controversy with the survey conducted by Fatemeh Rezaei, Mina Safarzadeh, Hamidreza Mozafari and Payam Tavakoli in Iran population which indicated a high prevalence of geographic tongue among 7-18 years age group. This may be due to the selection of sample in lower age group.

This study also indicated a female predilection for geographic tongue, which is similar to the surveys conducted by Santhosh Patil (2013) in Jaipur population, Taheri and Maleki(2000), Mumcu et al.(2005)and Jainkittivong and Langlaid et al.(2005). On the other hand, R.Krittika, K.R.Don (2020) published that geographic tongue was more prevalent in males than females among Chennai population. Other surveys conducted by Fatemeh Rezaei, Mina Safarzadeh, Hamidreza Mozafari & Payam Tavakoli (2014, Iran), Mina Safarzadeh (2015) and Voros-Balog et al.(2003) indicated a male predilection. Survey conducted by Kovackovic and S Kaleri(2000) indicated equal prevalence of geographic tongue among males and females. These differences may probably be

due to the interferences of hormones among study participants especially female hormones in adolescents and elderly women.

This study also specified that about 16.67% patients with geographic tongue were aware of the present lesion. A survey conducted by Ayah H MUSAAD, Amal H Abuaffan and Eman Khier (2015) indicated an awareness rate of about 33.03% in the Sudan population among which 45.71% were males and 10.26% were females.

Among the patients with geographic tongue, about 0.76% reported burning sensation. In survey conducted among school students in Kermanshah, Iran; pain and discomfort while eating hot and spicy foods as well as eggplant and tomato were reported in 57.24% of students (Fathemeh Rezaei, 2014). Geographic tongue in some patients was associated with consumption of cheese (Korting et al., 1996; Champion et al., 1998; Scully, 2004).

None of the patients were diagnosed with psoriasis. A survey performed by Mina Safarzadeh (2015) also indicated the absence of psoriasis in patients with geographic tongue. On contrary many other surveys indicated the association of psoriasis with geographic tongue. Singh et al. (2013), Picciani et al. (2011), Tomb et al. (2010), Costa et al. (2009), Hernández-Pérez et al. (2008), Zargari (2006), Daneshpazhooh et al. (2004) specified that among the patients with geographic tongue 5.6%, 12.1%, 7.7%, 18.1%, 12.5%, 7.2%, 14% were associated with psoriasis respectively.

CONCLUSION

The prevalence of geographic tongue among the patients attending Rajah Muthiah Dental College and Hospital, Chidambaram was 2.3%. This study portrays that geographic tongue was more prevalent in age group of 21 -60 years. This study also shows a female predominance with a prevalence rate of 66.67%. It is also noted that only about 16.67% patients were aware of the presenting condition. It is necessary to assure the patient about the benign nature of this condition/lesion. It does not require specific treatment. Topical application of prednisolone and use of mouthwash containing anesthetizing compounds can be recommended.

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THE USE OF ARTICAININE IN PEDIATRIC DENTISTRY: A COMPREHENSIVE REVIEW

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ABSTRACT

The purpose of this article is to discuss and share the current information regarding the use of articaine as local anaesthetic for pediatric patients, so that practitioners are encouraged to use it, so as to create better pain control, as well as create children, who have a positive attitude towards dentistry.

INTRODUCTION

Articaine is a widely used local anaesthetic in dentistry due to its rapid onset and longer duration of action. It has gained popularity in pediatric dentistry because of its safety and effectiveness in providing profound anaesthesia with minimal discomfort. It has not become so popular in India due to the cost, decreased use of cartridge system among dentists and limited availability as we have only one manufacturing facility for articaine in India. This review article aims to provide a comprehensive overview of the use of articaine in pediatric dentistry, including its pharmacology, clinical effectiveness, safety, and limitations.

History:

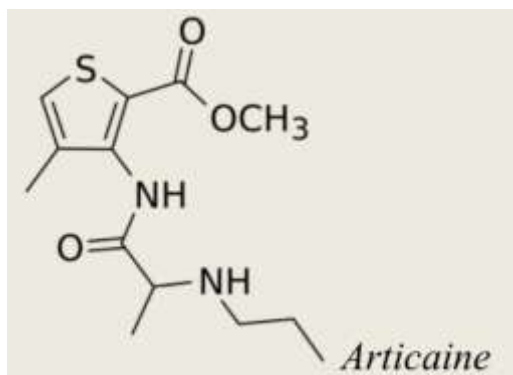
Articaine was originally synthesised as carticine in 1969 and entered clinical practice in Germany in 1976¹. The name was changed in 1984 the year it was released in Canada². It then entered United Kingdom in 1998¹. The United States in 2000(3), and Australia in 2005⁴.

Pharmacology:

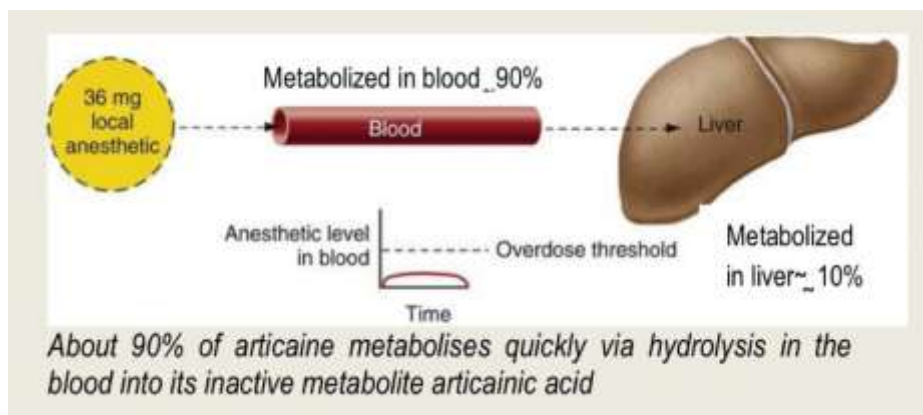
Articaine belongs to the amide class of local anaesthetics, and its unique molecular structure provides it with a higher lipophilicity and faster onset of action than other commonly used local anaesthetics. It has a higher potency compared to lidocaine and can be used at lower doses. Articaine is mostly metabolised in the blood then liver and excreted through the kidneys.

Articaine Structure :

It is chemically known as 4-methyl-3-[2-(propylamino)propionamido]-2-thiophenecarboxylic acid methyl ester. It is a unique amide local anaesthetics that it contains a thiophene instead of a benzene ring. The thiophene ring allows greater lipid solubility and potency as a greater portion of the administered dose can enter neurons⁵. It is the only amide anaesthetics containing an ester group, allowing hydrolysis in unspecific blood esterase⁶. About 90% of articaine metabolises quickly via hydrolysis in blood into inactive metabolites articanic acid, which is excreted by the kidney in the form articanic acid glucuronide⁷. It's metabolism is age dependent where clearance and volume of distribution decreases with increasing age⁸. The serum half-life of articaine is 20 minutes⁶ and of articanic acid is 64 minutes⁷.



Here is a picture of the chemical structure of articaine:



Availability:

Articaine is available in various forms, including injection, dental cartridges, and topical gel. The most common form is the dental cartridge, which contains 1.7 ml of a solution containing 4% (40mg/mL) articaine hydrochloride.

Dosage:

The dosage of articaine in children depends on several factors, including the child's weight, age, medical history, and the type of procedure being performed.

For dental procedures in children, the recommended dosage of articaine is typically based on the child's weight. The American Academy of Pediatric Dentistry recommends a maximum dose of 4.4 mg/kg for healthy children and 2.2 mg/kg for children with medical conditions. The maximum dose should not exceed 7 mg/kg.⁹

The most common concentrations of articaine are:

4% Articaine with 1:100,000 epinephrine - This is the most commonly used concentration of articaine in dentistry. It provides excellent anaesthesia and haemostasis.

4% Articaine with 1:200,000 epinephrine - This concentration is used in patients who are sensitive to epinephrine or who require a lower dose of epinephrine.

4% Articaine without epinephrine - This concentration is used in patients who are sensitive to epinephrine or who have cardiovascular disease.

2% Articaine with 1:100,000 epinephrine - This concentration is used for infiltration anaesthesia and nerve blocks.

2% Articaine without epinephrine - This concentration is used for infiltration anaesthesia and nerve blocks in patients who are sensitive to epinephrine or who have cardiovascular disease.

Clinical effectiveness:

There are lot of studies on the clinical effectiveness of Articaine. A review of literature by Yapp K et al¹⁰ found that articaine is safe and

effective local anaesthetic drug to use in all aspects of dentistry for patients of all ages, with properties comparable to other local anaesthetic agents. Xiaoyon Zhou et al¹¹ compared buccal infiltration technique with 4% articaine to 2% lignocaine inferior alveolar nerve block technique for pulpal therapy in primary mandibular teeth and found 4% articaine buccal infiltration was equivalent to IANB with 2% lidocaine for providing pulpal anaesthesia. Another study was done by Erfanparast et al¹² where they compared pain perception and behavioural feedback of children during pulp treatment of mandibular second primary molars and found the pain score to be lower in the articaine group as compared to the lignocaine group. In 2013, Tortamano et al.¹³ evaluated the onset and duration of pulp anaesthesia using 4% articaine and 2% lignocaine and came to the result that the articaine group had rapid onset and longer pulpal anaesthesia. Another study done by Rathi et al.¹⁴ compared the efficacy of buccal infiltration of articaine versus lidocaine for extraction of primary molar teeth and found that in pediatric patients age 7-12 years, single buccal infiltration of 4% articaine with 1:100,000 epinephrine effectively provided adequate palatal or lingual anaesthesia for primary molar extractions, while 2% lignocaine with 1:80,000 epinephrine failed to provide adequate palatal or lingual anaesthesia based of subjective patient report.

Safety:

Articaine has been shown to be safe for use in children when administered within recommended doses. The most common adverse effects associated with articaine include numbness or tingling of the lips, tongue, or cheek, which are usually transient and self-limiting. Rare but serious adverse effects, such as allergic reactions and nerve damage, have been reported, but these are generally associated with overdoses or improper administration.

Limitations:

Despite its many benefits, articaine has some limitations in pediatric dentistry. It is not recommended for use in children under four years of age due to the risk of overdose.

Articaine should also be used with caution in children with liver or kidney disease, as they may be at increased risk of adverse effects. In addition, articaine is not recommended for use in patients with a known allergy to amide-type local anaesthetics.²

CONCLUSION

Articaine is a safe and effective local anaesthetic for use in pediatric dentistry. Its unique pharmacology, rapid onset of action, and long duration of anaesthesia make it an excellent choice for various dental procedures in children. Its ability to anaesthetise mandibular primary teeth can replace IANB technique in children with infiltration technique. It is important that the dose of the articaine be calculated for each child as smaller volumes of more concentrated local anaesthetic solutions are required than lidocaine. However, its limitations must be considered when selecting it as an appropriate local anaesthetic for pediatric patients.

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TONGUE LESIONS - PREVALENCE AND ITS ASSOCIATED FACTORS AMONG CUDDALORE DISTRICT POPULATION, INDIA: A CROSS – SECTIONAL ANALYTICAL STUDY

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ABSTRACT

Aim & Objective: Tongue is a mobile muscular organ located in the oral cavity. Tongue lesions are of health concern for dental practitioners. Tongue lesions are any abnormal damage to the surface of the tongue. The goal of this study was designed to determine the prevalence of various tongue lesions and their association with age, gender, habits, symptoms, awareness and underlying systemic disease.

Methodology: The study was conducted on 200 patients who visited the Department of Oral Medicine & Radiology, Rajah Muthiah Dental College & Hospital; were examined for the presence of various tongue lesions. The clinical examination was done following WHO criteria under artificial light on dental chair using mouth mirror.

Statistical Analysis: The data was collected and subjected to statistical analysis. Frequencies and percentages were calculated. Chi square test and Kruskal Wallis test was done to compare various parameters with presence of tongue lesions.

Result: The prevalence of tongue lesions was estimated to be 13.5%. The most common lesions were Geographic tongue (22.22%) and Traumatic ulcer (22.22%), followed by coated tongue (18.51%), fissured tongue (14.81%), depapillated tongue (11.11%), median rhomboid glossitis (7.4%) and macroglossia (3.7%). Females are more commonly affected. 59.25% of patients were aware of the lesions.

Conclusion: The current study provides information on the prevalence of tongue lesions in the Cuddalore district population. It alerts the dentist about the underlying systemic conditions and also provides precedent data for future studies.

J Ind Dent Assoc Kochi 2023;5(1):39-48.

INTRODUCTION

Tongue is the mobile muscular organ that is attached to the floor of the mouth (AvcoN, Kanli A 2003). The dorsum of tongue is covered by specialized epithelial structures called papillae that contain taste buds and serous glands. Tongue aids in various functions like tasting, masticating, phonation, perception of sensation, pain stimuli and development of orofacial region (du Toit DF, 2003). Tongue is the mirror reflection of general health of the body and many systemic diseases (Bhattacharya PT, 2016 & Mangold AR, 2016). Evaluation and diagnosis of tongue lesions helps in early recognition of various systemic diseases (Avcu N, KanliA, 2003).

Tongue lesions can be due to several different etiologies that can be a local factor or manifestation of systemic diseases (Banoczy J, Rigo O, Albrecht M, 1993). Recognition and diagnosis of tongue lesion requires clear knowledge about clinical features of tongue, thorough history, onset & duration, symptoms and habits (Brian V. Reamy, 2010). Many epidemiological studies have been performed in different regions describing the prevalence of tongue lesions in various communities and the prevalence of these lesions are found to be ranging from 11 to 80 years. (Bhattacharya PT, 2016, Patil S, Kaswan, Rahman F, Doni B, 2013). It may alert the dental practitioner regarding any associated underlying systemic conditions. It can present a diagnostic and therapeutic dilemma for the physicians. The study was designed to determine the awareness, prevalence and symptoms of different tongue lesions and its association with various factors in the Cuddalore district population.

MATERIALS & METHODS:

The present cross-sectional study was conducted on 200 dental out patients (age ranges from 11 to 80 years) who visited the department of Oral Medicine & Radiology, Rajah Muthiah Dental College & Hospital. The patients were examined for presence of various tongue lesions who visited the OPD between 2/12/2019 and 4/1/2020.

Ethical clearance from the institutional ethical

committee was obtained (ethical clearance number: IHEC/585/2019). Informed consent was obtained from the patients or their parents/guardians who were willing to participate in the study.

The questionnaire consisted of 11 questions, open and closed type.

The questionnaire collected information regarding age, gender, type of lesion, habits, symptoms, patient's awareness of the lesion, any treatment previously taken for the lesion, and presence of any systemic diseases. Alcohol, tobacco of any form was considered under the habits to determine their effects on the lesion.

The clinical examination of the tongue was done, while the patient was seated on a dental chair using a conventional mouth mirror under artificial illumination. Tongue lesions (fissured tongue, geographic tongue, coated tongue, median rhomboid glossitis, traumatic ulcer, aphthous ulcer, depapillated tongue, hairy tongue) were diagnosed using WHO guidelines.

STATISTICAL ANALYSIS:

The data was entered into the computer (MS-office, Excel) and was subjected to statistical analysis using the statistical package-SPSS version 19.0 (IBM Corp. Ltd.)

From the collected data, the frequency, percentages were calculated. The descriptive statistics of the key variables were reported. Chi square test and Kruskal Wallis test was done to compare various parameters with presence of tongue lesions. The significance level of $p < 0.05$ was considered as statistically significant.

RESULT:

The study consisted of 200 patients reported to the department of Oral Medicine & Radiology from 2/12/2019 to 4/1/2020, of which 102 (51%) were males and 98 (49%) were females. The age of the patient ranged from 11 to 80 years. Majority of the age group were 21-40 years and 41-60 years (Table1).

Table 1: Distribution of study participant

Demographic variables		n (200)	%
Age groups (years)	0-20	17	8.5
	21-40	122	61
	41-60	50	25
	61-80	11	5.5
Gender	Males	102	51
	Females	98	49

Practice of adverse habits was seen in only 13 cases (6.5%), while the remaining 187 cases (93.5%) did not have any of the habits (Table 2).

Table 2: Habits among the study population**Table 2: Habits among the study population**

Habits	n (200)	%
Present	13	6.5
Smoking	4	30.76
Smoking tobacco & alcohol	4	30.76
Smokeless tobacco	3	23.07
Smokeless & alcohol	1	7.69
Alcohol	1	7.69
No habits	187	93.5

Of the total 200 patients, 27 patients (13.5%) were diagnosed with various tongue lesions. The distribution of tongue lesions is presented in Table 3. The most prevalent tongue lesion was geographic tongue identified in 6 cases (22.22%) & traumatic ulcer affecting 6 cases (22.22%) followed by coated tongue with the prevalence of 18.51% (5 cases), fissured tongue (14.81%), depapillated tongue (11.11%), median rhomboid glossitis (7.4%) and macroglossia (3.7%) (Table 3).

Table 3: Prevalence of tongue lesions

Tongue lesions	n (200)	%
Present	27	13.5
Coated tongue	5	18.51
Depapillated tongue	3	11.11
Fissured tongue	4	14.81
Geographic tongue	6	22.22
Macroglossia	1	3.7
Median Rhomboid Glossitis	2	7.4
Traumatic Ulcer	6	22.22
No tongue lesions	173	86.5

Out of 27 patients with tongue lesions, 10 patients (37.03%) were asymptomatic, while the remaining 17 patients were symptomatic. The most common symptom among them was burning sensation seen in 33.33%, followed by discomfort and pain (Table 4).

Table 4: Symptoms associated with tongue lesions

Symptoms	n (27)	%
Burning sensation	9	33.33
Discomfort	3	11.11
Pain	2	7.40
Burning sensation & discomfort	1	3.70
Pain & burning sensation	1	3.70
Pain & discomfort	1	3.70
Asymptomatic	10	37.03

It was found that 16 out of 27 patients (59.25%) were aware of their tongue lesions. Similarly the minority of those patients (11.11%), who were aware of the lesion, had taken treatment for the condition (Table 5).

Table 5: Patient's awareness of the condition

Awareness of condition	n (27)	%
Yes	16	59.25
No	11	40.75
Treatment taken for the condition		
Yes	3	11.11
No	24	88.88

Majority (11.11%) of the tongue lesions were present among the individuals using smokeless tobacco alone.

Table 6: Distribution of tongue lesions among individuals with habits

Habits	n (27)	%
Present	8	29.69
Smoking	2	7.40
Smoking tobacco & alcohol	1	3.70
Smokeless tobacco	3	11.11
Smokeless & alcohol	1	3.70
Alcohol	1	3.70
No habits	19	70.37

Various systemic conditions were seen in patients with tongue lesions. The most common systemic condition seen in patients with tongue lesions was Diabetic Mellitus (25.92%), followed by Anaemia (2 patients) and Hypertension (2 patients) (Table 7).

Table 7: Distribution of tongue lesions among individuals with systemic illness

Table 7: Distribution of tongue lesions among individ

Systemic Illness	n (27)	%
Present	12	44.44
Diabetes Mellitus	7	25.92
Hypertension	2	7.40
Anemia	2	7.40
Asthma	1	3.70
Others	4	7.40
No systemic illness	15	55.55

In relation to gender, females had more tongue lesions (59.25%) compared to males but statistically non-significant ($p = 0.25$). In relation to age, 41-60 years had majority of tongue lesions (48.14%), followed by 21-40 years (33.33%), 61-80 years (14.81%) and 0-20 years (3.70%) and this was found to be statistically significant ($p = 0.00$) (Table 8).

Table 8: Prevalence of tongue lesions among study participants according to gender and age

Table 8: Prevalence of tongue lesions among study participants according to gender and age

Prevalence		n (27)	Prevalence (%)	p – value
Gender	Males	11	40.74	0.25*
	Females	16	59.25	
Age groups (years)	0 – 20	1	3.70	0.00†, ‡
	21 – 40	9	33.33	
	41 – 60	13	48.14	
	61 - 80	4	14.81	

*Chi-square test, †Kruskal Wallis Test, ‡Statistically significant (p < 0.05)

The tongue lesions present among those practicing adverse habits and suffering from systemic illness was found to be statistically significant (p = 0.00) (Table 9).

Table 9: Prevalence of tongue lesions among study participants according to habits and systemic illness

Variables	n (27)	%	p-value*
Habits present	8	29.69	0.00†
Systemic illness present	12	44.44	0.00†

*Chi-square test, †Statistically significant (p < 0.05)

Most common tongue lesions in the study such as geographic tongue, traumatic ulcer, coated tongue and fissured tongue were predominately noted in the second and third decade. Most of the tongue lesions significantly encountered the females but statistically non-significant. Except for depapillated tongue (p = 0.002), the presence of other tongue lesions was not significantly associated with any systemic illness (Table10).

Table 10: Analysis of prevalent lesions with gender, age groups, habits, and systemic illness

Tongue Lesions (No. of patients)	Gender* n (%)	Age groups* n (%)	Habits* n (%)	Systemic Illness* n (%)
Coated tongue (5)	M: 1 (20) F: 4 (80) p value: 0.295	A: 0 (0) B: 2 (40) C: 2 (40) D: 1 (20) p value: 0.917	Present: 0 (0) Absent: 5 (100) p value: 0.107	Present: 2 (40) Absent: 3 (60) p value: 0.824
Depapillated tongue (3)	M: 0 (0) F: 3 (100) p value: 0.127	A: 0 (0) B: 0 (0) C: 3 (100) D: 0 (0) p value: 0.303	Present: 2 (66.66) Absent: 1 (33.33) p value: 0.136	Present: 3 (100) Absent: 0 (0) p value: 0.002†
Fissured tongue (4)	M: 2 (50) F: 2 (50) p value: 0.683	A: 1 (25) B: 0 (0) C: 2 (50) D: 1 (25) p value: 0.053	Present: 1 (25) Absent: 3 (75) p value: 0.826	Present: 2 (50) Absent: 2 (50) p value: 0.808
Geographic tongue (6)	M: 4 (66.66) F: 2 (33.33) p value: 0.142	A: 0 (0) B: 4 (66.66) C: 1 (16.66) D: 1 (16.66) p value: 0.160	Present: 3 (50) Absent: 3 (50) p value: 0.215	Present: 3 (50) Absent: 3 (50) p value: 0.756
Macroglossia (1)	M: 0 (0) F: 1 (100) p value: 0.398	A: 0 (0) B: 1 (100) C: 0 (0) D: 0 (0) p value: 0.556	Present: 0 (0) Absent: 1 (100) p value: 0.508	Present: 0 (0) Absent: 1 (100) p value: 0.362
Median Rhomboid Glossitis (2)	M: 2 (100) F: 0 (0) p value: 0.076	A: 0 (0) B: 0 (0) C: 1 (50) D: 1 (50) p value: 0.456	Present: 1 (50) Absent: 1 (50) p value: 0.512	Present: 0 (0) Absent: 2 (100) p value: 0.188
Traumatic Ulcer (6)	M: 2 (33.33) F: 4 (66.66) p value: 0.675	A: 0 (0) B: 2 (33.33) C: 4 (66.66) D: 0 (0) p value: 0.576	Present: 1 (16.66) Absent: 5 (83.33) p value: 0.430	Present: 2 (33.33) Absent: 4 (66.66) p value: 0.534

M – Males, F – Females, A – 0 to 20 yrs, B – 21 to 40 yrs, C – 41 to 60 yrs, D – 61 to 80 yrs

*Chi-square test, †Statistically significant (p < 0.05)

DISCUSSION

The study was conducted based on various tongue lesions among males and females of different age groups. Epidemiological studies have shown variable prevalence of tongue lesions in different parts of the world (Axell T,1996 Bouquot JE,1986). These variations are due to differences in sex, age, diverse groups of the patients and use of discrete diagnostic criteria, methodology and procedures (Darwazeh AM, Pillai K, 1993).

The current study was contemplated to determine the prevalence of tongue lesions & their association with age, gender, habits, systemic illness, symptoms, awareness & treatment received.

The prevalence of tongue lesions in the study was estimated to be 13.5%. The results are in close proximity with the Indian studies conducted by Bhattacharya et al (13.75%) (PT Bhattacharya, 2016) and Patil et al (12.07%) (Patil S, Kaswan S, Rahman, 2013). The study conducted by Sujata et al (Mohammed S, Sujata MB, 2010) and Al-Maverick et al (Al-Moberick A, 2009) estimated a low prevalence of 9.2% & 3.96% respectively. However, much higher prevalence (27.3%) was reported in Brazil (Dos Santos PJ, Bessa CF, 2004).

The tongue lesions were common in 41-60 years group (48.14%) next common is 21-40 years (33.33%), 61-80 years is 14.81% and 0-20 years is only 3.70%, which is in accordance with study reported by Costa et al (Costa F, 2012). This is in contrast with Maher et al studies in which the tongue lesions were common in 20-40 years group (71.4%), next common is 0-20 years group (12.9%), 21-40 years (12.9%) and 61-80 years age group (2.9%) (Maher AL Shayeb, Ebtesam Fathy, 2020).

In our study, the tongue lesions were higher in females as compared to males, which is in accordance with Byahatti et al. having reported a female predominance 173 (54%) females (Byahatti SM, Ingafou MSH, 2010). Similarly Fuaod SA study reported 69 females and 61 males have tongue lesions (Sura Ali, 2013). These results are contradictory to the study reported by Patil S et al. with a male female ratio of 4.7:1 (Patil S, Kaswan S, Rahman F, Doni B, 2013).

This study estimates that 59.25% of the patients were aware of the tongue lesion and about 37.03% patients were asymptomatic, while the remaining patients have associated symptoms like burning sensation, discomfort & pain. The number of patients aware of their tongue condition is more & more symptomatic cases found in this study than in other previous studies. (PT Bhattacharya, 2016).

Geographic tongue is also known as benign migratory glossitis of multifactorial etiology. It may be caused by environmental allergies, vitamin B deficiency, congenital, systemic diseases, candidiasis, psoriasis, hormonal imbalance, etc. Geographic tongue (22.22%) and traumatic ulcer (22.22%) were the most common tongue lesions in our study population. The prevalence of geographic tongue in Brazilian population, Libyan population and Indian population showed prevalence of 21%, 17.4% and 16.4% respectively which is lower than the present study (Bhyatti SM, 2010, Bezerra S, Costa Isabel, 2000, Patil S, 2013).

Traumatic Ulcer is usually a single lesion with erythematous, non-inverted margins with a clean base covered with a pseudomembrane. They are usually painful and occur due to bite or trauma from sharp teeth or ill-fitting dentures. The prevalence of traumatic ulcer is higher in our study when compared to 1.8% and 1.6% in other Indian & Libyan populations (Patil S, 2013, Byahatti SM, 2010).

Our results demonstrate higher prevalence among males which was also a finding in Hungary study (Voros-Balog T, 2003). The higher prevalence among males was attributed to an increasing smoking habit among males (Darwazeh AM, 1993).

Coated tongue is characterized by marked accumulation of keratin on the filiform papillae of the dorsal tongue. The possible associated factors are debilitation, drugs, smoking and poor oral hygiene. The prevalence of coated tongue in the current study was 18.51%. Patil S reported the same as 28%, which is higher than the present study (Patil S, 2013). In Turkish population, prevalence rate was 2.1% which is very low compared to present study (Ugar-Cankal D, 2005).

Fissured tongue is a relatively benign condition characterized by numerous prominent deep grooves or fissures on the dorsum of tongue. The depth of fissures ranges from 2 to 6 mm. Fissured tongue was reported in 4 patients with the prevalence of 14.81%. The prevalence was similar and consistent with previous studies, (Patil S,2013, Darwazeh AM, 1993,Darwazeh AM,2011).The Brazilian and Libyan population reported a prevalence of 27.3% and 48.4%, higher than the present study (Dos Santos PJ,2004)(Byahatti SM,2010). Lower prevalence was seen among Turkish population (0.9%) (Ugar-Cankal D,2005) and Saudi population (1.4%) (Al-Moberick A,2009).

Depapillated tongue is clinically characterized by local or extensive loss of papilla from anterior two third of the dorsum of tongue may be due to trauma, defective restorations, xerostomia and it may be associated with burning sensation. The prevalence rate of depapillation was 11.11% which is in line to the study of Patil S et al 11.5% (Patil S, Kaswan S,2013). The prevalence of Libyan population was 25.6% (Byahatti,SM, 2010) which is higher than the result of the present study.

In this study, Median rhomboid glossitis seen only in 2 patients with the prevalence rate of 7.4% was reported. This study however reported a higher prevalence. The lower prevalence of 3.7% has been reported in the study of Patil S et al (Patil S, Kaswan S,2013) A prevalence of 0.6% has been reported in Jordanian & Libyan populations (Darwazeh AM,2011, Byahatti SM,2010). It is more prevalent in males and is in accordance with the study reported by Patil S et al (Patil S, Kaswan S,2013).

Macroglossia is the abnormal enlargement of the tongue in relation to the jaw. The prevalence rate in the present study was 3.7%. A lesser prevalence of 1.5% was reported by Patil S et al (Patil S, Kaswan S,2013). The prevalence in Turkish population was much lower than the present study (0.2%).

CONCLUSION

The current study highlights the various tongue lesions in the patients who visited for dental treatment. The overall prevalence of the

tongue lesions in the study population was 13.5%. Dental practitioners and health professionals should be aware of the different tongue lesions as it may alert them about any malignancies or other systemic illness. The community should be made aware of oral health and hygiene.

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