MAHE INSTITUTE OF DENTAL SCIENCES & HOSPITAL

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RESEARCH COMMITTEE MEETING

Minutes of the third Research Committee meeting held on 27/10/2017 at 9.30 AM in the Conference Hall of Mahe Institute of Dental Sciences & Hospital, Mahe.

Dr. Anil Melath , Chairman welcomed the gathering and introduced the Dr.M. Jonathan Daniel Professor and Head, Department of Oral Medicine and Radiology, MGPGI. Dr.Selvamani M Secretary of the Research Committee briefed members and started with the proceedings.

Members Present

1. Dr.Anil Melath	Chairman
2. Dr.Selvamani	Secretary
3. Dr. M.Jonathan Daniel	Member
4. Dr.Rena Ephraim	Member
5. Dr.Seby J Gardens	Member
6. Dr.George Thomas	Member
7. Dr.Gopikrishnan S	Member
8. Dr.Binoy Mathews .N	Member
9. Dr.Bastian T.S	Member
10. Dr.Mohammed Feroz T.P	Member
11. Dr.Ajoy Vijayan	Member

Discussion and approval of following dissertation topics of M.D.S students of 2017-2018 batch conceded.

The topics are as follows.

BRANCH-I: PERIODONTICS

PROJECT-1

TITLE : -Comparative Evaluation Of Clinical Changes And Microbial Flora Associated With Usage Of Mouth Washes Containing Green Tea, Chlorhexidine (0.2%) And Essential Oils In Patients Undergoing Orthodontic Therapy.

STUDENT NAME :-Dr.Krishna Priya A.B

GUIDE :-Dr.Anil Melath, Principal

PROJECT-2

TITLE :- Clinical Assessment Of Variations In Gingival Biotype Of Individuals With Regards To Age, Gender And Arch Location.

STUDENT NAME :-Dr.Hemalatha D M

GUIDE :-Dr.Mohammed Feroz T.P, Professor

PROJECT-3

TITLE :-Evaluation Of The Efficacy Of Desensitizing Tooth Paste, Mouthwash And Laser On Obliteration Of Dentinal Tubules: An In Vitro Scanning Electro Microscopic Study.

STUDENT NAME :-Dr.Anjana Vasudevan T

GUIDE :-Dr.Subair K, Reader

BRANCH-II:-ORAL PATHOLOGY AND MICROBIOLOGY

PROJECT-1

TITLE :- Epithelial And Connective Tissue Changes In Oral Submucous Fibrosis – A Morphometric Analysis.

STUDENT NAME :-Dr.Nitheash P

GUIDE :-Dr.Bastian T.S,Professor and HOD

PROJECT-2

TITLE :- Histological And Morphometric Study On Human Dentin And Pulp Of Patients with Diabetes Mellitus Type II.

STUDENT NAME :-Dr.Suhana H S

GUIDE :-Dr.Selvamani M, Reader

BRANCH-III:-ORTHODONTICS AND DENTOFACIAL ORTHOPAEDICS

PROJECT-1

TITLE :- Evaluation of Reliability of Symphyseal Angle in assessment of Skeletal Growth Pattern.

STUDENT NAME :-Dr.Rizwana

GUIDE :-Dr.Gopikrishnan S, Professor & HOD

PROJECT-2

TITLE :- Mesio-distal widths of Mandibular permanent first molars and incisors as predictors of mandibular permanent canine and premolar widths: Applicability and reliability in North Kerala population.

STUDENT NAME :-Dr.Aravinthan

GUIDE :-Dr.Suresh Babu C, Professor

PROJECT-3

TITLE :- Evaluation And Comparison Of Shear Bond Strength And Adhesive Residue Index Of Two Adhesive Pre Coated Bracket Systems With A Conventional Bracket System- An Invitro Study.

STUDENT NAME :-Dr.Swathi T

GUIDE :-Dr.Jithesh Kumar K,Reader

BRANCH-IV:-PAEDODONTICS AND PREVENTIVE DENTISTRY

PROJECT-1

TITLE :- Prevalence Of Traumatic Dental Injuries And Molar Relation In School Children ,In And Around Mahe.

STUDENT NAME :-Dr.Aswathi T.M

GUIDE :-Dr.Rena Ephraim,Professor & HOD

PROJECT-2

TITLE :- Cephalometric Evaluation Of The Pre – Treatment And Post Treatment Changes After The Correction Of Class Ii Division I Malocclusion With Twin Block Appliance In Mixed Dentition.

STUDENT NAME :-Dr.Bimal Rag B R

GUIDE :-Dr.Rajamani T, Professor

PROJECT-3

TITLE :- Effect Of Pediatric Drugs On Solubility And Microleakage Of Restorative Materials Used In Primary Teeth.

STUDENT NAME :-Dr.Mridhul M U

GUIDE :-Dr.Ambili Ayilliath, Reader

BRANCH-V:-PROSTHODONTICS AND CROWN AND BRIDGE

PROJECT-1

TITLE :- Comparative Evaluation Of Compressive And Flexural Strength Of Two Resin Based Core Build–Up Materials With An Alkasite Material – An In-Vitro Study

STUDENT NAME :-Dr.Abirami V.

GUIDE :-Dr.Binoy Mathews N, Professor & HOD.

PROJECT-2

TITLE :- Comparative Evaluation Of Stress Distribution Patterns Within Alveolar Bone Under Tooth Supported Mandibular Over Dentures Using Three Different Extra-Radicular Anchorage Systems –A Finite Element Analysis

STUDENT NAME :- Dr.Ranijayatha P R

GUIDE :-Dr.Nanda Kishore B

BRANCH-V:-CONSERVATIVE DENTISTRY AND ENDODONTICS

PROJECT-1

TITLE :- Evaluation of Dentinal Defects Formation With Single File Rotary Systems –An Invitro Stereomicroscopic Study.

STUDENT NAME :-Dr. Mohammed Jamshid

GUIDE :-Dr.George Thomas

PROJECT-2

TITLE :- Evaluation Of The Fracture Resistance Of Different Root Reinforcement Techniques In Flared Root Canals Using Fiber Posts – An Invitro Study.

STUDENT NAME :Dr.Aathira Muraleedharan

GUIDE :-Dr.Sunil Jose

PROJECT-3

TITLE :- Comparison of smear layer removal efficacy of Endovac pure with different irrigating systems: An *in vitro* SEM study.

STUDENT NAME :-Dr.Abdul Latheef Afsal

GUIDE :-Dr.Madhu Kiran

Recommendations from the committee members:

- Consent form should also be in a regional language other than English
- Copy right form should be included in dissertation.
- Not to mention brand name in objectives, but can be mention in methodology.
- Dr.Hemlatha D.M,Department of Periodontology informed to include gingival enlargement due to drug as exclusion criteria
- Dr.Aswathi T M, Department of Paedodontis informed to modify title of dissertation "In Mahe population" instead of" in and around Mahe".
- Dr.Bimal Rag B R, Department of Paedodontics to specify the parameters in objectives.
- Recommends to carry pilot study as soon as possible and conduct internal Research Committee meeting and record the minutes.
- Meeting adjourned at 1.00 P M with the approval of the above mentioned dissertation topics.

Dr.Anil Melath
Chairman

Dr.Selvamani M
Secretary

Dr.M.Jonathan Daniel
Professor &HOD
Department of Oral Medicine
MGPGI

PONDICHERRY UNIVERSITY

MAHE INSTITIUTE OF DENTAL SCIENCES AND HOSPITAL

DEPARTMENT OF PERIODONTICS

PROFORMA OF THESIS SUBMITTED IN PARTIAL FULFILLMENT FOR DEGREE OF MASTER OF DENTAL SURGERY IN PERIODONTICS

CLINICAL ASSESSMENT OF VARIATIONS IN GINGIVAL BIOTYPE OF INDIVIDUALS WITH REGARDS TO AGE, GENDER AND ARCH LOCATION

BY

DR.HEMALATHA.D.M

POST GRADUATE (MDS)-FIRSTYEAR

DEPARTMENT OF PERIODONTICS

NOVEMBER- 2017

GUIDE

DR.MOHAMMED FEROZ.T.P

PROFESSOR

DEPARTMENT OF PERIODONTICS

MAHE INSTITIUTE OF DENTAL SCIENCES & HOSPITAL.MAHE

PUDUCHERRY

CO- GUIDE

DR.MELWIN MATHEW

SENIOR LECTURER

DEPARTMENT OF PERIODONTICS

INTRODUCTION

The clinical appearance of the healthy marginal periodontium is genetically determined and seems to be influenced by tooth size, shape and position, and biological phenomena such as age, gender, and growth.[1] The contour of the gingiva closely follows the contour of the underlying alveolar bone.[2] The term "periodontal biotype" was introduced by Seibert and Lindhe.[3] Claffey and Shanley defined the thin tissue biotype as a gingival thickness of <1.5 mm, and the thick tissue biotype was referred to as having a tissue thickness ≥2 mm.[4]

Tissue biotypes are associated with the outcomes of periodontal therapy, root coverage procedures, and implant esthetics. It is suggested that gingival or periodontal diseases are more likely to occur in patients with a thin gingival biotype. Similarly, in implant restorations, the thick flat tissue biotype is an important factor for a successful esthetic treatment outcome. In root coverage procedures, a flap thickness of 1.5mm is associated with a more predictable prognosis. The identification of gingival biotype may be important in clinical practice since differences in gingival and osseous architecture have been shown to exhibit a significant impact on the outcome of restorative therapy.[5]

AIM

This study aims to evaluate the variations in the thickness of gingiva with respect to age, gender, and dental arch.

OBJECTIVES

- To evaluate the difference in gingival thickness in male and female.
- To assess the variations in the gingival biotype with respect to age.
- To compare the variations of gingival thickness in maxillary and mandibular arches.

HYPOTHESIS

NULL HYPOTHESIS: There are no significant variations in gingival thickness with age, gender and arch location.

ALTERNATE HYPOTHESIS: There is significant variation in gingival thickness with age, gender and arch location.

REVIEW OF LITERATURE

- **Shekhawat et al.** [1] (2012), conducted a study on 20 systemically healthy subjects and analyzed the correlation of gingival bleeding to gingival biotype. The study found a negative correlation between gingival thickness and bleeding on probing. Thinner gingiva bleeds more when compared to thicker gingiva.

- **Agarwal et al.** [5] (2017), examined the variations in gingival thickness in maxillary and mandibular arches in 90 healthy subjects and observed a significant decrease in the thickness of gingiva with age, in both the arches and was significantly high in females. The study also showed a thicker gingiva in the maxillary arch.

- **De Rouck T et al.** [6](2009), conducted a study on 100 periodontally healthy subjects. Evaluated the transparency of periodontal probe through gingival margin as a method to discriminate thick and thin gingival biotypes. The study elicited the predominance of thin biotype in females and thick biotype in males.

- **Huang LH et al.** [7] (2005), included 23 patients with Miller's class I recession in their study. Patients were treated with coronally advanced flap procedure and reviewed after 6months. 14 subjects with thick biotype showed complete root coverage, showing the significance of thick gingival biotype.

- **Muller HP et al.** [8] (2000), carried out a study on 40 young adults on the thickness of masticatory mucosa. And elicited that women have thinner palatal mucosa. This study stated that thickness of masticatory mucosa strongly depends on the gender and periodontal phenotype.

METHODOLOGY

The gingival status of the selected patients will be assessed by Gingival index (Loe and Silness).The facial gingiva will be topically anesthetized with a topical anesthetic spray. The gingival thickness will be assessed midbuccally, using an endodontic spreader (No.20) with a rubber stopper and measured on the ruler.

The measurement will be made in the middle of attached gingival between the mucogingival junction and the gingival margin .The thickness of gingiva will be recorded for six maxillary and six mandibular anterior teeth and final readings will be obtained by calculating the mean of all six measurements in the respective arches. The subjects will be diagnosed to have thin or thick biotype based on their gingival tissue thickness.

MATERIALS AND METHOD

SOURCE OF DATA

Outpatients from the Department of Periodontics, Mahe Institute of Dental Sciences and Hospital, willing to give the informed consent and to comply with the study will be included.

STUDY DESIGN

A total of 96 subjects will be divided into three different groups based on the age.

Each group comprised of 16 males and 16 females.

- Group I : 32 subjects with 15–25 years of age.
- Group II : 32 subjects with 26–39 years of age.
- Group III : 32 subjects with age more than 40 years.

INCLUSION CRITERIA

- Patients with no evidence of gingivitis and periodontitis.
- Patients with adequate width of attached gingiva.
- No visible signs of dental caries.
- Patient with all the maxillary and mandibular anterior teeth.

EXCLUSION CRITERIA

- Pregnant and lactating females.
- Patients with gingival enlargement/ any history of use of drugs that can cause gingival enlargement.
- Patients with gingival recession in the anteriors.
- Malocclusion or mal-alignment of anterior teeth.
- Anomalies like torus or exostosis.

STATISTICAL ANALYSIS

- The mean thickness of gingiva will be compared across different age groups.
- Comparison between the age groups will be done using ANOVA with post hoc test and Independent t test to compare between the genders.

RESULTS

Mean thickness of attached gingiva will be analyzed based on :

- The age groups.
- Gender differentiation.
- Maxillary and mandibular arches.

REFERENCES

1. Shekhawat NR, Dodwad V, Kukreja BJ. Determination of gingival thickness with variance component. Pharm Biomed Sci 2012;24:62-4.

2. Huang LH, Neiva RE, Wang HL. Factors affecting the outcomes of coronally advanced flap root coverage procedure. J Periodontol 2005;76:1729-34.

3. Seibert JL, Lindhe J. Esthetics and periodontal therapy. In: Lindhe J,editor. Textbook of Clinical Periodontology. 2nd ed. Copenhagen,Denmark: Munksgaard; 1989. p. 477-514.

4. Claffey N, Shanley D. Relationship of gingival thickness and bleeding to loss of probing attachment in shallow sites following nonsurgical periodontal therapy. J Clin Periodontol 1986;13:654-7.

5. AgarwalV, Sunny,MehrotraN, Vijay.V. Gingival biotype assessment: Variations in gingival thickness with regard to age, gender and arch location. Indian J Dent Sci 2017;9:12-5.

6. Huang LH, Neiva RE, Wang HL. Factors affecting the outcomes of coronally advanced flap root coverage procedure. J Periodontol 2005;76:1729-34.

7. Müller HP, Heinecke A, Schaller N, Eger T. Masticatory mucosa in subjects with different periodontal phenotypes. J Clin Periodontol 2000;27:621-6.

8. De Rouck T, Eghbali R, Collys K, De Bruyn H, Cosyn J. The gingival biotype revisited: Transparency of the periodontal probe through the gingival margin as a method to discriminate thin from thick gingiva. J Clin Periodontol 2009;36:428-33

MAHE INSTITUTE OF DENTAL SCIENCES

DEPARTMENT OF PERIODONTICS

CONSENT FORM

I……P/o……

hereby given my consent to perform the Dental /Anesthetic procedure upon me /my ward. I declare that the entire procedure / study has been completely detailed to me and understand that the data collected will be used for the thesis "CLINICAL ASSESSMENT OF VARIATIONS IN GINGIVAL BIOTYPE OF INDIVIDUALS WITH REGARDS TO AGE, GENDER AND ARCH LOCATION" and only for research and publication purpose. I agree to abide by the rules and regulations of this hospital. I have signed this consent form without any pressure and in my full sense.

Date: Signature/Thumb impression of the subject.

Signature of the Doctor

മാഹി ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ് ദന്തൽ സയൻസ് ആന്റ് ഹോസ്പിറ്റൽ

ഡിപ്പാർട്ട്മെന്റ് ഓഫ് പെരിയോഡോന്റിക്സ്

സമ്മതപത്രം

ഞാൻ/രക്ഷിതാവ്_____എന്റെ മകൾ/മകൻ_____

എന്നവർക്ക് ദന്തചികിത്സ/അനസ്തേഷ്യയെക്കുറിച്ചുള്ള എല്ലാ വിശദവിവരങ്ങളും ഡോക്ടർ എനിക്ക് ബോധ്യപ്പെടുത്തി തന്നിട്ടുണ്ടെന്നും എന്നിൽ നിന്നും ശേഖരിച്ച വിവരങ്ങൾ "ക്ലിനിക്കൽ അസസ്സ്മെന്റ് ഓഫ് വേരിയേഷൻസ് ഇൻ ജിൻജൈവൽ ബയോടൈപ്പ് ഓഫ് ഇൻഡിവിജ്വൽസ് വിത്ത് റിഗാർഡ് റ്റു ഏജ്, ജെന്റർ, ആന്റ് ആർച്ച് ലൊക്കേഷൻ" എന്ന പഠനത്തിനും അതിന്റെ പ്രസിദ്ധീകരണത്തിനു മാത്രമെ വിനിയോഗിക്കുന്നുള്ളു വെന്നും ബോധ്യപ്പെടുത്തിയിട്ടുണ്ട്.

ഞാൻ ഈ ഹോസ്പിറ്റലിന്റെ നിയമനടപടിക്രമങ്ങൾ കൃത്യമായി പാലിക്കുമെന്നും, സ്വന്തം ഇഷ്ടപ്രകാരവും പൂർണ്ണബോധ്യത്തോടെയുമാണ് ചികിത്സയ്ക്ക് തയ്യാറായതെന്ന് ഇതിനാൽ സമ്മതിച്ചിരിക്കുന്നു.

തീയതി

ഒപ്പ്

ഡോക്ടറുടെ ഒപ്പ്

MAHE INSTITUTE OF DENTAL SCIENCES

DEPARTMENT OF PERIODONTICS

PROFORMA SL.NO:

Name: OP No:

Age: Date:

Sex: PhNo:

Occupation: Address:

Chief complaint:

History of presenting illness:

Medical history:

Drug history:

Past dental history

GINGIVAL INDEX

13	12	11	21	22	23
43	42	41	31	32	33

Scoring:

INFERENCE:

GINGIVAL THICKNESS:

	MAXILLARY ANTERIORS		MANDIBULAR ANTERIORS	
	RIGHT	LEFT	RIGHT	LEFT
CENTRAL INCISOR				
LATERAL INCISOR				
CANINE				
TOTAL				
MEAN				

INFERENCE:

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MINDS/PG-ETHICAL/02/2017-18 Date: 26-10-2017

ETHICAL CLEARANCE CERTIFICATE

Dissertation Topic :- Clinical Assessment Of Variations In Gingivalbiotypeof Individuals With Regards To Age, Gender And Arch Location

Nature of Project :- Masters of Dental Surgery

Student Name :- DR.HEMALATHA.D.M

Guide Name :- Dr.Mohammed Feroz T.P

Co-Guide Name :- Dr.Melwin Mathew

On behalf of the Mahe Institute of Dental Sciences & Hospital, Mahe, U.T.of Puducherry, Ethical Committee, hereby give ethical approval in respect of undertakings contained in the above mentioned Research work. The Researcher Student may therefore commence with the research work as from the date of this certificate, using the reference number indicated above.

Dr.Babu Raveendran,
Chairman

Dr.Anil Melath
Principal

PONDICHERRY UNIVERSITY

MAHE INSTITUTE OF DENTAL SCIENCES AND HOSPITAL

DEPARTMENT OF PERIODONTICS

PROFORMA OF THESIS SUBMITTED IN PARTIAL FULFILLMENT FOR DEGREE OF MASTER OF DENTAL SURGERY IN PERIODONTICS

"EVALUATION OF THE EFFICACY OF DESENSITIZING TOOTH PASTE, MOUTHWASH AND LASER ON OBLITERATION OF DENTINAL TUBULES : AN IN VITRO SCANNING ELECTRON MICROSCOPIC STUDY"

BY

DR.ANJANA VASUDEVAN.T

POST GRADUATE (MDS)-FIRST YEAR

DEPT. OF PERIODONTICS.

OCTOBER 2017

GUIDE

DR. SUBAIR. K

READER

DEPT. OF PERIODONTICS

MAHE INSTITUTE OF DENTAL SCIENCES AND HOSPITAL,MAHE,

CO-GUIDE

DR.ASHITHA MOHANDAS

SENIOR LECTURER

DEPT.OF PERIODONTICS

MAHE INSTITUTE OF DENTAL SCIENCES AND HOSPITAL,MAHE,

PUDUCHERRY.

INTRODUCTION :

Dentin hypersensitivity is dental pain which is sharp in character and of short duration, arising from exposed dentinal surfaces in response to stimuli, typically thermal, evaporative, tactile, osmotic, chemical or electrical; and which cannot be ascribed to any other dental disease . [1]Dentinal hypersensitivity develops in two phases: lesion localization and lesion initiation. [1]

Lesion localization occurs by loss of protective covering over the dentin, thereby exposing it to external environment. It includes loss of enamel via attrition, abrasion, erosion or abfraction. Another cause for lesion localization is gingival recession which can be due to toothbrush abrasion, pocket reduction surgery, vital tooth preparation for crown, excessive flossing or secondary to periodontal diseases. [2]

For dentinal hypersensitivity to occur, the lesion localization has to be initiated. It occurs after the protective covering of smear layer is removed, leading to exposure and opening of dentinal tubules .

The disease is prevalent in the patient with the age range of 20-50 years. However, it is more prevalent in the patient with the age range of 30-40 and more prevalent in female individuals that would probably be related to their dental hygiene and dietary. The occurrence of dentin hypersensitivity in canines and premolars is more than other teeth and the buccal surface of the teeth has been reported to be more involved with the disease than other places. [3]

The purpose of this study is to find a novel treatment alternative among the desensitizing tooth paste, mouthwash and laser in occluding dentinal tubules and thereby reducing dentinal hypersensitivity.

AIM OF THE STUDY

To evaluate and compare the efficacy of desensitizing toothpaste, desensitizing mouthwash and diode laser on dentinal tubular obliteration.

OBJECTIVES OF THE STUDY

- To evaluate the effectiveness of desensitizing dentifrice on dentinal tubule obliteration.
- To assess the efficacy of desensitizing mouthwash on dentinal tubule obliteration.
- To determine the effectiveness of diode laser on dentinal tubule obliteration.
- To compare the efficacy of desensitizing dentifrice, mouthwash and diode laser on the dentinal tubule obliteration under scanning electron microscopy.

HYPOTHESIS

- Null hypothesis- There will be no significant difference in terms of dentinal tubule obliteration with respect to desensitizing toothpaste, mouthwash and diode laser.
- Alternate hypothesis- There will be significant difference in the effectiveness of desensitizing tooth paste, mouthwash and diode laser on dentinal tubule obliteration.

REVIEW OF LITERATURE

1. **Asrani HM et al [1] 2016** evaluated the ability of desensitizing agent Vivasens and Laser (diode)on dentinal tubule occlusion and its effectiveness over time using scanning electron microscopy and concluded that both Vivasens and Diode laser were equally effective in the obliteration of dentinal tubules just after application as well as after 15 days of treatment.

2. **Dilsiz A et al [2] 2010** evaluated and compared the efficacy of desensitizer toothpaste alone and in combination with the diode laser in the management of dentinal hypersensitivity in 13 adult patients and concluded that the desensitizing tooth paste appears to have therapeutic potential to alleviate dentinal hypersensitivity and conversely diode laser has the ability to reduce dentinal hypersensitivity.

3. **C L Chen et al [3] 2015** compared the effectiveness of red propolis extract ,calcium sodium phosphosilicate and arginine calcium carbonate in occluding dentinal tubules in 80 extracted human permanent molars and observed that all 3 agents demonstrated tubule occlusion especially arginine calcium carbonate showed more occlusion during treatment and red propolis extract demonstrated higher degree of occlusion following acid challenge.

4. **Monica Umana et al [4] 2013** evaluated the effects of diode lasers (810-980nm) on dentinal surfaces in 24 caries free human impacted wisdom teeth and each surface was treated with diode laser, continuous and non contact mode with 0.8,1,1.6 and 2 W respectively . Study concluded that diode lasers used at 0.8 and 1 W for 10 sec in continuous mode were able to seal the dentinal tubules.

5. **W.H Arnold et al [5] 2015** investigated the effectiveness of several different products on dentin tubule occlusion using qualitative and quantitative methods in 78 caries free extracted human molars and concluded that desensitizing toothpastes are the most common products that are used against dentin hypersensitivity and these toothpastes affect dentin tubule occlusion.

MATERIALS AND METHOD

Source of data

Extracted single rooted teeth samples will be collected from Out patients of Department of Oral and Maxillofacial Surgery , Mahe Institute of Dental Sciences & Hospital.

Inclusion criteria

- Patients in the age group of 10-20.
- Single rooted teeth (undergoing orthodontic treatment.)

Exclusion criteria

- Decayed teeth
- Fractured teeth
- Malformed teeth.

Methodology

- 30 extracted sound human single rooted teeth (lower premolar) will be taken.
- Teeth to be cleaned off gross debris and stored in 0.9% saline.
- The enamel will be removed with plain cut tungsten carbide fissure bur.
- Crown dentin discs, at the level of cervical region with a thickness of 2 mm, to be cut perpendicular to the long axis of tooth.
- The dentin discs will be polished using pumice and bristle brush.
- Specimens to be washed in distilled water for 12 min.
- Each specimen to be etched with 37% phosphoric acid for 30seconds to expose the dentinal tubules.
- Specimens to be rinsed with distilled water and ultrasound to remove the residual smear layer for five minutes.

- **Group I**

  10 samples to be applied with desensitizing toothpaste (arginine, calcium carbonate).

- **Group II**

  10 samples to be immersed in desensitizing mouthwash (Potassium citrate).

- **Group III**

  10 samples to be exposed to diode laser.

- **Group I**

  Specimens have to be applied with arginine and calcium carbonate containing desensitizing toothpaste. Pea-size amount to be applied on the dentin surfaces with the help of a finger and keep it for atleast 2 minutes.

- **Group II**

  Specimens to be immersed in desensitizing mouthwash for 30s and then rinsed in distilled water for further 30s.

- **Group III**

  Specimens have to be exposed with soft tissue diode laser with 810nm; non -contact continuous mode on the region of exposed dentin ,1 mm away for 10sec; output power - 0.8-1 W.

- Samples in all the 3 groups is to be air dried.

SEM STUDY

- Each specimen to be mounted on a metal stub.
- Samples will be stored in a vaccum silica gel dessicator for 1 hour.
- Samples will then be sputter-coated with 25nm of gold for 10min.
- Specimens will be examined under the SEM (×1500).

EVALUATION PARAMETERS

- Scanning electron microscopy scoring (C L Chen et al)[3]

1. Occluded (100% of tubules occluded.)
2. Mostly occluded (50-100% of tubules occluded.)
3. Partially occluded (25-50% of tubules occluded.)
4. Mostly unoccluded (<25% of tubules occluded.)
5. Unoccluded (0% of tubules occluded.)

STATISTICAL ANALYSIS

- Data will be expressed in terms of mean and standard deviation.
- Comparison between the groups will be done using ANOVA with post hoc test or kruskal wallis test.

RESULTS

- The results will be based on the analysis of the data obtained from the study.

REFERENCES

1. Asrani HM, Jain DN, Asrani A, Deshmukh P, Sankhla A. Comparative evaluation of desensitizing agent Vivasens and Laser for obliteration of dentinal tubules. Endodontology 2016;28:154-8.

2. Dilsiz A, Aydin T, Emrem G.Effects of the combined desensitizing dentifrice and diode laser therapy in the treatment of desensitization of teeth with gingival recession. Photomed Laser Surg. 2010;28 Suppl 2 : S69-74.

3.Chen CL, Parolia A, Pau A, Celerino de Moraes Porto IC. Comparative evaluation of the effectiveness of desensitizing agents in dentine tubule occlusion using scanning electron microscopy. Aust Dent J. 2015;60(1):65-72.

4. Umana M, Heysselaer D, Tielemans M, Compere P, Ing, Zeinoun T, et al . Dentinal tubules sealing by means of diode lasers (810 and 980 nm) : a preliminary in vitro study. Photomed Laser Surg.2013;31(7):307-14.

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CONSENT LETTER

Date:

I have no objection in participating in the study entitled **"EVALUATION OF THE EFFICACY OF DESENSITIZING TOOTH PASTE, MOUTHWASH AND LASER ON OBLITERATION OF DENTINAL TUBULES : AN IN VITRO SCANNING ELECTRON MICROSCOPIC STUDY"** by Dr Anjana Vasudevan. T under the guidance of Dr Subair. K. I understand that my identity will not be disclosed to anyone without my permission and the teeth collected will only be utilized for research and publication purpose, for the benefit of the patients. I have the right to withdraw from the study and the teeth collected are utilized with my permission.

Signature/ thumb impression of the subjects

Name

Signature of the relative

Name and relation

സമ്മതപത്രം

തീയതി :

ഡോക്ടർ അഞ്ജന വാസുദേവൻ.ടി എന്ന ഞാൻ **"EVALUATION OF THE EFFICACY OF DESENSITIZING TOOTH PASTE, MOUTHWASH AND LASER ON OBLITERATION OF DENTINAL TUBULES : AN IN VITRO SCANNING ELECTRON MICROSCOPIC STUDY"** എന്ന ആശയത്തിൽ ഡോക്ടർ സുബൈർ.കെ എന്നവരുടെ കീഴിൽ ഗവേഷണം നടത്തുന്നു. ഈ ഗവേഷണത്തിൽ ദന്തക്രമീകരണ പ്രക്രിയയുടെയോ അല്ലാതെയോ ഭാഗമായി എടുക്കുന്ന പല്ലുകൾ മാത്രമേ ങ്ങങ്ങൾ ശേഖരിക്കുന്നുള്ളു .പഠന സംബന്ധമായ ആവശ്യങ്ങൾക്കും പ്രസിദ്ധീകരണങ്ങൾക്കും മാത്രമേ അത് ഉപയോഗിക്കുകയുള്ളു .

ഡോക്ടർ അഞ്ജന വാസുദേവൻ.ടി ഡോക്ടർ സുബൈർ.കെ

(ഇൻവെസ്റ്റിഗേറ്റർ) (ഗൈഡ്)

പ്രസ്തുത ഗവേഷണത്തിന്റെ ഭാഗമാകുന്നതിൽ എനിക്ക് യാതൊരുവിധ എതിർപ്പും ഇല്ലെന്നും , ഈ ഗവേഷണത്തിൽ നിന്നും ശേഖരിക്കുന്ന വിവരങ്ങൾ ദുരുപയോഗം ചെയ്യില്ലെന്നും , ഈ ഗവേഷണത്തിൽ നിന്നും എപ്പോൾ വേണമെങ്കിലും പിന്മാറാൻ അവകാശമുണ്ടെന്നും , ഗവേഷണ വിവരങ്ങൾ എന്റെ അനുവാദത്തോടു കൂടിയേ ഉപയോഗിക്കുകയുള്ളുവെന്നും ഞാൻ മനസിലാക്കുന്നു.

പങ്കാളിയുടെ ഒപ്പ് / രക്ഷിതാവിന്റെ ഒപ്പ് /

കൈ വിരലടയാളം . കൈ വിരലടയാളം .

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MINDS/PG-ETHICAL/03/2017-18 Date:26.10.2017

ETHICAL CLEARANCE CERTIFICATE

Dissertation Topic :- Evaluation Of The Efficacy Of Desensitizing Tooth Paste, Mouthwash And Laser On Obliteration Of Dentinal Tubules : An In Vitro Scanning Electron Microscopic Study.

Nature of Project :- Masters of Dental Surgery

Student Name :- DR.ANJANA VASUDEVAN.T

Guide Name :- Dr.Subair .K

Co-Guide Name :- Dr.Ashitha Mohandas

On behalf of the Mahe Institute of Dental Sciences & Hospital, Mahe, U.T.of Puducherry, Ethical Committee, hereby give ethical approval in respect of undertakings contained in the above mentioned Research work. The Researcher Student may therefore commence with the research work as from the date of this certificate, using the reference number indicated above.

Dr.Babu Raveendran,
Chairman

Dr.Anil Melath
Principal

PONDICHERRY UNIVERSITY

MAHE INSTITUTE OF DENTAL SCIENCES AND HOSPITAL

DEPARTMENT OF ORTHODONTICS AND DENTOFACIAL ORTHOPEDICS

PROFORMA OF DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT FOR DEGREE OF MASTER OF DENTAL SURGERY IN ORTHODONTICS AND DENTOFACIAL ORTHOPAEDICS

"EVALUATION OF RELIABILITY OF SYMPHYSEAL ANGLE IN ASSESSMENT OF SKELETAL GROWTH PATTERN"

BY

DR RIZWANA

JUNIOR RESIDENT (POST GRADUATE) MDS 1st YEAR

GUIDE

DR.S. GOPI KRISHNAN MDS

PROFESSOR AND HOD

DEPARTMENT OF ORTHODONTICS& DENTOFACIAL ORTHOPAEDICS

MAHE INSTITUTE OF DENTAL SCIENCE AND HOSPITAL

CHALAKKARA, MAHE

INTRODUCTION

In Orthodontics knowledge of mandibular growth is indispensable in the diagnosis and treatment planning of various dento-facial anomalies. Two commonly used parameters have emerged to aid in the determination of the vertical facial type in relation to underlying skeletal features: Inclination of the mandible to anterior cranial base or to maxilla and the Percentage of lower facial height to total facial height.

Prediction of mandibular growth pattern (MGP) plays an important role in orthodontic diagnosis and treatment planning. Different methods have been introduced for predicting MGP and assessing the symphyseal morphology is one of them. Ricketts and others stated that morphology of the symphysis may be used to predict the direction of mandibular growth. Kieller's four variables (mandibular inclination, inter-molar angle, shape of the inferior border of the mandible, and inclination of the symphysis) accounted for 86% of the variability changes in the direction of mandibular growth.[1]

So far very few studies have been done to check the reliability of the symphyseal angle and no study has been done to assess the same in North Kerala population. Therefore the present study is aimed to determine the reliability of this angle for the assessment of skeletal growth pattern.

AIM

To evaluate the reliability of Symphyseal angle for the assessment of skeletal growth pattern in North Kerala population.

OBJECTIVES

1) To determine the reliability of symphyseal angle for the assessment of skeletel growth pattern

2) To assess the correlation of Symphyseal angle value measurements in Lateral Cephalogram and OPG

REVIEW OF LITERATURE

1 **Aki T et al (1994)** conducted a cephalometric study to determine whether symphysis morphology could be used as a predictor of the direction of mandibular growth and to assess growth changes of the symphysis. It was concluded that a mandible with an anterior growth direction was associated with a small height, large depth, small ratio and large angle of the symphysis. Conversely, a posterior growth direction was associated with a large height, small depth, large ratio and small angle of the symphysis.[1]

2 **Mangla R et al (2011)** conducted a study to evaluate the mandibular morphology in different facial types. It was found that the mandible with the vertical growth pattern was associated with a symphysis with large height, small depth, large ratio, small angle, decreased ramus height and width, smaller mandibular depth, increased gonial angle, and decreased mandibular arc angle in contrast to mandible with a horizontal growth pattern. Sexual dichotomy was found with mean symphysis height and depth in the female sample being smaller than in the male sample.[2]

3 **Esenlik E, Sabuncuoglu A (2012)** conducted a study to investigate the alveolar and symphysis region properties in hyper-, hypo-, and normodivergent Class II division 1 anomaly. The heights and widths of the symphysis and alveolus and the depth of maxillary palate were measured on the lateral cephalograms. Mean symphysis width was wider in the hypodivergent Class II group than in the other groups, while mean symphysis height was similar among all groups. The study concluded that symphysis width is the main factor in the differential diagnosis of Class II division 1 anomaly rather than symphysis height and hypodivergent Class II division 1 anomaly is more suitable for mandibular incisors movements.[3]

4 **Karine EMA, José VN, Guilherme de AA (2012)** conducted a study to establish cephalometric reference values for mandibular symphysis in adults. Dentoalveolar, skeletal and soft tissue variables were measured considering the influence of gender and facial type. The sample consisted of sixty cephalometric radiographs of white Brazilian adult patients, with a mean age of 27 years and 6 months, who had not undergone orthodontic treatment and who presented well-balanced faces and normal occlusion. Result of the study showed that the brachyfacial group showed broader symphysis in the dentoalveolar and basal areas

and a greater buccal dentoalveolar inclination. The projection of the chin was 6.67 mm below the subnasal vertical line and there was no significant difference between the genders or facial types.[4]

5 **Mahkameh Moshfeghi et al (2014)** found the symphyseal ratio to have a significant correlation with the MGP. The symphyseal ratio (Height/Depth) was small in a mandible with vertical growth pattern Cl II or Cl III. Conversely, a horizontal growth pattern of a Cl II or Cl III mandible was associated with a larger ratio of the symphysis in comparison with the normal group. The symphyseal ratio was also found to be greater in females.[5]

MATERIALS & METHODS

The study will be carried out using Lateral Cephalograms and Panoramic radiographs of 60 patients of age group 14-25 years with an ANB angle range of $2\text{-}4^0$, obtained from the record section of Department of Orthodontics and Dentofacial Orthopaedics, Mahe Institute of Dental Science and Hospital, Mahe

Total samples will be divided into three groups with radiographs (Lateral Cephalograms and OPG) of 20 patients in each, based on growth pattern, differentiated by two parameters (Bjork's sum and FMA value) in cephalogram

- Group 1: radiographs of patients with normodivergent pattern (Bjork sum value 396^o and FMA value $25+/-5^o$)
- Group 2: radiographs of patients with hypodivergent pattern (Bjork's sum value $< 396^o$ and FMA value $< 20^o$)
- Group 3: radiographs of patients with hyperdivergent pattern (Bjork's sum value $> 396^o$ and FMA value $> 30^o$)

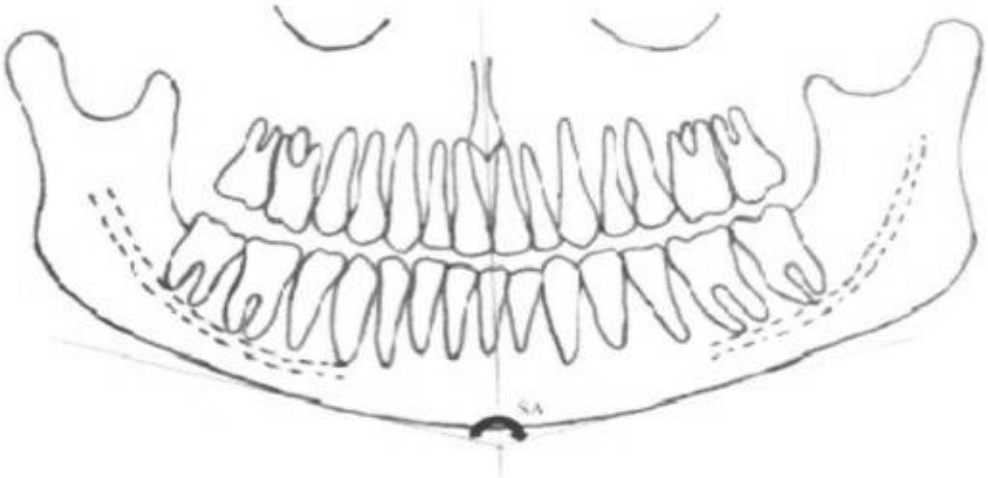
Exclusion criteria

- Unacceptable quality radiograph
- History of orthodontic intervention

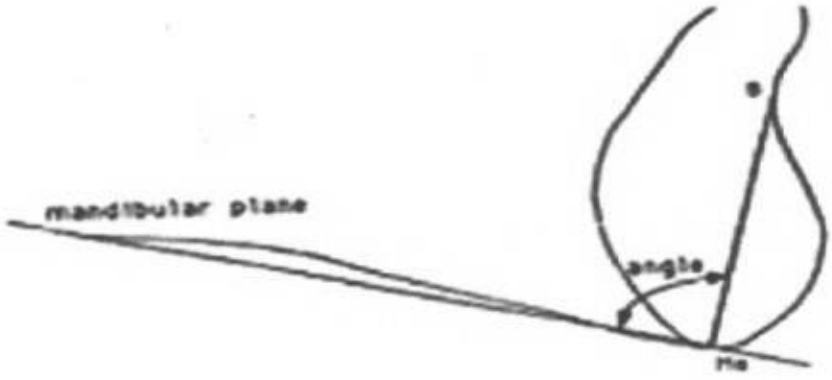
Tracing will be made by hand using a sharp 3H pencil on acetate tracing paper in a dark room using a x-ray viewer. Angle will be measured nearest of 0.5 degree. The important hard and soft tissue structures will be marked on the cephalogram.

Various reference points, planes and angles will be drawn, and recorded for evaluation.

In the panoramic radiograph Symphyseal Angle will be constructed from two tangents drawn at the most prominent point on the inferior border of the mandible in the canine and premolar regions, meeting at the midsagittal plane, drawn passing through the anterior nasal spine and between the two central incisors. All the radiographs will be traced in this way and the Symphyseal Angle will be measured. To reduce the intra-operator errors, all the measurements will be repeated after one week



On lateral cephalogram symphyseal angle will be measured as posterio superior angle between lines Me-B point and the mandibular plane.



Bjork's sum value is obtained by adding Saddle angle, Articulare angle and Gonial angle.

FMA is the angle formed by the intersection of FH plane and Mandibular plane

Measurements will be tabulated and mean values for the symphyseal angle in three groups will be derived and assessed for statistical significance.

Symphyseal angle derived from lateral cephalogram and OPG for all the three groups will be subjected to statistical analysis to determine the correlation between the same angles in two different radiographs.

RESULTS

The measurements obtained will be subjected to appropriate statistical analysis and results will be expressed in the forms of graphs, tables, photograph etc

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MINDS/PG-ETHICAL/06/2017-18 Date:26.10.2017

ETHICAL CLEARANCE CERTIFICATE

Dissertation Topic :- Evaluation of Reliability of Symphyseal Angle in assessment of Skeletal Growth Pattern.

Nature of Project :- Masters of Dental Surgery

Student Name :- DR RIZWANA

Guide Name :- Dr.Gopikrishnan S

On behalf of the Mahe Institute of Dental Sciences & Hospital, Mahe, U.T.of Puducherry, Ethical Committee, hereby give ethical approval in respect of undertakings contained in the above mentioned Research work. The Researcher Student may therefore commence with the research work as from the date of this certificate, using the reference number indicated above.

Dr.Babu Raveendran,
Chairman

Dr.Anil Melath
Principal

CONSENT LETTER

I..... S/o or D/o ..... have no objection in participating in the study entitled **"EVALUATION OF RELIABILITY OF SYMPHYSEAL ANGLE IN ASSESSMENT OF SKELETAL GROWTH PATTERN".** By Dr.Rizwana under the guidance of Dr. Gopikrishnan S. I understand that my identity will not be disclosed to anyone without my permission and the data collected will be utilized only for research and publication purpose. I understand that I have the right to withdraw from the proposed study at any time.

Signature/Thumb impression:

Name:

Signature of the relative:

Name of the relation:

സമ്മത പത്രം

മാഹീ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ് ഡെന്റൽ സയൻസ് ആൻഡ് ഹോസ്പിറ്റലിൽ ഡോ .റിസ്വാന നടത്തുന്ന **"EVALUATION OF RELIABILITY OF SYMPHYSEAL ANGLE IN ASSESSMENT OF SKELETAL GROWTH PATTERN"** എന്ന ഗവേഷണ വിഷയത്തിൽ പൂർണ്ണ മനസ്സോടു കൂടി ഭാഗമാകുന്നതിൽ എനിക്ക് യാതൊരു വിധ എതിർപ്പും ഇല്ല. ഈ ഗവേഷണത്തിൽ നിന്നും ശേഖരിക്കുന്ന വിവരങ്ങൾ ദുരുപയോഗം ചെയ്യില്ലെന്നും ഗവേഷണത്തിനും അനുബന്ധ പഠനങ്ങൾക്കും മാത്രമാണ് ഉപയോഗിക്കുന്നതെന്നും ഞാൻ മനസ്സിലാക്കുന്നു.

ഈ ഗവേഷണത്തിൽ നിന്നും എപ്പോൾ വേണമെങ്കിലും പിന്മാറാനുള്ള അവകാശമുണ്ടെന്നും ഞാൻ മനസ്സിലാക്കുന്നു.

പങ്കെടുക്കുന്ന വ്യക്തിയുടെ ഒപ്പ് /കൈ വിരലടയാളം

പേര്:

രക്ഷിതാവിൻറെ ഒപ്പ് / കൈ വിരലടയാളം

പേര്:

PONDICHERRY UNIVERSITY

MAHE INSTITUTE OF DENTAL SCIENCES AND HOSPITAL

DEPARTMENT OF ORTHODONTICS AND DENTOFACIAL ORTHOPEDICS

PROFORMA OF DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT FOR DEGREE OF MASTER OF DENTAL SURGERY IN ORTHODONTICS AND DENTOFACIAL ORTHOPAEDICS

"MESIO-DISTAL WIDTHS OF MANDIBULAR PERMANENT FIRST MOLARS AND INCISORS AS PREDICTORS OF MANDIBULAR PERMANENT CANINE AND PREMOLAR WIDTHS: APPLICABILITY AND RELIABILITY IN NORTH KERALA POPULATION"

BY

DR ARAVINTHAN

JUNIOR RESIDENT (POST GRADUATE) MDS 1st YEAR

GUIDE

DR SURESH BABU MDS

PROFESSOR

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INTRODUCTION

The universe of malocclusion commonly identified in an orthodontic clinic is a result of dental problems, skeletal problems and a combination of dental and skeletal problems. Most malocclusions involve problems of an imbalance between the size of the teeth and the size of the arches with which they are associated. This is especially seen in the lower arch, which is constrained by the upper arch, and can be seen clinically in class 1 malocclusion with crowding. Most of these cases have less than three mm of negative tooth size arch length discrepancy[1].

Tooth size prediction methods can be grouped into 3 categories: those that use linear regression equations (eg, tables of prediction), those based on radiographs, and a combination of both. The first method is the most widely used, especially the tables of Moyers and the equations of Tanaka and Johnston. However, these equation and tables can either overestimate or underestimate the actual widths of the permanent canines and premolars.

The arch length decrease during the dental transition, particularly in the mandible is usually analyzed in the mandibular arch. Predicting the mesio-distal widths of unerupted permanent canines and premolars is important to determine whether the available space in the arch is greater than, smaller than, or equal to the sum of these unerupted teeth; it is fundamental in determining whether the treatment plan will involve serial extractions, tooth eruption guidance, space maintenance, space gain, or just monitoring the occlusion.

Estimating the mesio-distal widths of the mandibular permanent canines and premolars is an essential aspect of mixed dentition analysis. Method introduced by Tanaka-Johnston and Moyers proposed to predict the sum of the mandibular permanent canine and premolar widths based on the sum of the mandibular permanent first molar and incisors[2].

The purpose of this study is to test the applicability and reliability of this method in a North Kerala population.

AIM

To test the applicability and reliability of the mesio-distal widths of mandibular permanent first molars and incisors as predictors of mandibular permanent canine and premolar widths in North Kerala population.

OBJECTIVES

1) To measure and assess the mesio-distal widths of mandibular permanent first molars and incisors as predictors of mandibular permanent canine and premolar widths in North Kerala population by using Tanaka-Johnston and Moyers mesio-distal width prediction table.

2) To test the reliability of Tanaka and Johnston and Moyers mesio-distal width prediction table in North Kerala population.

3) To evaluate the sexual dimorphism as a variable influencing the prediction comparison.

REVIEW OF LITERATURE

1)Tanka MM, Johnston LE (1974) conducted a study of the prediction of the size of unerupted canines and premolars in a contemporary orthodontic population in Cleveland area of Europe. Prediction table were constructed, and they were practically identical to those of Moyers. The size in millimeters of unerupted canines and premolars at the 75th percentile can be predicted by taking half the width of the mandibular incisors and adding 11.0 for the maxillary teeth and 10.5 for the mandibular teeth[3].

2) Bernabe E, Mir CF (2005) conducted a study of lower incisors as the best predictors for the unerupted canine and premolars sum in Peruvian sample. In this study it is acceptable and reliable with mild alteration in the statistical values[4].

3) Melgaco CA, Araujo MT, (2006) conducted a study of applicability of three tooth size prediction methods for white Brazilians. No clinical relevant difference was observed between predicated and actual widths of the lower permanent canine derived by Tanaka and Johnston. Moyers table underestimated the actual widths of the lower permanent canine and premolars for male and female[5].

4) Al-Bitar et al (2008) conducted a study on the applicability of prediction in Jordanian population. The actual measurement and prediction derived from the Tanaka and Johnston equation are different[6].

5) Brito FC, Nacif VC, Melgaco CA (2014) conducted a study of mandibular permanent first molars and incisors as predictors of mandibular permanent canine and premolar widths in Brazil population. The method was consistent and applicable to studied population[2].

MATERIALS AND METHODS:

The study will be carried on dental casts of patients who reported for orthodontic treatment to the Department of orthodontics and Dentofacial Orthopaedics at Mahe Institute of Dental sciences and Hospital. The sample will consist of 200 dental casts of patient with permanent dentition in both arches with except 3rd molar. Only samples from the North Kerala population is included in the study to test the acceptability and reliability of mandibular permanent first molars and incisors as predictors of mandibular permanent canine and premolar width bilaterally.

Inclusion criteria:

1) Patients with permanent dentition in both arches.
2) Patients with full complement of teeth in the Upper and Lower arch except the 3rd molars.

Exclusion criteria:

1) Interproximal caries or restoration
2) Missing or supernumerary teeth
3) Significant teeth wear
4) History of previous orthodontic treatment

The mesio-distal width of the individual teeth will be measured by digital Vernier calipers. Teeth will be measured to the nearest 0.01mm. To get better access to the proximal areas, fine pointed wire segments will be attached to the tip of the caliper. The pointer will be placed parallel to the occlusal surface and perpendicular to the long axis of the teeth.

For each patient cast, the sum of following will be calculated:

1) Mesio-distal widths of four mandibular incisors and bilateral 1st molars
2) Mesio-distal widths of mandibular canines and premolars in each quadrant

A single investigator will measure the casts with digital calipers. To determine the intra-observer reliability, casts will be randomly selected and remeasured after 2 weeks. Student t-test will be used to measure intra-examiner reliability by fixing the level of significance at 5% and absolute agreement of kappa statistic value at 0.8. Intra class Correlation Coefficient will also be calculated.

The actual values will be compared with those predicted by the charts of Moyers and the method proposed by Tanaka and Johnston. Paired Student t tests with significance level of 5% will be used to compare the different actual and predicted sums of the mesio-distal widths of the permanent canines and premolars. Correlation and linear regression analyses will be performed between the predicted and actual tooth sizes for North Kerala population.

RESULTS

The obtained measurement values will be evaluated statistically to correlate with the other studies to obtain acceptability and reliability of Mesio-distal widths of mandibular permanent first molars and incisors as predictors of Mesio-distal widths of mandibular permanent canine and premolar widths in North Kerala population.

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CONSENT LETTER

I..... S/o or D/o ..... have no objection in participating in the study entitled ""**MESIO DISTAL WIDTHS OF MANDIBULAR PERMANENT FIRST MOLARS AND INCISORS AS A PREDICTORS OF MANDIBULAR PERMANENT CANINE AND PREMOLAR WIDTHS: APPLICABILITY AND RELIABILITY IN NORTH KERALA POPULATION**"" By Dr.Aravinthan under the guidance of Dr. Suresh babu. I understand that my identity will not be disclosed to anyone without my permission and the data collected will be utilized only for research and publication purpose. I understand that I have the right to withdraw from the proposed study at any time.

Signature/Thumb impression:

Name:

Signature of the relative:

Name of the relation:

സമ്മത പത്രം

മാഹി ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ് ഡെന്റൽ സയൻസ് ആൻഡ് ഹോസ്പിറ്റലിൽ ഡോ . അരുവിന്ദൻ നടത്തുന്ന **"MESIO DISTAL WIDTHS OF MANDIBULAR PERMANENT FIRST MOLARS AND INCISORS AS A PREDICTORS OF MANDIBULAR PERMANENT CANINE AND PREMOLAR WIDTHS: APPLICABILITY AND RELIABILITY IN NORTH KERALA POPULATION"** എന്ന ഗവേഷണ വിഷയത്തിൽ പൂർണ്ണ മനസ്സോടു കൂടി ഭാഗമാകുന്നതിൽ എനിക്ക് യാതൊരു വിധ എതിർപ്പും ഇല്ല. ഈ ഗവേഷണത്തിൽ നിന്നും ശേഖരിക്കുന്ന വിവരങ്ങൾ ദുരുപയോഗം ചെയ്യില്ലെന്നും ഗവേഷണത്തിനും അനുബന്ധ പഠനങ്ങൾക്കും മാത്രമാണ് ഉപയോഗിക്കുന്നതെന്നും ഞാൻ മനസ്സിലാക്കുന്നു.

ഈ ഗവേഷണത്തിൽ നിന്നും എപ്പോൾ വേണമെങ്കിലും പിന്മാറാനുള്ള അവകാശമുണ്ടെന്നും ഞാൻ മനസ്സിലാക്കുന്നു.

പങ്കെടുക്കുന്ന വ്യക്തിയുടെ ഒപ്പ് /കൈ വിരലടയാളം

പേര്:

രക്ഷിതാവിൻറെ ഒപ്പ് / കൈ വിരലടയാളം

പേര്:

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MINDS/PG-ETHICAL/07/2017-18 Date:26.10.2017

ETHICAL CLEARANCE CERTIFICATE

Dissertation Topic :- Mesio-distal widths of Mandibular permanent first molars and incisors as predictors of mandibular permanent canine and premolar widths: Applicability and reliability in North Kerala population.

Nature of Project :- Masters of Dental Surgery

Student Name :- DR ARAVINTHAN

Guide Name :- Dr.Sureh Babu C

On behalf of the Mahe Institute of Dental Sciences & Hospital, Mahe, U.T.of Puducherry, Ethical Committee, hereby give ethical approval in respect of undertakings contained in the above mentioned Research work. The Researcher Student may therefore commence with the research work as from the date of this certificate, using the reference number indicated above.

Dr.Babu Raveendran,
Chairman

Dr.Anil Melath
Principal

PONDICHERRY UNIVERSITY

MAHE INSTITUTE OF DENTAL SCIENCES AND HOSPITAL

DEPARTMENT OF ORTHODONTICS AND DENTOFACIAL ORTHOPEDICS

PROFORMA OF DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT FOR DEGREE OF MASTER OF DENTAL SURGERY IN ORTHODONTICS AND DENTOFACIAL ORTHOPAEDICS

"EVALUATION AND COMPARISON OF SHEAR BOND STRENGTH AND ADHESIVE RESIDUE INDEX OF TWO ADHESIVE PRE COATED BRACKET SYSTEMS WITH A CONVENTIONAL BRACKET SYSTEM- AN INVITRO STUDY"

BY

DR SWATHI T

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GUIDE

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INTRODUCTION

Bonding of Orthodontic brackets to the tooth surface has been a common feature since the introduction of bonding in Orthodontics. The conventional bonding procedure include cleaning of the tooth surface, etching of the enamel with 37% phosphoric acid, application of primer and bonding of the bracket with the adhesive resin applied on the bracket base[1].

Bonding procedure has been reduced with a lot of innovations in the procedure, reducing it to a two step procedure (self etching primer) from the three step procedure and the latest in the field is the introduction of Adhesive Pre coated brackets (APC). The introduction of APC brackets have reduced the chair side time needed for Orthodontic bracket bonding by around 3-4 min/patient.

Attempts to minimize the amount of flash have led to the creation of different bonding systems and techniques. The company 3M Unitek (Monrovia, Calif) has developed a new APC Flash-Free Adhesive Coated Appliance System as an attempt to eliminate the need for flash removal.

AIM OF THE STUDY

Aim of the study is to evaluate and compare the Shear bond strength and Adhesive Residue Index of two Adhesive Pre Coated Bracket systems with Conventional Ceramic Bracket.

OBJECTIVES

1) To evaluate the Shear Bond Strength of the Adhesive Pre Coated FLASH FREE bracket systems and Adhesive Pre Coated PLUS bracket system.
2) To compare the shear bond strength of two Adhesive Pre Coated bracket systems with Conventional CLARITY ADVANCED Ceramic bracket system.
3) To evaluate the difference in the Adhesive Residue Index (ARI) between the bracket systems.
4) To compare the changes in enamel surface morphology at the adhesive interface with scanning electron microscopy.

REVIEW OF LITERATURE

1) Michael G. Buonocore in 1955 conducted a study on a simple method of increasing the adhesion of acrylic filling materials to enamel surfaces. He explored a several possibilities to obtain bonding between filling materials and tooth structure. He also found that a phosphoric acid and a phosphomolybdateoxalic acid treatment have been employed to alter enamel surfaces chemically. The phosphoric acid treatment seems to give better results and is simpler to use[1].

2) David Armstrong, G Shen, Peter Petocz, Ali Darendeliler in 2007 conducted a study on Excess Adhesive Flash (EAF) upon bracket placement. They concluded that there were significant amounts of EAF suggesting that clinicians need to be more vigilant in its removal to reduce plaque retentive areas, gingival irritation, and potential white spot lesions and there is no reduction in the amount of excessive adhesive around orthodontic brackets with the addition of a color change feature in the bonding cement[2].

3) Tancan Uysal, Ayca Ustdal and Gokmen Kurt in 2010 conducted an invitro study to evaluate the shear bond strength (SBS) of different metallic and ceramic bracket bonding combinations using self-etching primers (SEPs) .Their aim was to minimize possible enamel fracture risks at the debonding stage, by reducing bond strength values of ceramic brackets by changing the enamel-conditioning method. The study showed that use of SEPs for conditioning enamel in the bonding of ceramic orthodontic brackets significantly decreased the SBS values compared with the conventional acid-etching method[3].

4) Thorsten Grünheid, Geoffrey N. Sudit, and Brent E. Larson in 2015 conducted an in vitro comparison of bond quality, adhesive remnant cleanup, and orthodontic acceptance of a flash-free product. A total of 184 bovine incisors were bonded with ceramic brackets using either the flash-free adhesive or a conventional adhesive. For both adhesives, the microleakage was minimal with no significant differences between the two adhesives; there was no significant difference in adhesive cleanup time[4].

5) Moonyoung Lee, Georgios Kanavakis in 2016 conducted a study on comparison of shear bond strength and bonding time of a novel flash free bonding system. They found that APC flash free adhesive system can potentially reduce bonding time while increasing SBS[5].

6) Moritz Foerscha, Christian Schusterb, Roman K. Rahimic, Heinrich Wehrbeind, Collin Jacobs in 2016 conducted a clinical and stereomicroscopic study on a new flash-free orthodontic adhesive system to analyze the clinical and laboratory properties of the recently introduced APC flash free orthodontic adhesive. They found that the flash-free adhesive significantly reduced the time needed for the bonding process. The excess resin expanded 0.16 to 0.08 mm over the bracket margin. The new technology seems to facilitate a smooth and sufficient marginal surface of the adhesive, which clinically might improve reduction of plaque accumulation[6].

MATERIALS AND METHODS

BRACKETS

60 brackets, 20 each of Ceramic Maxillary Premolar APC Flash-Free Adhesive brackets (3M Unitek) and APC PLUS Adhesive Coated Brackets (3M Unitek) will be used for the experimental groups. Clarity ADVANCED Ceramic maxillary Premolar Brackets (3M Unitek) will use as a control group[1].

BONDING SYSTEM

1) Transbond XT, light cure composite system. (3M Unitek dental product division, Monrovia, Calif)

2) Light Curing Unit (Ortholux Luminous Curing Light (3M Unitek)

TEETH

Newly extracted human Maxillary premolars will be collected, cleaned of all organic debris and stored in a solution of 0.1% (weight/volume) thymol.

The Inclusion Criteria for Tooth Selection

1) Intact buccal enamel.

2) Not subject to any pretreatment chemical agents (such as hydrogen peroxide).

3) No cracks due to the presence of extraction forceps.

4) No caries.

METHOD

The teeth will be polished with pumice and rubber prophylactic cup for 10 seconds and randomly divided into three groups (20 teeth per group). Each tooth will be embedded into cold-cure acrylic resin up to the level of cement-enamel junction prior to Orthodontic bonding.

After mounting the teeth, the buccal enamel surface will be etched for 30s using 37 % Phosphoric acid gel (3M Unitek), washed and dried with an oil free air spray.

All teeth will prepared with Transbond XT Primer (3M Unitek) for 5 seconds, followed by a gentle burst of dry air to thin the primer.

The brackets will be bonded by a single operator according to one of the three following procedure:

- APC Flash-Free group: 3M APC Flash-Free Adhesive Coated brackets will be bonded to the tooth with a constant force at the ideal occluso-gingival and mesio-distal position.
- APC PLUS group: 3 M APC PLUS Adhesive Coated brackets will be bonded to the tooth with a constant force at the ideal occluso-gingival and mesio-distal position. Excess adhesive resin will removed with an explorer.
- Conventional bonding group: Transbond XT Light Cure Adhesive Paste (3M Unitek) will be applied onto a Clarity ADVANCED Ceramic bracket base with a plastic instrument and the bracket will be bonded to the tooth with a constant force at the ideal occluso-gingival and mesio-distal position. Excess adhesive resin will removed with an explorer.

All adhesive resin will be polymerized for a total of 12 seconds with an Ortholux Luminous Curing Light (3M Unitek) at an intensity of 1600 mw/cm^2. After bonding, the teeth will be stored in distilled water at 37^{0}C for 24 hours to allow complete polymerization of the bonding material.

All samples will be submitted to shear bond strength test in an inciso gingival direction, in a universal testing machine (INSTRON) at a crosshead speed of 1mm per minute[1].

SBS will be calculated and the bracket and tooth will be examined with a digital microscope under 83X magnification. The Residual Adhesive on the bracket and enamel will be assessed using ARI scores established by Artun and Bergland with the help of another observer and graded on a scale between 0and 3[4].

- 0 - no adhesive remaining adhered to enamel.
- 1 – Less than half of adhesive remaining adhered to enamel.
- 2 - More than half of adhesive remaining adhered to enamel.
- 3 - All adhesive remaining adhered to enamel.

Adhesive interface will be observed by Scanning Electron Microscopy

RESULTS

The data of the recorded observation from the study will be statistically analyzed for results. Descriptive statistical functions like mean, maximum and minimum values, range, standard deviation and standard error will be calculated and tabulated for each group. ANOVA and Paired students 't' test will be performed on the data for group I, group II and group III to determine whether any significant difference exist between the groups.

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MINDS/PG-ETHICAL/08/2017-18 Date:26.10.2017

ETHICAL CLEARANCE CERTIFICATE

Dissertation Topic :- Evaluation and Comparison of Shear Bond Strength and Adhesive residue index of two Adhesive Pre coated bracket system with a Conventional bracket System –An In –Vitro Study

Nature of Project :- Masters of Dental Surgery

Student Name :- DR SWATHI T

Guide Name :- Dr.Jithesh Kumar K

On behalf of the Mahe Institute of Dental Sciences & Hospital, Mahe, U.T.of Puducherry, Ethical Committee, hereby give ethical approval in respect of undertakings contained in the above mentioned Research work. The Researcher Student may therefore commence with the research work as from the date of this certificate, using the reference number indicated above.

Dr.Babu Raveendran,
Chairman

Dr.Anil Melath
Principal

സമ്മത പത്രം

..... എന്ന ഞാൻ ഇതരകരണങ്ങളാൽ എടുക്കേണ്ടി വന്ന പല്ലുകൾ ഡോ. സ്വാതി ടി യ്ക്ക് **"EVALUATION AND COMPARISON OF SHEAR BOND STRENGTH AND ADHESIVE RESIDUE INDEX OF TWO ADHESIVE PRE COATED BRACKET SYSTEM WITH A CONVENTIONAL BRACKET SYSTEM –AN INVITRO STUDY"** എന്ന ആശയത്തിൽ ഗവേഷണത്തിനായി ഉപയോഗിക്കേണ്ടതുണ്ട് എന്ന്മനസ്സിലാക്കുന്നു. പ്രസ്തുത ഗവേഷണത്തിന്റെ ഭാഗമാകുന്നതിൽ എനിക്ക് യാതൊരു വിധ എതിർപ്പും ഇല്ല എന്നും, ഈ ഗവേഷണത്തിൽ നിന്നും ശേഖരിക്കുന്ന വിവരങ്ങൾ ദുരുപയോഗം ചെയ്യില്ല എന്നും ഗവേഷണത്തിനും അനുബന്ധ പഠനങ്ങൾക്കും മാത്രമാണ് ഉപയോഗിക്കുന്നതെന്നും ഞാൻ മനസ്സിലാക്കുന്നു.

പങ്കെടുക്കുന്ന വ്യക്തിയുടെ ഒപ്പു / കൈ വിരലടയാളം

പേര്:

രക്ഷിതാവിന്റെ ഒപ്പു/ കൈ വിരലടയാളം

പേര്:

CONSENT LETTER

I ..... declare that my extracted teeth can be used by Dr Swathi. T for the study entitled **"EVALUATION AND COMPARISON OF SHEAR BOND STRENGTH AND ADHESIVE RESIDUE INDEX OF TWO ADHESIVE PRE COATED BRACKET SYSTEM WITH A CONVENTIONAL BRACKET SYSTEM – AN INVITRO STUDY"** . I have no objection in taking part in this study. I understand that my identity will not be disclosed to anyone without my permission and the data collected will be utilized only for research and publication purpose.

Signature/Thumb impression:

Name:

Signature of the relative:

Name of the relation:

PONDICHERRY UNIVERSITY

MAHE INSTITUTE OF DENTAL SCIENCES AND HOSPITAL

DEPARTMENT OF ORAL PATHOLOGY & MICROBIOLOGY

PROFORMA OF THESIS SUBMITTED IN PARTIAL FULFILLMENT FOR DEGREE OF MASTER OF DENTAL SURGERY IN ORAL PATHOLOGY AND MICROBIOLOGY

EPITHELIAL AND CONNECTIVE TISSUE CHANGES IN ORAL SUBMUCOUS FIBROSIS – A MORPHOMETRIC ANALYSIS.

BY

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INTRODUCTION

Oral Submucous Fibrosis (OSF) is a common oral health problem in the Indian subcontinent. OSF was first reported by Schwartz[1] and defined by Pindborg et al as an insidious, chronic disease affecting any part of the oral cavity and sometimes the pharynx. Although occasionally preceded by and/or associated with vesicle formation, it is always associated with a juxta-epithelial inflammatory reaction followed by a fibroelastic change of the lamina propria, with epithelial atrophy leading to stiffness of the oral mucosa and causing trismus and inability to eat[1]. Current evidence suggests that arecoline in the areca nut is the key factor in initiating the disease process.

The important histopathological characteristics of this disease include epithelial atrophy with loss of rete ridges, reduced vascularity, chronic inflammatory infiltration and hyalinization of the submucosal tissues. The epithelial atrophy observed in OSMF is presumed to be secondary to increased collagen production and reduced vascularity seen in the adjoining connective tissue, in different stages. The degree of vascularity of the diseased mucosa in OSMF has always been a matter of considerable dispute. According to few studies, dilated and congested blood vessels are seen in very early and early stages of OSMF. Whereas, obliteration or narrowing of blood vessels points to advanced stage in OSMF.[2] In contrast to this, as suggested by another study, persistent dilatation of blood vessels occur in moderately advanced and advanced OSMF cases.[3] Morphometry has been shown to have a great degree of precision and to be efficient for quantifying the morphologic characteristics of cells and tissues in two dimensional planes.

AIM

To study morphometrically the epithelial and connective tissue changes in Oral Submucous Fibrosis

OBJECTIVES OF THE STUDY

1. To assess histopathological changes in epithelial thickness in different grades of OSMF.
2. To determine the mast cell density in different grades of OSMF.
3. To determine mean density of capillaries, mean luminal diameter and circumference of capillaries in different grades of OSMF.
4. To correlate the epithelial thickness, mast cell density, mean density, mean luminal diameter and circumference of capillaries among various grades of OSMF and with controls.

REVIEW OF LITERATURE

Singh M et al (2010); have done a Morphometric Analysis in Potentially Malignant Head and Neck Lesions: Oral Submucous Fibrosis with Hematoxylin/Eosin, and using special stains such as Van Gieson's picric acid and acid fuchsin stain and Masson's trichrome stains and concluded that mean blood vessel area and the mean vessel diameter showed a marked increase in grade II and decrease in grade IV and the grade III OSMF. They also observed that the collagen thickness increases according to increasing grade while density of endothelial cells decreases[4].

Jayasooriya PK et al (2010); studied the relationship between thickness of fibrosis and epithelial change in oral submucous fibrosis and they concluded that the advancement of fibrosis increases the risk of development of epithelial dysplasia in oral submucous fibrosis[5].

Sharmistha D et al (2013); have done an analysis to qauntify the histopathological changes in oral submucous fibrosis morphometrically and correlate those findings with the histological grading and clinical severity of trismus. They gave a conclusion that the thickness of the epithelium and subepithelial collagen showed no statistically significant differences between the different stages. However, vasculature was indirectly proportional to the histological stages[6]

Chavan S et al (2013); have done a quantitative analysis of mast cells in oral submucous fibrosis and gives a result that the mast cell response in oral sub mucous fibrosis was reported to be high in the early stages. As the disease advances, tissue becomes less reactive, gets hyalinized and occasionally shows degeneration where by the mast cells are reduced to even fewer than the normal mucosa[7].

Pujari R et al (2013); have done retrospective study to find possible correlation between Mast cells of OSMF, Oral Squamous cell carcinoma and normal buccal mucosa by means of acidified toluidine blue staining method and showed that the density of mast cell increased with disease progression and they suggested that the mast cells have a definite role in initiation and progression of OSMF[8].

Garg N et al (2014); have done a study on Morphometric analysis of epithelial thickness and blood vessels in different grades of oral submucous fibrosis and came to a conclusion that each grade of OSMF is found to display either hyperplastic or atropic epithelial changes. Vascular analysis did not show any sustained change with the increasing severity of the disease[9]

Murgod V et al (2014); have done an original study of Morphometric analysis of the mucosal vasculature in oral submucous fibrosis and its comparison with oral squamous cell carcinoma. They observed that the vascularity was increased in early OSMF and reduced in advanced OSMF, suggesting that inflammation may play a role in the early stages while progressive fibrosis may predispose to atrophy of the epithelium and subsequent malignant changes[3].

MATERIALS AND METHODS

1. Trinocular Research Microscope Olympus Bx-53 Japan with Digital camera
2. Computer and Image analysis software
3. Leica RM 2245 Semi-Automatic Microtome
4. Harris's Hematoxylin & Eosin stain
5. 1 % Toluidine blue stain
6. Microscopic slides & cover slip
7. DPX (Dibutyl Phthalate Xylene) Mountant

SOURCES OF DATA

Tissues blocks from archives of department of Oral Pathology & Microbiology

STUDY DESIGN

Descriptive study

Method of Collection of the Data

The control group will comprise of 10 paraffin embedded blocks of normal buccal mucosa, collected from archives of Department of Oral Pathology & Microbiology, Mahe Institute of Dental Sciences.

25 paraffin embedded tissues blocks in each histological grade of OSMF will form the study group. The study group will be selected based on the following criteria.

Inclusion Criteria

- Stored tissue blocks histopathologically confirmed cases of OSMF will be included for the study.

Exclusion Criteria

- Tissue blocks of patients with any history of systemic diseases which may affect capillary characteristics like Diabetes mellitus, Hypertension from medical records of patients.
- Tissue blocks of patients without adequate clinical details and tissue for analysis.

METHODOLOGY

10 paraffin embedded normal mucosal tissue blocks will form the control group. Paraffin embedded histopathologically confirmed tissue blocks are obtained from the Department of Oral Pathology where 5-6 μm thick sections will be taken from these tissue blocks and stained with Haematoxylin & Eosin and 1% Toluidine Blue stains. These sections will be examined in bright field microscope and OSMF cases will be graded according to Pindborg JJ and Sirsat SM (1966) et al[1]. All the cases and 10 normal buccal mucosal slides will be viewed under trinocular microscope and the image of the selected field will be captured and will be further quantified in image Prog Res Capture 2.8.8 version software for epithelial thickness, Mast cell density, luminal diameter, circumference of capillaries and mean density of capillaries in various grades of OSMF.

All the obtained data will then be exported to Microsoft Excel work sheet for further analysis.

Measurement of Epithelial Thickness

Images of normal mucosa and OSMF were morphometrically measured (in μm) at 3 points from epithelial surface to epithelial connective tissue interface using Prog Res Capture 2.8.8 version image analysis software at 20x magnification in 5 different fields. The mean of the 3 measurements in 5 fields were taken as the thickness of the epithelium.

Mast Cell Count Analysis

Mast cells were counted manually in 10 random high power fields under a magnification of 40x in a stepladder fashion. Mast cells were expressed as an average number per 10 high power fields.

Areas selected for Capillary Analysis

- 5 randomly selected high power fields, immediately adjacent to basement membrane i.e. juxtaepithelial area.
- 5 randomly selected high power fields, adjacent to submucosa towards the epithelium.
- Capillaries seen in longitudinal section will be excluded.
- Capillary density was calculated by the following formula-

$$\text{Capillary density} = \frac{\text{Average of the total number of capillaries counted in 5 different high power fields}}{\text{Area covered under 40X objective}}$$

HISTOMORPHOMETRY

- Density of the capillaries will be calculated by counting the number of capillaries in 5 randomly selected high power fields in the areas as mentioned above.
- Inner luminal diameter and the luminal circumference of the capillaries will be measured using image analysis software.
- The results thus obtained from the different grades of the OSMF will be compared with the normal tissue sections.

RESULT

The results obtained will be subjected to following statistical analysis.

Student t test

one way ANOVA test.

CONCLUSION

Based on the outcome of the analysis, we can evaluate whether any correlation exists between Epithelial thickness, Vasculature and Mast cell density in different grades of Oral Submucous Fibrosis and this may help as a guideline to institute appropriate therapeutic intervention in different stages of the disease.

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CONSENT LETTER

I..... S/o or D/o ..... have no objection in participating in the study entitled "Epithelial and Connective tissues changes in Oral Submucous Fibrosis: A Morphometric analysis." by Dr. Nitheash.P under the guidance of Dr. Bastian T.S. I understand that my identity will not be disclosed to anyone without my permission and the tissue collected will be utilized only for research and publication purpose. I understand that I have the right to withdraw from the proposed study at any moment.

Signature/Thumb impression:

Name:

Signature of the relative:

Name of the relation:

സമ്മതപത്രം

മാഹി ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ് ഡെന്റൽ സയൻസ് ആൻഡ് ഹോസ്പിറ്റലിൽ ഡോ . നിതേഷ്. പി നടത്തുന്ന "Epithelial and Connective Tissue Changes in Oral Submucous Fibrosis - A Morphometric Analysis" എന്ന ഗവേഷണ വിഷയത്തിൽ പൂർണ്ണ മനസ്സോടുകൂടി ഭാഗമാകുന്നതിൽ എനിക്ക് യാതൊരു വിധ എതിർപ്പും ഇല്ലെന്നും, ഈ ഗവേഷണത്തിൽ നിന്നും ശേഖരിക്കുന്ന വിവരങ്ങൾ ദുരുപയോഗം ചെയ്യില്ലെന്നും ഞാൻ മനസ്സിലാക്കുന്നു, ഈ ഗവേഷണത്തിൽ നിന്നും എപ്പോൾ വേണമെങ്കിലും പിൻമാറാൻ അവകാശമുണ്ടെന്നും ഗവേഷണ വിവരങ്ങൾ എന്റെ അനുവാദത്തോടുകൂടിയേ ഉപയോഗിക്കുകയുള്ളുവെന്നും ഞാൻ മനസ്സിലാക്കുന്നു.

പങ്കാളിയുടെ ഒപ്പ് / കൈവിരലടയാളം

പേര് :

ഒപ്പ് / കൈവിരലടയാളം

പേര് :

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MINDS/PG-ETHICAL/04/2017-18

Date:26.10.2017

ETHICAL CLEARANCE CERTIFICATE

Dissertation Topic	:- Epithelial And Connective Tissue Changes In Oral Submucous Fibrosis A Morphometric Analysis.
Nature of Project	:- Masters of Dental Surgery
Student Name	:- DR NITHEASH P
Guide Name	:- Dr.Bastian T.S

On behalf of the Mahe Institute of Dental Sciences & Hospital, Mahe, U.T.of Puducherry, Ethical Committee, hereby give ethical approval in respect of undertakings contained in the above mentioned Research work. The Researcher Student may therefore commence with the research work as from the date of this certificate, using the reference number indicated above.

Dr.Babu Raveendran,
Chairman

Dr.Anil Melath
Principal

PONDICHERRY UNIVERSITY

MAHE INSTITUTE OF DENTAL SCIENCES AND HOSPITAL

DEPARTMENT OF ORAL PATHOLOGY & MICROBIOLOGY

PROFORMA OF THESIS SUBMITTED IN PARTIAL FULFILLMENT FOR DEGREE OF MASTER OF DENTAL SURGERY IN ORAL PATHOLOGY AND MICROBIOLOGY

"HISTOLOGICAL AND MORPHOMETRIC STUDY ON HUMAN DENTIN AND PULP OF PATIENTS WITH DIABETES MELLITUS TYPE II "

BY

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INTRODUCTION:

Diabetes Mellitus is a common chronic metabolic disorder in which the pancreas produces little or no insulin necessary for glucose metabolism, characterized by hyperglycemia, exhibiting various detrimental alterations in major organs of human bodies and causing widespread complications and damage, in particular, micro & macro vascular system affecting aorta to the smallest capillary & venules[1]. Patients with diabetes mellitus has shown many changes in oral tissues,one such finding is limited or no collateral circulation in dental pulp[2].

Studies shown that the changes observed in the periodontal tissue were the same as in the pulp, angiopathies and thickened basement membrane[3]. Studies on wistar rat induced diabetes mellitus has shown collagen synthesis or concentration was markedly decreased while studies conducted on 39 dental pulp from 27 patients has shown increased transformation of loose connective tissue into fibrous tissue[4].

Studies on rat fed with high sucrose diet revealed widened predentin zone, reflecting increased matrix, synthesis and disturbed mineralization. Studies also suggested significantly increase in alkaline phosphatase[5]level in dentin.

However, there is scant information available on the possible effects exerted by the diabetic condition on tooth development including effect on both dentin and pulp integrity.

AIM:

Histological and morphometric study on human dentin and pulp of patients with diabetes mellitus Type II.

OBJECTIVES

1. To study morphometrically pre-dentin and dentin thickness in Diabetic and Non-Diabetic subjects using an image analyser
2. To carry out qualitative analysis of pulpal collagen in Diabetic and Non- Diabetic subjects,histologically using picrosirius red stain.
3. To study histologically blood vessel density of pulpal tissue in Diabetic and Non-Diabetic subjects.

REVIEW OF LITERATURE

Bissada and Sharawy et al (1970) found no vascular changes in the dental pulps of diabetics[2] on the other hand, **Russel et al (1967)** reported that the changes observed in the periodontal tissue were the same as in the pulps,with respect to angiopathies, and a thickness of basement membrane[3]. These changes were located in both large and small pulp vessels.

Catanzaro O et al. (2006) conducted a study to determine the effect of diabetes mellitus progression on inflammatory and structural components of dental pulp on male Wistar rats by inducing diabetes in them by giving a single injection of Streptozotocin (STZ). Dental pulp tissue samples were taken from central incisors and molars of diabetic rats 30 and 90 days after the STZ treatment. Results suggested that at 30 days of diabetes the dental pulp Alkaline Phosphatase was significantly increased and the collagen concentration was markedly decreased[6].

Popescu MR et al (2014) conducted a study on 68 patients diagnosed with Diabetes mellitus for histological analysis of the collagen fibers from the chorion in patients with diabetes mellitus and periodontal disease. Result suggested that the patients with diabetes mellitus with an evolution of less than 10 years the collagen fibers appeared as dissociated by the inflammatory cells that were inserted among them. While in patients with diabetes for over 10 years there have been a plentiful collagen sclerosis, zones of collagen hyalinization with an increased number of fibrocytes[7]

Abbassy MA et al. (2015) conducted a study to detect the rates of dentine mineral apposition and formation on thirty Wistar rats by inducing diabetes in them. Results showed that the enamel and dentine thickness were significantly reduced (hypoplasia) and there was a significant reduction of the rate of dentine mineral apposition and formation, while there was no significant effect on mineral density of enamel and dentine[8].

Claudinoa M et al (2015) conducted a study to evaluate the putative influence of diabetes without metabolic control in the loss of tooth structure as well as histological changes in dentin and pulp tissue on 25 Wistar rats by inducing diabetes in them. Result suggested that morphometrical analyses of dental pulp revealed significant reduction in volumetric density of collagen fibers and fibroblasts as well in density of blood vessels after 3 months of diabetes

induction, when compared to control group. Uncontrolled diabetes seems to trigger the loss of tooth structure, associated to histological dental changes and mediates its evolution to progressive severe pulp and periapical lesions. Therefore, diabetes may be considered a very important risk factor regarding alterations in dental pulp, development of dental caries, and periapical lesions[9].

Moraru AI et al (2017) conducted a histological and immunohistochemical study on 39 dental pulps from 27 patients with type II diabetes mellitus to determine the changes on dental pulp. The most constant histopathological change in dental pulp in patients with diabetes was the increase in fibrillar collagen by transforming the pulp from a loose connective tissue into a fibrous tissue. Another constant change was the thickening of the vascular wall by increasing its content in collagen, most blood vessels presenting microscopic aspects of arteriosclerosis[4]

MATERIALS AND METHODS

Materials

1. Extracted Teeth (single rooted)
2. Decalcifying agents – Acid
3. Tissue processing equipment
4. Soft tissue microtome
5. Picrosirius red special stain
6. Hematoxylin&Eosin stain
7. OlympusBX53,Japan with Image prog res capture 2.8.8 version.
8. Equipments for haematological tests.

Study type

Descriptive study

Source of data

The study will be conducted on single rooted teeth extracted for various reasons from the patients suffering from diabetes mellitus Type II reporting to Mahe Institution of Dental Sciences & Hospital, Mahe, U.T.of Puducherry . Only teeth from the patients who give consent for research will be included in this study.

Study group - Confirmed cases of diabetes mellitus type II

Control group - Healthy controls

Inclusion criteria

Non carious, sound teeth extracted due to periodontal disease or orthodontic reasons.

Subjects will be divided into 3 groups.

Group 1-Ages between 31-40yrs
Group 2-Ages between 41-50yrs
Group 3-Ages between 51 and above
Control group-Healthy individuals.

Exclusion Criteria for cases and controls:

- Dental caries
- Restored teeth
- Grossly decayed teeth
- Renal failure
- Nephrotic syndrome
- Gastrointestinal surgery such as jejunoileal bypass and subtotal gastrectomy
- Patient undergoing cortisol medication
- Endocrine disorders affecting calcium level like thyroid, parathyroid disorder
- Patient undergoing treatment for chronic systemic conditions and infections

Method of Collection of Data:

The study sample will have a minimum of 60 teeth, out of which equal numbers will be from Diabetic and control subjects. Patients with a minimum age of 31 years will be included in the study after recording their diabetic status.

Informed consent will be taken from all the patients for enrolment in the study by adhering to the ethical protocols. Detailed history of the patients will be recorded and thorough clinical examination will be done and the findings will be recorded in proforma. A routine blood test is carried out to rule out any systemic illness.

Methodology:

The extracted teeth will be immediately transferred to 10% neutral buffered formalin to allow fixation of pulp. After fixation, the teeth will be decalcified and subjected to routine processing. Subsequently the processed teeth will be embedded in paraffin wax and tissue blocks will be prepared. Four to five - 6 μ thick serial sections will be made using soft tissue microtome. These consecutive sections of decalcified teeth will be stained with Hematoxylin and Eosin stain to determine predentin thickness.

The stained sections will then be viewed under Trinocular research microscope (Olympus BX 53, Japan) and the images will be captured using camera installed along the microscope. All the captured images will be stored and measured using Image Prog Res Capture 2.8.8 version after proper calibration. All the obtained data will then be exported to Microsoft Excel work sheet for further analysis.

Criteria to analyze Dentin and Predentin Thickness:

The H & E stained sections will be viewed under Trinocular research microscope (Olympus BX 53, Japan). In each slide, six different sites will be identified. Images of the pre-dentin width will be captured using a digital camera with ×40 apochromatic objective. All captured images will be stored in a hard disk, and measurements (in -microns) will be carried out on these images using the tools of the Image – Prog Res Capture 2.8.8 version.

Criteria to analyze collagen concentration:

The Picrosirius Red Stained (PSR) section showing collagen fibers will be viewed under polarized microscope and images will be captured using Trinocular research microscope (Olympus BX 53, Japan) and images analysis done using Image – Prog Res Capture 2.8.8 version. Usually thin normal fibers in PSR stained section show green to greenish yellow polarization colors, whereas thick fibers show yellowish – orange through orange to red polarization colors.

Criteria to study blood vessel density:

This will be done under high power (40X) directly without the use of image analysis software.

Capillary density was calculated by the following formula.

$$\text{Capillary density} = \frac{\text{Average of the total number of capillaries counted in 5 different high power fields}}{\text{Area covered under 40X objective}}$$

Area covered under 40X objective = 375 square micrometer[10]

RESULTS

The results obtained will be subjected to statistical analysis by one way ANOVA and independent t test

CONCLUSION

- Clinical dilemma whether to conduct pulp capping or to extend indications for pulpectomy in medically compromised patients with DM still exists. Fundamental physiological and clinical data on this problem are scarce. Pulp reparative response and thickness of dentin during DM are detrimental in planning appropriate treatment procedures in patients.Analysis of data obtained from our study may results as a guideline to deliver good treatment in uncontrolled diabetic patients according to their dentinal and pulpal status.

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10.Histology & the methods used for its study. In: Cormack DH, editor. Ham's Histology. 9th ed. Philadelphia: Lippi.

CONSENT LETTER

I.....S/O or D/O..... have no objection in participating in the study entitled **"HISTOLOGICAL AND MORPHOMETRIC STUDY ON HUMAN DENTINE AND PULP OF PATIENTS WITH DIABETES MELLITUS TYPE II.** by Dr. Suhana H.S under the guidiance of Dr. Selvamani. I understand that my identity will not be disclosed to anyone without my permission and the data collected will be utilised only for research and publication, for the benefit of the patients. I understand that I have the right to withdraw from the study at any moment.

Signature /Thumb impression of subjects

Signature of the Relative Name

Name of relation

സമ്മതപത്രം

മാഹി ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ് ഡെന്റൽ സയൻസ് ആൻഡ് ഹോസ്പിറ്റലിൽ ഡോ: സുഹാന എച് എസ് നടത്തുന്ന "HISTOLOGICAL AND MORPHOMETRIC STUDY ON HUMAN DENTIN AND PULP OF PATIENTS WITH DIABETES MELLTIUS TYPE II " എന്ന ഗവേഷണ വിഷയത്തിൽ പൂർണ മനസ്സോടു കൂടി ഭാഗമാകുന്നതിൽ എനിക്ക് യാതൊരുവിധ എതിർപ്പും ഇല്ലെന്നും ഈ ഗവേഷണത്തിൽ നിന്നും ശേഖരിക്കുന്ന വിവരങ്ങൾ ദുരുപയോഗം ചെയ്യില്ലെന്നും ഞാൻ മനസ്സിലാക്കുന്നു

ഈ ഗവേഷണത്തിൽ നിന്നും എപ്പോൾ വേണമെങ്കിലും പിന്മാറാൻ അവകാശമുണ്ടെന്നും ഗവേഷണ വിവരങ്ങൾ എന്റെ അനുവാദത്തോടു കൂടിയേ ഉപയോഗിക്കുകയുള്ളുവെന്നും ഞാൻ മനസ്സിലാക്കുന്നു .

പങ്കാളിയുടെ ഒപ്പ് /കൈവിരലടയാളം

പേര്

ഒപ്പ് /കൈവിരലടയാളം

പേര്

Proforma for study: "Histological and morphometric study on human dentin and pulp of patients with diabetes mellitus type II."

Name	
Age	
Sex	
Address Contact phone number (if any)	
Occupation	
Educational qualifications.	
Socio economic status	
Medical history	
Age of diagnosis of Diabetes	

Family History	
Genaral examination	Built: Co-operative/Non cooperative:
Extra oral examinations	Facial symmetry: Regional lymph nodes: TMJ:
Examination of teeth	
Consent for haematological investigations	**Yes/no**
Lab investigations	**RBS** **FBS**
Signature of the principal investigator:	Signature of the participant/guardian:

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MINDS/PG-ETHICAL/05/2017-18 Date:26.10.2017

ETHICAL CLEARANCE CERTIFICATE

Dissertation Topic :- Histological And Morphometric Study On Human Dentin And Pulp Of Patients with Diabetes Mellitus Type II.

Nature of Project :- Masters of Dental Surgery

Student Name :- DR SUHANA H S

Guide Name :- Dr.Selvamani M

On behalf of the Mahe Institute of Dental Sciences & Hospital, Mahe, U.T.of Puducherry, Ethical Committee, hereby give ethical approval in respect of undertakings contained in the above mentioned Research work. The Researcher Student may therefore commence with the research work as from the date of this certificate, using the reference number indicated above.

Dr.Babu Raveendran,
Chairman

Dr.Anil Melath
Principal

PONDICHERRY UNIVERSITY

MAHE INSTITUTE OF DENTAL SCIENCES AND HOSPITAL

DEPARTMENT OF CONSERVATIVE DENTISTRY AND ENDODONTICS

PROFORMA OF THESIS SUBMITTED IN PARTIAL FULFILMENT FOR DEGREE OF MASTER OF DENTAL SURGERY IN CONSERVATIVE DENTISTRY AND ENDODONTICS

Evaluation of Dentinal Defects Formation with Single File Rotary Systems – A Stereomicroscopic Study

BY

Dr. MOHAMMED JAMSHID

Junior Resident (P.G) M. D. S. – I Year

GUIDE

Dr. GEORGE THOMAS, M. D. S.
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DEPARTMENT OF CONSERVATIVE DENTISTRY AND ENDODONTICS

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OCTOBER 2017

INTRODUCTION

Endodontic therapy has become an integral part of restorative dentistry in the modern times. A 100% success rate in endodontics still remains a near target for the fraternity. Modern day materials and instrument advances have made it possible for the practitioner to come ever so close to that target

A large part of the success of endodontics depends upon the complete debridement of the root canals. In fact it is the presence or absence of residual bacteria in the root canal system which contributes to the outcome of the endodontic treatment.

Biomechanical preparation is one of the major steps for removal of bacteria and debris in the root canal system to achieve a successful endodontic treatment. Hand instrumentation which remains as a common canal preparation technique in endodontic practice though has lost popularity, still remains the integral part of biomechanical preparation.

The introduction of nickel-titanium (NiTi) rotary files to endodontics almost two decades ago has changed the way root canal preparations are performed, enabling more complicated root canal systems to be shaped with fewer procedural errors.

Rotary instrumentation traditionally used increasing instrument sizes to shape the canal. This resulted maintaining a large inventory for the operator as well as the procedure was time consuming. This led to the manufacturer to introduce newer file systems which can be used to finish the entire preparation with a single file rotary instrument

These single file systems have complex and varying design and taper to be used as a single instrument. These are also designed to be used in a continuous rotary motion and reciprocating motion according to the material composition and cutting efficiency. Each manufacturer claims their instrument to be safer and superior to the others. Some of these designs have aggressive cutting action on the dentine which can result in the formation of microcracks and fracture propagated along the wall.

Studies have shown that as a result of craze lines or microcracks, there might be occurrence of root fracture that propagates due to repeated application of stress by the occlusal forces[1,2,3] . In different degrees, dentinal damage can occur due to procedures like biomechanical preparation, obturation, and retreatment[3,4] Rotary instrument by its innate behaviour in the canal may result in more friction, which may increase dentinal defects and microcracks formation in comparison to hand instruments [5,6]

In this study a comparison and evaluation of dentinal crack formation during biomechanical preparation using some of the contemporary single file systems available in the market is proposed. The file system will also be tested and evaluated for efficiency when used in continuous rotating and reciprocating motion.

AIM

To assess the dentinal defects formation during biomechanical preparation of root canal using different single rotary file systems

OBJECTIVE

The objective of this study is to

1. Evaluate dentinal defects formation induced by new rotary file systems
2. Compare incidence of dentinal defects caused by instrumentation between different types of rotary single file system
3. Compare dentinal defects formation between continuous rotary and reciprocating system

HYPOTHESIS

The null hypothesis of this study is that the dentinal defects formation during biomechanical preparation is same for all the six rotary systems used.

REVIEW OF LITERATURE

1. **Eugenio Pedulla et al (2017)** [7]studied effect of 6 single-file system on dentinal crack formation. All the instruments tested created dentinal cracks. Within the limitations of this study, the flexibility of nickel-titanium instruments because of heat treatment seems to have a significant influence on dentinal crack formation. HyFlex EDM and WaveOne Gold caused less microcracks than the other instruments tested.

2. **E Karataset al (2016)** [8] studied incidence of dentinal crack after root canal preparation with protaper gold, profile vortex, f360, reciproc and protaper universal instruments. All the systems that were tested produced dentinal cracks. There was no significant difference between the control and F360 groups in terms of dentinal crack formation.

3. **Deepa Deepak Shori et al (2015)** [9]had done stereomicroscopic evaluation of dentinal defects induced by new rotary system; "protaper next". They concluded that all rotary files induced defects in root dentin, whereas the hand instruments induced minimal defects.

4. **Shiwani Garg et al (2015)** [10] compared dentinal damage induced by different nickel titanium rotary instrument during canal preparation. This study revealed that use of rotary instruments could result in an increased chance for dentinal defects as compared to hand instrumentation.

5. **Bier C A et al (2009)** [11] studied the ability of different nickel titanium rotary instruments to induce dentinal damage during canal preparation. In conclusion, except the hand file and control group, all experimental groups showed microcrack formations.

MATERIALS AND METHODS

Source of data:

105 freshly extracted single rooted permanent teeth indicated for extraction either due to periodontal or orthodontic reasons will be collected from the Department of Oral and Maxillofacial Surgery, Mahe Institute of Dental Sciences, Chalakkara, Mahe, U.T. of Puducherry

All the soft tissue and debris will be removed and the teeth will be stored in distilled water at room temperature.

Method of Collection:

105 extracted teeth will be selected and stored in distilled water.

The teeth will be decoronated at CEJ by using a diamond discs, ensuring minimum of10mm of root length. All the roots will be inspected with transmitted light for detecting any pre-existing cracks or any craze lines by using a stereomicroscope under ×12 magnification, to exclude teeth with such findings from this study

Inclusion Criteria:

- Teeth extracted for periodontal and orthodontic reasons
- Teeth with single root
- Teeth with intact root apex

Exclusion Criteria:

- Teeth with open apex
- Dilacerated root
- Teeth with resorption
- Teeth with fracture
- Teeth with root caries

Materials:

- 105 extracted teeth
- Diamond Disc
- High speed airotor handpiece (NSK, japan)
- K files (Mani K files)
- Wave one medium file (Dentsply Maillefer)
- Hyflex EDM file(Coltene Whaledent)
- One shape files(micro mega France)
- Reciproc R25 files(VDW Germany)
- Neoniti A1 files(Neolix France)
- Wave one gold (Dentsply Maillefer)
- Endomotor
- Measuring scale
- 3% Sodium hypochlorite
- Saline
- 17% EDTA
- Distilled water
- Stereomicroscope

METHODOLOGY:

The specimens will be decoronated at the cementoenamel junction using diamond disc.

105 specimens will be selected and will be divided into 6 main groups

Group	Description	Subgroup
1.	Control group	
2.	Continuous file systems	A. One shape
		B. Neoniti
		C. Hyflex EDM
3.	Reciprocating file systems	A. Wave one
		B. Reciproc
		C. Wave One Gold

Refined endodontic access cavities will be prepared. K files will be used to confirm the canal patency and working length will be determined. Root canal shaping procedure will be performed with 6 different file system comprising of continuous and reciprocating motion (Wave One, Reciproc, One Shape, Hyflex EDM, Neoniti, Wave One Gold) according to the manufacturer's instructions of each system, with slow pecking motion and light apical pressure.

- Unprepared tooth (Group 1)
- One shape (Group 2A) Neoniti (Group 2B) Hyflex EDM files (Group 2C) with size 25 will be used in continuous rotation as suggested by the manufacturer
- Wave one (Group 3A) Reciproc R25 (Group 3B) Wave One Gold (Group 3C) with file size 25 will be used with appropriate reciprocating motion as suggested by manufacturer

After each instrument insertion, the teeth will be irrigated with 2ml 3% Sodium Hypochlorite and 17% EDTA solution. After completion of the procedure, canal will

be rinsed with 2ml distilled water. To avoid any artifact by dehydration, all roots will be kept in distilled water throughout all the experimental procedure.

MICROSCOPIC EXAMINATION

All roots will be sectioned horizontally- 3,6,9mm from the apex with diamond disc. The slices will then be viewed through a stereomicroscope at 24x and 40x magnification.

SCORING CRITERIA

A defect is a crack originating from the inner root canal space. All other defects that did not originate from the canal wall as craze lines will not be considered. Root will be classified as cracked if at least one of the three sections obtained from each root showed one crack

RESULTS

Results will be statistically analyzed for the above groups and concluded

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സമ്മതപത്രം

ഡോ. മുഹമ്മദ് ജംഷിദ് എന്ന ഞാൻ **"Evaluation of Dentinal Defects Formation with Single File Rotary Systems – A Stereomicroscopic Study"** എന്ന ആശയത്തിൽ പ്രൊഫ. ഡോ. ജോർജ് തോമസ് എന്നവരുടെ കീഴിൽ ഗവേഷണം നടത്തുന്നു. ഈ ഗവേഷണത്തിൽ ദന്തക്രമീകരണപ്രക്രിയയുടെയോ അല്ലാതെയോ ഭാഗമായി എടുക്കുന്ന പല്ലുകൾ മാത്രമേ ഞങ്ങൾ ശേഖരിക്കുന്നുള്ളു.
പഠനസംബന്ധമായആവശ്യങ്ങൾക്ക്മാത്രമേഅത്ഉപയോഗിക്കുകയുള്ളൂ.

ഡോ. മുഹമ്മദ് ജംഷിദ് (ഇൻവെസ്റ്റിഗേറ്റർ)

പ്രൊഫ.ഡോ.ജോർജ് തോമസ് (ഗൈഡ്)

പ്രസ്തുത ഗവേഷണത്തിൻ്റെ ഭാഗമാകുന്നതിൽ എനിക്ക് യാതൊരുവിധ എതിർപ്പും ഇല്ലെന്നും ഈ ഗവേഷണത്തിൽനിന്നും ശേഖരിക്കുന്ന വിവരങ്ങൾ ദുരുപയോഗംചെയ്യില്ലെന്നും, ഈ ഗവേഷണത്തിൽ നിന്നും എപ്പോൾ വേണമെങ്കിലും പിന്മാറാൻ അവകാശമുണ്ടെന്നും, ഗവേഷണവിവരങ്ങൾ എൻ്റെ അനുവാദത്തോടുകൂടിയേ ഉപയോഗിക്കുകയുള്ളുവെന്നും ഞാൻമനസ്സിലാക്കുന്നു

കുറിപ്പ്: സമ്മതപത്രം ഇംഗ്ളീഷിലും മലയാളത്തിലും അച്ചടിക്കുന്നതാണ്. പങ്കെടുക്കുന്നയാൾ നിരക്ഷരരോ പ്രായപൂർത്തി ആകാത്തവരോ ആണെങ്കിൽ അവരുടെ സാന്നിധ്യത്തിൽ രക്ഷിതാവിനെ വായിച്ചു കേൾപ്പിക്കുന്നതായിരിക്കും.

പങ്കാളിയുടെ ഒപ്പ്/

കൈവിരലടയാളം

രക്ഷിതാവിൻ്റെ ഒപ്പ്/

കൈവിരലടയാളം

CONSENT LETTER OF SUBJECTS

I have no objection in participating in the study entitled "**Evaluation of Dentinal Defects Formation with Single File Rotary Systems – A Stereomicroscopic Study**" by Dr. Mohammed Jamshid, under the guidance of Dr. George Thomas. I understand that my identity will not be disclosed to any one without my permission and the teeth collected will be utilized only for research for the benefit of the patients. I have the right to withdraw from the study at any moment and the teeth collected are utilized with my permission.

Note: The consent letter will be printed in English as well as in the language of the subjects. If the subject is illiterate, it will be read by one of the close relatives of the subject and will be signed and/or Thumb impressed by both of them.

Signature/ Thumb impression of the subjects

Name

Signature of the relative

Name and relation

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MINDS/PG-ETHICAL/14/2017-18 Date:26.10.2017

ETHICAL CLEARANCE CERTIFICATE

Dissertation Topic	:- Evaluation of Dentinal Defects Formation With Single File Rotary Systems –An Invitro Stereomicroscopic Study.
Nature of Project	:- Masters of Dental Surgery
Student Name	:- DR. MOHAMMED JAMSHID
Guide Name	:- Dr.George Thomas

On behalf of the Mahe Institute of Dental Sciences & Hospital, Mahe, U.T.of Puducherry, Ethical Committee, hereby give ethical approval in respect of undertakings contained in the above mentioned Research work. The Researcher Student may therefore commence with the research work as from the date of this certificate, using the reference number indicated above.

Dr.Babu Raveendran,
Chairman

Dr.Anil Melath
Principal

PONDICHERRY UNIVERSITY

MAHE INSTITUTE OF DENTAL SCIENCES AND HOSPITAL

DEPARTMENT OF CONSERVATIVE DENTISTRY AND ENDODONTICS

PROFORMA OF THESIS SUBMITTED IN PARTIAL FULFILMENT FOR DEGREE OF MASTER OF DENTAL SURGERY IN CONSERVATIVE DENTISTRY AND ENDODONTICS

Comparison of smear layer removal efficacy of EndoVac pure with different irrigating systems: An in vitro SEM study

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INTRODUCTION

Successful endodontic treatment depends on the effective cleaning and shaping of root canals through chemo-mechanical instrumentation.[1]After biomechanical preparation a layer of debris composed of organic and inorganic material such as dentin chips, micro-organisms and pulp tissue remnants are formed on the root canal walls which obliterates the dentinal tubule entrances and root canal ramifications.

Mechanical instrumentation that leads to the formation of tissue debris and smear layer formation gives favourable environment for microorganisms to grow and disrupt the seal between the material and canal walls.[2]Smear layer removal may facilitate the opening of dentinal tubules for intra canal medicament action and allows better adhesion of the root canal filling materials.

Effective irrigant delivery and agitation are prerequisites to promote root canal disinfection and debris removal from inaccessible areas and improve successful endodontic treatment.[2]Various newer irrigation systems have been introduced to increase the mechanical flushing action of irrigants for better removal of smear layer, which was not possible with conventional syringe irrigation with needles and cannulas.[3]

So to achieve the goal of irrigation various irrigation activation based on different working principles like positive pressure agitation, negative pressure agitation, sonic and ultrasonic agitation has been introduced in recent years.[2]The EndoVac system is another irrigation system which uses negative pressure to draw the irrigant down the canal to the apex and claims to deliver the irrigant in the apical 1-2 mm without any risk of perfusion of irrigant beyond the apex.[4]Ultrasonic activation of irrigating solution also increases the effectiveness of the irrigating solution in the removal of smear layer.

EndoVac Pure, is a new irrigation system that combines a portable base unit with a sterile-packed cartridge and an ergonomically designed handheld controller for ease of use. It works on the apical negative pressure technique. With a single handheld controller, dentists can achieve complete three-dimensional and apical cleaning of a root canal. EndoVac Pure removes debris and bacteria from the apical third and provides a continuous flow of irrigants to the canal while minimizing the risk of extrusion beyond the apex. Endovac Pure's Apex cartridge is sterile packed and fully integrates the MacroPure and MicroPure cannulas for greater ease of use.

NaOCL has been shown to be effective agent in dissolving organic tissues whereas chelating agents such as Ethylenediamine tetraacetic acid (EDTA) have been irrigants of choice to demineralize dentin and aid in removal of inorganic component of smear layer.

The purpose of this in vitro study is to compare the efficacy of Endovac Pure irrigation system with other five irrigation technique using 17 % EDTA as final rinse for smear layer removal. Then canals are cleaned by saline to remove any remnants of EDTA. Evaluation of dentinal tubular opening of root canal will be done.

AIM

To evaluate the efficacy of Endovac Pure with Passive ultrasonic irrigation, Endo activator, Rotary microbrush irrigation, XP-endo Finisher and side-vent needle irrigationon smear layer removal.

OBJECTIVES

- To assess the effect of Endovac Pure, Passive ultrasonic irrigation, Endoactivator, Rotary microbrush, XP-endo Finisher and side-vent needle irrigation method on smear layer removal
- To compare within the system the cleaning efficacy at different levels of the root canal system
- To evaluate the efficacy of the above different irrigation delivery systems in comparison to side-vent needle irrigation as control group on the smear layer removal with17% EDTA irrigating solution using scanning electron microscope.

HYPOTHESIS

1. The null hypothesis of this SEM study is that all irrigation system will exhibit the same efficacy in smear layer removal.
2. Cleaning efficacy will be good in the root canal system at all levels.

REVIEW OF LITERATURE

AnkurDua et al (2015)[3] compared the efficacy of EndoVac with max-I probe using 5.25% sodium hypochlorite (NaOCl) and 17% ethylene diamine tetraacetic acid (EDTA). They concluded that both irrigation systems (EndoVac and Max-I probe) are effective in removal of smear layer at 3 mm level. However, the apical negative pressure system (EndoVac) used in the study is significantly more effective than the side-vented closed ended needle (Max-I probe) in removal of smear layer at apical 1 mm level.

Sanghamitra Suman et al (2017)[5] compared the smear layer removing efficacy of the EndoActivator, EndoVac and Er:YAG laser in extracted mandibular premolars, at the apical, middle and coronal third of root canal, through scanning electron microscopy. This study concluded that use of EndoVac system was significantly more effective in removing debris from the apical third than all other groups. EndoActivator performed better than laser at the apical third. All three experimental groups (EndoVac, EndoActivator, and laser) were better than needle irrigation at the middle and apical third. At the coronal third, no significant difference was seen between the four groups

Pranav Khaord, Aesha Amin et al (2015)[6] compared smear layer removal after final irrigant activation with sonic irrigation (SI), manual dynamic agitation (MDA), passive ultrasonic irrigation (PUI), and conventional syringe irrigation (CI). They concluded that endoactivator was most efficient in removal of the smear layer, followed by PUI, followed by manual dynamic activation, followed by CI (simple irrigation).

SagarBorse et al (2017)[2] reviewed the effect of different irrigation devices on removal of smear layer. They concluded that effective irrigant delivery and agitation leading to effective cleanliness are prerequisites for successful endodontic treatment. On the basis of data available in this systematic review it can be concluded that machine assisted irrigation devices are more effective in removal of smear layer and can improve success of root canal therapy.

Varun Raj Kumar et al (2015)[7]compared the efficacy of different irrigation systems comparing irrigation with syringe and needle (Dispo Van), Max-I-Probe needle (Dentsply Maillefer), Endo Activator (Dentsply Maillefer), and EndoVac (Sybron Endo)in removing the smear layer generated at apical third. They concluded that machine-assisted irrigation devices and activation of irrigant resulted in better irrigation at the apical third level in both quantity and quality, thus being more efficient in removing the smear layer. Traditional needle irrigation alone showed less penetration of irrigant into the apical third and was limited to the level of penetration of the needle. Side-vented needles did not show much difference than their tip-vented counterparts.

V Adarsh et al (2016)[8] compared the efficacy of conventional needle irrigation delivery system, Endo Activator system, and EndoVac irrigation in removal of smear layer in root canals. It was concluded that Endo Activator and EndoVac give relatively cleaner surfaces of root canal walls when used with EDTA for smear layer removal than conventional needle irrigation and probably aid in a better clinical outcome of the root canal treatment.

Fuat Ahmetoglu et al (2014)[9] had evaluated effectiveness of the apical negative pressure irrigation (EndoVac), passive ultrasonic irrigation (PUI), and conventional needle irrigation (CI) systems on smear layer (SR) removal. Regardless of which irrigation system was used, the use of NaOCl alone failed to remove the SR. In NaOCl/EDTA combination groups, the SR was removed partially or completely and no statistical significance. This study demonstrated that in order to remove the SR should be used EDTA solution for final irrigation in the root canal, regardless of the technique in each of the three

MATERIALS AND METHODS

- **Materials required:**

1. 60 extracted teeth
2. Diamond disc
3. Endo access bur
4. Endo Z bur
5. K-files
6. Protaper rotary instruments
7. 17%EDTA (solution & gel)
8. 5.25% Sodium Hypochlorite
9. Absorbent paper points
10. Distilled water
11. Saline
12. Thymol
13. Chisel
14. Mallet
15. Endovac Pure
16. Rotary microbrush
17. Endo activator
18. Side-vent needle
19. XP-endo Finisher
20. Ultrasonic unit
21. Scanning electron microscope

- Source of data-

60 Single rooted permanent premolar teeth indicated for extraction due to periodontal or orthodontic reasons will be collected from the Department of Oral and Maxillofacial Surgery, Mahe Institute of Dental Sciences, Mahe.

- Inclusion criteria-

1. Extracted for periodontal or orthodontic reasons
2. Fully developed apices
3. Teeth with single patent root canal

- Exclusion criteria-

1. Teeth withanatomical variations
2. Teeth with visible root caries
3. Teeth with signs of external or internal resorption

Method-

Buccal and proximal radiographs will be taken to confirm single canal configuration. The external surfaces of the teeth will be debrided using ultrasonic scaler and stored in thymol solution at room temperature. Access opening will be done with the help of Endo Access and Endo Z burs (Dentsply Maillefer). Biomechanical preparation will be done in all specimens to size of F4 ProTaper rotary files (Dentsply Maillefer).All specimens will be irrigated with 17% EDTA solution as final rinse in accordance with manufacturer's recommendations.

Samples will be grouped as follows:

Group 1: Samples irrigated with side-venting needle (Control group)

Group 2: Irrigant activated with Endovac Pure.

Group 3: Irrigant activated with Endoactivator.

Group 4: Irrigant activated with Rotary microbrush.

Group 5: Irrigant activated with Passive ultrasonic method.

Group 6: Irrigant activated with XP-endo Finisher.

The teeth will then be split with the help of mallet and chisel. The coronal, middle and apical third will be marked on the teeth.

These specimens will be mounted on the brass stubs for gold sputtering with 100Å of gold palladium and will be viewed under scanning electron microscope.

Scoring criteria

Score 0: No smear layer, more than 80% of the dentinal tubules open and free of debris.

Score 1: Minor smear layer, more than 50% of the dentinal tubules open and free of debris.

Score 2: Heavy smear layer, more than 30% of the dentinal tubules open and free of debris.

Score 3: Maximum obliteration of dentinal tubules.

RESULTS

The results will then be statistically analyzed for the above six groups and will be concluded

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സമ്മതപത്രം

ഡോ. അബ്ദുൾ ലത്തീഫ് അഫ്സൽ എന്ന ഞാൻ **"Comparison of smear layer removal efficacy of EndoVac pure with different irrigating systems: An in vitro SEM study"** എന്ന ആശയത്തിൽ പ്രൊഫ. ഡോ. മധു കിരൺ എന്നവരുടെ കീഴിൽ ഗവേഷണം നടത്തുന്നു. ഈ ഗവേഷണത്തിൽ ദന്തക്രമീകരണ പ്രക്രിയയുടെയോ അല്ലാതെയോ ഭാഗമായി എടുക്കുന്ന പല്ലുകൾ മാത്രമേ ഞങ്ങൾ ശേഖരിക്കുന്നുള്ളു. പഠനസം ബന്ധമായ ആവശ്യങ്ങൾക്ക്മാത്രമേ അത് ഉപയോഗിക്കുകയുള്ളൂ.

ഡോ. അബ്ദുൾ ലത്തീഫ് അഫ്സൽ
(ഇൻവെസ്റ്റിഗേറ്റർ)

പ്രൊഫ.ഡോ.മധുകിരൺ
(ഗൈഡ്)

പ്രസ്തുതഗവവേഷണത്തിൻ്റെ ഭാഗമാകുന്നതിൽ എനിക്ക് യാതൊരുവിധ എതിർപ്പും ഇല്ലെന്നും ഈ ഗവവേഷണത്തിൽ നിന്നും ശേഖരിക്കിന്ന വിവരങ്ങൾ ദുരുപയോഗം ചെയ്യില്ലെന്നും, ഈ ഗവവേഷണത്തിൽനിന്നും എപ്പോൾ വേണമെങ്കിലും പിന്മാറാൻ അവകാശമുണ്ടെന്നും, ഗവവേഷണവിവരങ്ങൾ എൻ്റെ അനുവാദത്തോടുകൂടിയേ ഉപയോഗിക്കുകയുള്ളുവെന്നും ഞാൻമനസ്സിലാക്കുന്നു

കുറിപ്പ്: സമ്മതപത്രം ഇംഗ്ളീഷിലും മലയാളത്തിലും അച്ചടിക്കുന്നതാണ്. പങ്കെടുക്കുന്നയാൾ നിരക്ഷരരോ പ്രായപൂർത്തി ആകാത്തവരോ ആണെങ്കിൽ അവരുടെ സാന്നിധ്യത്തിൽ രക്ഷിതാവിനെ വായിച്ചു കേൾപ്പിക്കുന്നതായിരിക്കും.

പങ്കാളിയുടെഒപ്പ്/
കൈവിരലടയാളം

രക്ഷിതാവിൻ്റെ ഒപ്പ്/
കൈവിരലടയാളം

CONSENT LETTER OF SUBJECTS

I have no objection in participating in the study entitled "**Comparison of smear layer removal efficacy of EndoVac pure with different irrigating systems: An in vitro SEM study** by Dr. Abdul Latheef Afsal, under the guidance of Dr Madhu Kiran. I understand that my identity will not be disclosed to any one without my permission and the teeth collected will be utilized only for research for the benefit of the patients. I have the right to withdraw from the study at any moment and the teeth collected are utilized with my permission.

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Signature/ Thumb impression of the subjects

Name

Signature of the relative

Name and relation

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MINDS/PG-ETHICAL/16/2017-18 Date:26.10.2017

ETHICAL CLEARANCE CERTIFICATE

Dissertation Topic :- Comparison of smear layer removal efficacy of Endovac pure with different irrigating systems: An *in vitro*SEM study.

Nature of Project :- Masters of Dental Surgery

Student Name :- DR. ABDUL LATHEEF AFSAL

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On behalf of the Mahe Institute of Dental Sciences & Hospital, Mahe, U.T.of Puducherry, Ethical Committee, hereby give ethical approval in respect of undertakings contained in the above mentioned Research work. The Researcher Student may therefore commence with the research work as from the date of this certificate, using the reference number indicated above.

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Chairman

Dr.Anil Melath
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PONDICHERRY UNIVERSITY

MAHE INSTITUTE OF DENTAL SCIENCES AND HOSPITAL

PROFORMA OF THESIS SUBMITTED IN PARTIAL FULLFILMENT FOR DEGREE OF MASTER OF DENTAL SURGERY IN PROSTHODONTICS

COMPARATIVE EVALUATION OF COMPRESSIVE AND FLEXURAL STRENGTHS OF TWO RESIN BASED CORE BUILD–UP MATERIALS WITH AN ALKASITE MATERIAL

AN IN-VITRO STUDY

SUBMITTED BY

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TITLE OF THE STUDY

COMPARATIVE EVALUATION OF COMPRESSIVE AND FLEXURAL STRENGTHS OF TWO RESIN BASED CORE BUILD UP MATERIALS WITH AN ALKASITE MATERIAL

AN IN VITRO STUDY

INTRODUCTION:

DEFINITION OF CORE:

The center or base of a structure and the foundation restoration which restores sufficient coronal anatomy of a vital or endodontically treated tooth (GPT 9).

CORE BUILD-UP MATERIALS:

Core build-up materials are used for restoring badly broken down vital or non-vital teeth that are to be used as abutments under subsequent restorations trying to stabilize its weakened part, providing a foundation for the tooth, that allows the clinician to create a favorable retention and resistance form for overlying prostheses.

The purpose of core build-up materials is to replace missing tooth structure, create optimal geometry for the coronal restoration, support and preserve the residual tooth structure, offer sufficient resistance to displacement and promotes retention of the final restoration. As the core becomes an integral part of the load bearing structure of the tooth, it should provide resistance and retention form for the coronal restoration and possess sufficient strength to resist occlusal forces[1].

A core restoration should provide satisfactory strength and resistance during crown preparation and impression procedures, thereby contributing to the retention and support of provisional crowns and in the long term, definitive restoration[2].

In an intact tooth, the occlusal loads are transferred to dentin as compression which is distributed over a large internal volume of tooth structure reducing local stress. The restored tooth, allows complex stress distribution pattern along the tooth and restoration interface, producing compressive and flexural stress[1].

The core material should have compressive strength to resist vertical forces and flexural strength to prevent core dislodgement during function for many years[2]. The materials used should be biocompatible, esthetically pleasing, reduced marginal leakage, easy to apply, with an ability to bond to tooth structure and to pins or posts, if applied.

Cores are usually retained by pins, posts and/or bonding systems to facilitate their retention, and to restore the tooth to the extent to support a crown or bridge[3].Several dental materials have been used for core-build up procedures, some as direct and some indirect, such as custom cast post and core[3].

The materials used for direct core build-up includes High Copper Amalgam (DURALLOY), Visible light cured resin composite(GRANDIO), Resin reinforced composite(PARACORE), Bulk fill composite(FILTEK), Polyacid modified composite(COMPOMER), Resin-modified glass ionomer(VITREMER), and Silver cermet cement(HI-DENSE XP). Most of these materials were not specifically developed for this purpose, but as a virtue of properties such as fluoride release, pleasing colors, adhesion to tooth structure, fast setting rates, choice of curing mechanism and handling properties, they have found application in core build-up procedures[3].

With the advent of an alkasite, many of the desirable properties were combined into one material. An alkasite (Cention N) which like compomer or ormocer materials is essentially a subgroup of the composite material class. It is a substitute for amalgam (mercury-free) and GIC. The manufacturer claim that the material has durability, adequate strength, esthetics, calcium, fluoride and hydroxide ions releasing, can be polymerized by both chemical and light activation. The main advantage of this material is that it bonds mechanically and chemically to the dentin substrate. It is dispensed in powder and liquid form. Since it exhibits a combination of ideal properties of a core

build-up material, this study is being carried out to test its compressive and flexural strength, for use as a core build-up material.

In view of the development of newer materials in the market, clinicians often face uncertainities regarding the choice of the best core build-up materials to achieve optimum results. A comparison of the compressive and flexural strengths of different core build-up materials available would help the clinician to choose the appropriate core material for the restoration of weakened tooth structure[2,3].

AIM:

The aim of this study is to test the compressive and flexural strengths of the two commercially available resin based core build-up materials like Filtek™ (Bulk fill composite) and Paracore™ (Resin based core build-up composite) with a recently introduced alkasite material, Cention N.

OBJECTIVES:

- To evaluate the compressive and flexural strengths of Filtek™ (Bulk fill composite)
- To assess the compressive and flexural strengths of Paracore™ (Resin based core build-up composite).
- To determine the compressive and flexural strengths of Cention N (Alkasite).
- To compare and evaluate the compressive and flexural strengths of Filtek™ and Paracore™ with Cention N.

REVIEW OF LITERATURE:

1. ***Bulem et al (2008)***[4] had conducted a study on compressive and diametral tensile strength of several type of core materials. The materials were Admira; Filtek P60, Grandio; Rebilda DC, Duralloy and Argion molar. Kruskal-Wallis test was computed, and multiple comparison test discerned many differences among materials. The result of this study is packable composite resin (Filtek P60), visible light cured nanohybrid resin composite (Grandio), and organically-modified ceramic (Admira) had higher compressive and DTS values than other materials.

2. ***Jayanthi N, Vinod V (2013)***[2] conducted a study to compare the mechanical properties of materials used for direct core foundations. The differences between the compressive strength and flexural strength of Filtek ™Z350 nanocomposite with the conventional core build-up materials like amalgam, Vitremer GIC and Fluorocore were tested. The result of the study showed that Fluorocore had the highest compressive strength and flexural strength followed by Filtek™ Z350 and both these materials are stronger than other core build-up materials in extensively damaged teeth.

3. ***Passos SP et al (2013)***[5]conducted a study to evaluate and compare the mechanical properties of five commercial core materials using Fracture Toughness(FT), Knoop Hardness Number(KNH), Diametral Tensile Strength (DTS) and Dynamic Elastic Moduli (DEM). The result demonstrated significant differences in the FT, KHN and DTS values of the core build-up materials tested.

4. ***Agarwal A, Mala K (2014)***[6] had conducted a study to evaluate and to compare the individual compressive, tensile and flexural strength of fiber-reinforced dual cure resin core build-up material, Silorane-based composite resin and dual curing composite for core build-up with silver amalgam core used as a control. The result is the Silorane-based material showed the highest flexural strength, but other

mechanical properties were inferior to dual cure composite materials with nanofillers.

5. ***Kumar G, Shivarayan A (2015)***[3] have conducted a study to evaluate certain mechanical properties of commonly used materials for direct core build-up, including visible light cured composite, polyacid modified composite, resin modified glass ionomer, high copper amalgam and silver cermet cement. The result of this study showed the highest value for elastic modulus and silver cermet showed less value for all the properties except for elastic modulus.

6. ***Jain G et al (2015)***[1] conducted a study to compare the shear bond strength of three recently introduced dual cure resin core build-up materials namely Paracore, Fluorocore and Multicore. The result of this study is that the mean SBS was highest in multicore at all the time periods as compared to Fluorocore and Paracore and was also higher at 48h thermocycling in all three groups studied.

MATERIALS:

The materials used in this study are Filtek™ [3M ESPE] (Bulk fill composite), Paracore™ [COLTENE] (Resin based core build-up composite) and Cention N [IVOCLAR VIVADENT] (Alkasite) which is a subgroup of composite.

SAMPLES:

TOTAL →90 SAMPLES

Groups:

1. Group A→ 30 samples of FILTEK™
2. Group B → 30 samples of PARACORE™
3. Group C→ 30 samples of CENTION N

Sub groups:

1. GROUP A1→FILTEK™ → 15 samples will be tested for Compressive strength
2. GROUP A2→FILTEK™ → 15 samples will be tested for Flexural strength
3. GROUP B1→PARACORE™→ 15 samples will be tested for Compressive strength
4. GROUP B2→PARACORE™→ 15 samples will be tested for Flexural strength
5. GROUP C1→CENTION N→ 15 samples will be tested for Compressive strength
6. GROUP C2→CENTION N→ 15 samples tested will be for Flexural strength

METHODOLOGY:

SPECIMEN PREPARATION:

Cylindrical split metal molds of dimensions 6±1 mm (height) × 4 ±1 mm (diameter) will be used to fabricate 15 samples of each core material for testing the Compressive strength.

Rectangular split metal molds of dimensions 25±1 mm (length) × 2±1mm (width) × 2±1 mm (height) will used to fabricate15 samples of each core material for testing the Flexural strength[1].

The samples will be stored in a water bath at 37±1° C for 24 hours to ensure complete polymerization prior to testing.

MECHANICAL TESTING:

COMPRESSIVE TEST:

- The samples will be tested using a UNIVERSAL INSTRON TESTING machine.
- The specimen will be connected to a load measuring cell, which continuously records the load applied to the samples at a crosshead speed of 0.75±0.25mm/min until the specimen fractures.

FLEXURAL TEST:

- The samples will be tested using 3 POINT BENDING TEST.
- The samples will be connected to a load measuring cell, which continuously records the load applied to the samples at a crosshead speed of 0.5 mm/min until the specimen fractures.

RESULT:

The result of the study will be tabulated and subjected to statistical analysis (ANOVA followed by TUKEY'S HSD post hoc).

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Dissertation Topic :- Comparative Evaluation Of Compressive And Flexural Strength Of Two Resin Based Core Build–Up Materials With An Alkasite Materia – An In-Vitro Study

Nature of Project :- Masters of Dental Surgery

Student Name :- DR.ABIRAMI V

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PROFORMA OF THESIS SUBMITTED IN PARTIAL FULFILLMENT FOR DEGREE OF MASTER OF DENTAL SURGERY IN PROSTHODONTICS

COMPARATIVE EVALUATION OF STRESS DISTRIBUTION PATTERNS WITHIN ALVEOLAR BONE UNDER TOOTH SUPPORTED MANDIBULAR OVER DENTURES USING THREE DIFFERENT EXTRA-RADICULAR ANCHORAGE SYSTEMS

–A FINITE ELEMENT ANALYSIS

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COMPARATIVE EVALUATION OF STRESS DISTRIBUTION PATTERNS WITHIN ALVEOLAR BONE UNDER TOOTH SUPPORTED MANDIBULAR OVER DENTURES USING THREE DIFFERENT EXTRA-RADICULAR ANCHORAGE SYSTEMS –A FINITE ELEMENT ANALYSIS

INTRODUCTION:

Edentulism is considered as a major health problem due to associated impairments and disabilities. The treatment modalities available for these patients include; Conventional complete dentures, Tooth Supported over dentures, Implant Supported Over dentures and Fixed implant supported restorations.

Conventional Complete dentures have been the standard of care for more than a century. Complete denture wearers are usually satisfied with maxillary dentures but the majority of them often struggle to eat with the mandibular denture because of the lack of retention. Other disadvantages are; loss of discrete tooth proprioception, progressive loss of alveolar bone, transfer of all occlusal forces from the teeth to the oral mucosa and loss of patient's confidence [1].

Preventive prosthodontics emphasizes the importance of any procedure that can delay or eliminate future Prosthodontic problems and an over denture is an important part of preventive treatment. A tooth supported over denture affords the following advantages; Reduced alveolar bone resorption around the abutment tooth, increased proprioception, substantially increased occlusal forces, enhanced stability and retention of the prosthesis, economical, maintenance of vertical dimension of occlusion [2], and psychological benefit to the patient.

Different over denture attachments designs for tooth supported over dentures includes studs, bars and accessory attachments. The selection of the most appropriate attachment system includes the number, distribution and location of the remaining natural teeth, the amount of bone support, dexterity of the patient and financial feasibility.

Stresses on underlying oral tissues such as alveolar bone cannot be assessed experimentally but they can be measured by mathematical analytic tools, such as finite element analysis [3]. The finite element analysis requires the creation of a computer simulated model. The basic process consists in configuring the complete structure as an assembly of individual structural elements. Each of these individual elements are called finite elements. Adjacent elements will be connected at specific points (nodes) on their common boundaries. In making the finite element model, the characteristics of different materials, the mucosa, bone, attachments, periodontal ligament and the abutment teeth will be entered into the computer programme.

Many studies have addressed the stress distribution patterns in implant supported over denture but till date few studies have compared the stress distribution patterns in tooth supported over dentures. Therefore this study aims at evaluating stress distribution patterns in tooth supported over denture with three different anchorage systems by a Finite Element Analysis.

AIM:

To quantitatively compare the stress distribution within alveolar bone around the canine abutment teeth and saddle regions of tooth supported mandibular over dentures retained by three different attachment systems .

The study will be done using finite element analysis when the attachment systems are subjected to compressive and oblique static loads in the first molar regions.

OBJECTIVES:

1. To assess the stress distribution patterns in alveolar bone around the canine abutment teeth and saddle regions when subjected to compressive loads on mandibular tooth supported over dentures retained with Ball attachments.

2. To evaluate the stress distribution patterns in alveolar bone around the canine abutment teeth and saddle regions when subjected to oblique loads on mandibular tooth supported over dentures retained with Ball attachments.

3. To determine the stress distribution patterns in alveolar bone around the canine abutment teeth and saddle regions, when subjected to compressive loads on mandibular tooth supported over dentures retained with Bar and clip attachments

4. To evaluate the stress distribution patterns in alveolar bone, around the canine abutment teeth and saddle regions when subjected to oblique load on mandibular tooth supported over dentures retained with Bar and Clip attachments

5. To assess the stress distribution patterns in alveolar bone around the canine abutment teeth and saddle regions, when subjected to compressive loads on mandibular tooth supported over dentures retained with Locator attachments

6. To determine the stress distribution patterns in alveolar bone around the canine abutment teeth and saddle regions, when subjected to oblique loads on mandibular tooth supported over dentures retained with Locator attachments

7. To compare the stress distribution patterns around the canine abutment teeth and saddle regions in alveolar bone, when subjected to compressive and oblique static loads in mandibular tooth supported over dentures retained with 3 different attachments.

REVIEW OF LITERATURE:

1. Pan S *et al* (1999) [4] used the three-dimensional finite element method to investigate the stress distribution in a mandible with an over denture supported by the roots of two canines. The two teeth were either connected with a bar attachment or restored with telescopic crowns, and were then restored with a complete over denture. He concluded that, in terms of stress in the alveolar bone, complete over denture over telescopic crowns is more convenient than over bar attachments. . Stress increases as the height of the bone around the roots decreases, but the increment is less than 30%. It is important for an abutment with bone resorption to perform root amputation to obtain an acceptable crown/root ratio.

2. Tanaka T *et al* (2006) [5] conducted a finite element analysis to investigate stresses around over denture abutments with and without crown restoration for varying bone

heights. Three dimensional finite models of the mandibular right first and second premolars with periodontal ligament and five alveolar bone models of different heights were constructed. A single oblique load of 80N at a 30 degree angle distal from vertical axis was directed at the center of the occlusal surface of second premolar. He concluded that a periodontally compromised with tooth C/R ratio over approximately 1.5 should be used as an overdenture abutment.

3. Satyabodh *et al* (2011) [6] conducted a study on use of implant O ring attachment for tooth supported mandibular over denture. Teeth that might be considered for extraction may be considered as long or short term alternatives to implant or total edentulousness. He concluded that different bar and stud attachment designs suggested in the literature for implant over dentures also hold true for tooth born over dentures. O ring can be used successfully in a tooth supported over denture

4. Anwar *et al*(2014)[7]This study was designed to investigate the stresses induced by ball and locator attachments as connecting mechanisms between implants and overdentures using finite element analysis. Both attachments were attached to the same width and length of a hexed-implant embedded in a bone block. Vertical load (100N) and oblique off-central load in different angles. He concluded that the locator attachments may provide an adequate attachment system with respect to reducing the stress on the implant body and supporting structures when compared with the ball attachments for implant-retained overdentures.

5. Kaur R *et al* (2015) [8] discussed case reports with three different types of Over dentures Over denture with cast copings with short dowels, O-ring attachments, and a customized bar supported over denture with copings. In cases with limited inter arch space, reinforcement of the denture base with metal framework adjacent to the top of the coping would be effective in reducing over denture fracture due to reduced thickness of acrylic resin because of the bulkiness of the bar assembly.

6. Faraj *et al* (2016)[9] conducted clinical study to compare clinically and radiographically between flex pivot(precision attachment with flexible male sphere) and castable pivot (semi precision attachment) used for root supported over denture and found out that precision attachment with flex pivot was associated with more superior clinical periodontal parameters.

MATERIALS AND METHODS

The study will be performed in three stages: the creation of a solid model of partially edentulous mandible with bilateral canines (17mm root length), attachments: ball, bar and clip and locator (Rhein83), and complete denture; the creation of a finite element model; overlapping and gluing the parts of the models to act as one solid body with different material properties, then analyzing the process of load transfer and stress distribution using the facility available in the ANSYS 14.5 software.

SPECIFICATIONS OF 3D MODEL DESIGN

Model (1)

Edentulous Mandible

Periodontal ligament (.35mm)

Bilateral Canines (length: 17mm)

Ball Attachments (Rhein83)

Denture

Model (2)

Bilateral Canines (17mm)

Bar and Clip Attachments (Rhein83)

Edentulous Mandible

Periodontal ligament (.35mm)

Denture

Model (3)

Bilateral Canines (17mm)

Locator Attachments (Rhein83)

Edentulous Mandible

Periodontal ligament (.35mm)

Denture

Designing of the models:

The first step in modeling is to prepare an edible geometry of interest in computer. Three dimensional geometry of mandible is generated using computer tomography (CT)

A graphic preprocessor of a finite element analysis program (ANSYS 14.5) will be used to construct three- dimensional finite element model.

3 models will be created for teeth supported over dentures, with 3 different anchorage systems. The model will be configured with the assumed mechanical properties of the material used.

A bilateral masticatory occlusal load of 150N (90 degrees) and oblique load of 80N at 30degrees was applied to the mandibular first molar region. The stress around the canine abutment teeth and saddle regions under mandibular tooth supported over denture will be studied with the help of ANSYS 14.5 software.

RESULT:

The result would be evaluated and analyzed for maximum and minimum deflections in all the three types of attachments under the abutments and saddle areas.

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ETHICAL CLEARANCE CERTIFICATE

Dissertation Topic :- Comparative Evaluation Of Stress Distribution Patterns Within Alveolar Bone Under Tooth Supported Mandibular Over Dentures Using Three Different Extra-Radicular Anchorage Systems –A Finite Element Analysis

Nature of Project :- Masters of Dental Surgery

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PROFORMA OF THESIS SUBMITTED IN PARTIAL FULFILLMENT FOR

DEGREE OF MASTER OF DENTAL SURGERY IN PEDODONTICS AND PREVENTIVE DENTISTRY

PREVALENCE OF TRAUMATIC DENTAL INJURIES AND MOLAR RELATION IN SCHOOL CHILDREN IN MAHE.

BY

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INTRODUCTION

A traumatic event is an incident that causes physical, emotional, spiritual or psychological harm [1]. It has a physical, aesthetic and psychological impact not only on the child, but also on his/her parents [2]. According to studies, the most common age group in which permanent tooth injury occurs is 6-12 years. As infants, the incidence of dental injuries is more when they are learning to walk and run, and as children gain confidence and coordination, the incidence of dental injuries decrease; it then rises again during the very active age range of 8-12 years, as a result of bicycle, skateboard, playground and sports accidents [3]. Similar studies from all across the world shows that boys experienced dental trauma more frequently than girls. It is explained by the fact that girls are generally more mature in their behaviour than boys, who tend to be energetic and inclined towards vigorous outdoor activities at that age[4,5].

It has been reported that the majority of dental injuries involve the anterior teeth, mainly maxillary central incisors, followed by the maxillary lateral incisors [5,6]. Studies also found fall as the commonest cause of injury; the second most common cause being that of unknown origin [5, 6] .Children with class I molar relation with proclination and class II division I exhibited large number of traumatic injuries. A large number of children who sustained accidental damage to their maxillary incisors had increased overjet and incompetent lips at rest, in accordance with various earlier studies [3]. This could be due to the fact that lips cushion the impact of colliding materials with anterior teeth, thus minimizing the possibility of a fracture. Increased overjet also means increased exposure of teeth which predisposes to trauma [5].

However, no study has yet been done on the prevalence of trauma, nor its occurrence according to gender, etiology and age group in school children in Mahe.

AIMS AND OBJECTIVES

- To assess the prevalence of traumatic injuries to anterior teeth in children aged 6-12 years, in the schools, in and around Mahe.
- To compare the prevalence of trauma in these school children in the age group of 6-8 and 9-12years.

- To compare the prevalence of these injuries according to gender.
- To assess the molar relation in these children.

REVIEW OF LITERATURE

Tasneem et al in 2016 conducted a cross sectional study in private and government schools of Kashmir among 1600 school children aged 12 years. It was concluded that the prevalence of traumatic dental injuries[TDIs] was 9.3%, and was more in males compared to females. Fall and sports were seen by them to be the most common causes of trauma. The highest potential risk factor for the occurrence of trauma was increased overjet . Academic performance was found to be significantly associated to anterior teeth TDIs [6].

Mohan Govindrajan et al in 2017 conducted a cross sectional study among 3200 school children in the age group of 3-13 years from 10 schools of Chidambaram, Tamilnadu. The trauma prevalent in this study was 10.13%. Children with class I and mesial step molar relationship exhibited more number of TDIs and enamel fracture was the most common type of injury recorded [5].

Abu-Hussein Muhammed conducted a study of 4262 Arab Israeli school children aged 9-12 years, who were interviewed and examined between 2012 -2015 in different private dental clinics in Israel. Among those examined,520(12.21%) had experienced TDIs, males(8%) showing a higher prevalence than females(4.2%). Enamel fracture was the most frequently observed injury, maxillary central incisor being the most commonly involved tooth and fall, the leading cause of trauma[7].

Faezeh Eslamipour et al carried out a cross-sectional survey through clinical examination of the permanent incisors and canines of 907 school children (9 to 14 years old) in 20 public schools in Isfahan, Iran. The overjet, lip coverage, and visible signs of dental trauma were recorded. Approximately 36% recalled the occurrence of dental trauma, but only 23.8% of children had visible signs of dental trauma to the permanent incisors (girls [18.8%], boys [29.9%]). The maxillary central incisors were commonly injured (69.5%). The most frequent types of injuries were the enamel fracture (59.0%), craze lines (16.3%), and enamel and dentin fracture (13.4%). Tooth avulsion was seen in 0.7%. No significant association was found between dental trauma and increased overjet of > 3 mm . The relationship between trauma and lip

coverage was statistically significant; Violence (30%) and fall (22.7%) were the main causes of TDIs in their study [8].

Swati Sharma et al in 2015 carried out a study in 50 children (7-12 years) who reported to outpatient Department of Paediatric and Preventive Dentistry, Buddha Institute of Dental Sciences and Hospital, with an aim to know the risk factor associated with anterior teeth trauma. Results showed that more number of boys suffered traumatic injuries than girls. Maxillary central incisor is the most common teeth to get injured. Ellis class I (51%) is the most common form of injury suffered by both male and female followed by class II injury [9].

MATERIALS AND METHODS

After getting clearance from the ethical committee of Mahe Institute of Dental Sciences and Hospital, the study would be conducted in the schools in Mahe..Permission will be obtained from the Principal of Mahe Dental College and the Principal of the schools for conducting the study. A signed written informed consent will be requested from the parents of the children who are included in the study .The candidates will be examined by a single examiner, seating them comfortably in a ventilated place and with the help of mouth mirror and a torch light. Those candidates with proven traumatic injury to anterior teeth will be requested to answer the given questionnaire. This study will be conducted among 1300 school children in and around Mahe. Study sample will be divided into 2 age groups: children aged 6-8 years [group A] and those aged 9-12 years [group B].

Examination will be done as per WHO type IV criteria. Ellis and Davis classification will be used for recording the type of injuries. However, type VI injury will not be recorded as dental radiographs will not be available for diagnosis, in the in-school field conditions The examination will be carried out by a single trained dental surgeon. Data will be obtained concerning the prevalence of traumatic dental injury (TDI), age, gender, etiology, type of fractured teeth, time of fracture and lip competence. Occlusal relationship will be recorded according to Angle's molar classification with Dewey's modification. The clinical examination will include a visual inspection for lip coverage as the subject enters the examination room without

his\her awareness. Lip coverage will be recorded as adequate if the lips covered the maxillary incisor in a rest position, and as inadequate, if the majority of crown height is exposed.

INCLUSION CRITERIA

1) Healthy children of 6 to 12 years of age who will be present on the day of examination, in the school
2) Children from whom written parental consent has been taken.
3) Children within the age group of 6-12 years presenting with a history of trauma to permanent anterior teeth would be included in the study

EXCLUSION CRITERIA

1) Children whose parents have not given informed consent.
2) Those who do not agree to participate.
3) Children with any mental or behavioural disorder.
4) Children with missing or grossly decayed first permanent molar.
5) Children with physical and muscular disability

RESULTS

The results obtained would then be tabulated according to age, gender, etiology and molar relationship; interpreted using SPSS software and compared by Chi-square test. In our study P </= to 0.05 would be considered as the level of significance.

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പങ്കുചേരാനുള്ള അഭ്യർത്ഥന

ഡോ: അശ്വതി എന്ന ഞാൻ **"PREVALENCE OF TRAUMATIC DENTAL INJURIES AND MOLAR RELATION IN SCHOOL CHILDREN IN MAHE."** എന്ന ആശയത്തിൽ എന്റെ പഠനത്തിന്റെ ഭാഗമായി താങ്കളുടെ കുട്ടി പങ്കുചേരണമെന്ന് വിനീതമായി അഭ്യർത്ഥിക്കുന്നു. പ്രൊഫ: ഡോ. . റീന എഫ്രേമിന്റെ കീഴിലായിരിക്കും ഈ പഠനം നടക്കുക. താങ്കളുടെ കുട്ടിക്ക് ഈ പഠനം കൊണ്ട് യാതൊരു ബുദ്ധിമുട്ടും ഉണ്ടായിരിക്കുകയില്ല എന്ന് ഞങ്ങൾ ഉറപ്പ് തരുന്നു.. ഒരു ദന്തപരിശോധന മാത്രമായിരിക്കും ഞങ്ങൾ അവരിൽ നടത്തുക. താങ്കളുടെ സമ്മതമില്ലാതെ ഈ വിവരങ്ങൾ ആരുമായും കൈമാറുകയോ, ചർച്ച ചെയ്യുകയോ ഇല്ല. പഠനസംബന്ധമായ ആവശ്യങ്ങൾക്ക് മാത്രമേ അത് ഉപയോഗിക്കുകയുള്ളൂ. ഏത് നിമിഷവും ഈ പഠനത്തിൽനിന്നും താങ്കൾക്ക് പിൻമാറാവുന്നതാണ്. അതുവരെ ശേഖരിച്ച വിവരങ്ങൾ താങ്കളുടെ സമ്മതത്തോടെ മാത്രമേ ഉപയോഗിക്കുകയുള്ളൂ.

കുറിപ്പ് : രക്ഷിതാവിന്റെ സമ്മതപത്രം ഇംഗ്ലീഷിലും മലയാളത്തിലും അച്ചടിക്കുന്നതാണ്. പങ്കെടുക്കുന്ന ആൾ നിരക്ഷരനാണെങ്കിൽ അവരുടെ സാന്നിദ്ധ്യത്തിൽ അടുത്ത ബന്ധുവായിച്ച് കേൾപ്പിക്കുന്നതായിരിക്കും

ഡോ: അശ്വതി

(ഇൻവെസ്റ്റിഗേറ്റർ)

പ്രൊഫ. ഡോ. റീന എഫ്രേം

(ഗൈഡ്)

REQUEST FOR PARTICIPATION

I, Dr.Aswathi T.M. request you to be kind enough to allow your child to volunteer as a subject in the research project entitled **PREVALENCE OF TRAUMATIC DENTAL INJURIES AND MOLAR RELATION IN SCHOOL CHILDREN,IN AND AROUND MAHE** under the joint supervision of Prof. (Dr.) Rena Ephraim. No invasive procedure will be under taken on your child and no drugs will be given as a part of the study. Your child's identity will not be disclosed to any one without your permission and the data collected will be utilized only for academic purpose and research for the benefit of the patients. You have the right to withdraw from the study at any moment and the data so far collected will be utilized only with your permission.

Note:- The request letter will be printed in English as well as in the language of the subjects. If the subject is illiterate, it will be read by one of the close relatives of the subject in his presence.

Dr. Aswathi T.M.

(Investigator)

Prof (Dr.) Rena Ephraim

(Guide)

രക്ഷിതാവിന്റെ സമ്മതപത്രം

എന്റെ മകൻ / മകൾ **PREVALENCE OF TRAUMATIC DENTAL INJURIES AND MOLAR RELATION IN SCHOOL CHILDREN IN MAHE** എന്ന പ്രസ്തുത പഠനത്തിന്റെ ഭാഗമാവുന്നതിൽ എനിക്ക് യാതൊരു വിധ എതിർപ്പും ഇല്ലെന്നും, എന്റെ മകൻ / മകളുടേയോ പേരോ മേൽവിലാസമോ വെളിപ്പെടുത്തുക ഇല്ലെന്നും, ഈപഠനത്തിൽനിന്നും ശേഖരിക്കുന്ന വിവരങ്ങൾ ദുരുപയോഗം ചെയ്യില്ലെന്നും, ഈ പഠനത്തിൽനിന്നും എപ്പോൾ വേണമെങ്കിലും പിൻമാറാനുള്ള അവകാശമുണ്ടെന്നും, പഠനവിവരങ്ങൾ എന്റെ അനുവാദത്തോടുകൂടിയേ ഉപയോഗിക്കുകയുള്ളൂ എന്നും ഞാൻ മനസ്സിലാക്കുന്നു.

കുറിപ്പ് : രക്ഷിതാവിന്റെ സമ്മതപത്രം ഇംഗ്ലീഷിലും മലയാളത്തിലും അച്ചടിക്കുന്നതാണ്. പങ്കെടുക്കുന്ന ആൾ നിരക്ഷരനാണെങ്കിൽ അവരുടെ സാന്നിദ്ധ്യത്തിൽ അടുത്ത ബന്ധു വായിച്ച് കേൾപ്പിക്കുന്നതായിരിക്കും.

രക്ഷിതാവിന്റെ ഒപ്പ് / കൈവിരലടയാളം :

രക്ഷിതാവിന്റെ പേര് :

ബന്ധുവിന്റെ ഒപ്പ് / കൈവിരലടയാളം :

ബന്ധുവിന്റെ പേരും ബന്ധവും :

CONSENT LETTER OF SUBJECTS

I have no objection in my child participating in the study entitled **"PREVALENCE OF TRAUMATIC DENTAL INJURIES AND MOLAR RELATION IN SCHOOL CHILDREN IN MAHE"**.I understand that my child's identity will not be disclosed to any one without my permission and the data collected will be utilized only for academic purpose and research for the benefit of the patients. I have the right to withdraw from the study at any moment and the data so far collected will be utilized only with my permission.

Note: The consent letter will be printed in English as well as in the language of the subjects. If the subject is illiterate, it will be read by one of the close relatives of the subject and will be signed and/or Thumb impressed by both of them.

Signature/ Thumb impression of the subjects

Name

Signature of the relative

Name and relation

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MINDS/PG-ETHICAL/09/2017-18 Date:26.10.2017

ETHICAL CLEARANCE CERTIFICATE

Dissertation Topic :- Prevalence Of Traumatic Dental Injuries And Molar Relation In School Children In Mahe.

Nature of Project :- Masters of Dental Surgery

Student Name :- DR.ASWATHI T.M

Guide Name :- Dr.Rena Ephraim

On behalf of the Mahe Institute of Dental Sciences & Hospital, Mahe, U.T.of Puducherry, Eth Committee, hereby give ethical approval in respect of undertakings contained in the above mentio Research work. The Researcher Student may therefore commence with the research work as from date of this certificate, using the reference number indicated above.

Dr.Babu Raveendran,
Chairman

Dr.Anil Melath
Principal

PONDICHERRY UNIVERSITY

MAHE INSTITUTE OF DENTAL SCIENCES

DEPARTMENT OF PEDODONTICS AND PREVENTIVE DENTISTRY

PROFORMA OF THESIS SUBMITTED IN PARTIAL FULFILLMENT FOR DEGREE OF MASTER OF DENTAL SURGERY PEDODONTICS AND PREVENTIVE DENTISTRY

EFFECT OF PEDIATRIC DRUGS ON SOLUBILITY AND MICROLEAKAGE OF RESTORATIVE MATERIALS USED IN PRIMARY TEETH.

BY

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OCTOBER 2017

INTRODUCTION

Pleasant tasting syrups have a long history of use in pediatric practice to aid compliance with medication[1].Pediatric liquid drugs are generally sweetened and prescribed for children in the form of analgesics, antibiotics, antihistamines, antiepileptics, multivitamins to overcome commonly occurring diseases such as common cold, cough, fever and in mild aches and pains [2]. Pharmaceutical firms sweeten liquid drug preparations with sucrose to increase the palatability, compliance and also to act as a preservative [1].

Acidic preparations are also often necessary for drug dispersion, chemical stability maintenance, to ensure physiological compatibility and to improve flavor[3]. Additionally these syrups also contain agents which aid in improvement of the appearance, bioavailability and stability. These pharmaceutical adjuvants are usually considered to be inert and do not add to or affect the intended action of the therapeutically active ingredients. However, these inert agents have been found to pose dangers like dental caries and erosionin children who are frequently given these medications[1].The effect of long term consumption of sugar containing liquid medications on the teeth is an issue of concern for the dental health. The ingestion of liquid oral medications at bedtime is frequently not followed by proper oral hygiene practices [1].In addition to the acidic components, other factors such as prolonged and frequent ingestion (i.e., two or more times daily), bedtime and between meal consumption, high viscosity and the collateral effect of reduced salivary flow, may contribute to increase the risk for medication-induced dental erosion[4].The sugar containing property and increased acidity might also result insolubility and microleakage of the restorative materials present in the oral cavity of these children.

In pediatric population, the commonly used restorative materials are Glass Ionomer Cements (GIC), Compomers, or Composites, with the proper indications dependent upon the individual requirements of children [2].The ultimate goal of a restoration is to restore proper tooth form, function and esthetics, while maintaining the marginal and surface integrity of teeth, in harmony with the oral environment [5]. The demand for esthetic appearances in relation to various dental materials is increasing day by day in Pediatric

dentistry. Syrups sweetened with sucrose produce a marked and long term drop in plaque pH leading to dissolution of restorative materials and tooth enamel, causing marginal leakage and therebyleading to secondary caries, pulpal injury and accelerated deterioration of the restorative materials [1].Excessive solubility of dental restorative materials can also lead to surface deformation and marginal discrepancies.

Resistance to surface degradation in the oral environment is essential for longevity of the restorations [5] Because of this solubility and microleakage of dental restorative materials is of considerable clinical importance and cannot be overlooked. Therefore, in view of the increased use of pediatric drugs by children for prolonged periods in recent years, especially those with chronic diseases, it is essential to determine the effects of these drugs on restorative materials used in Pediatric dentistry. So the need for the present study is to assessthe effect of these drugs on the solubility and microleakage of commonly used pediatric restorative materials like Glass Ionomer Cement and Composite resin.

AIMS AND OBJECTIVES

- To evaluate the effect of commonly used pediatric drugs on the surface solubility of the restorative materials used in primary teeth.
- To assess the effect of these pediatric drugs on microleakage of the restorative materials used in primary teeth.

REVIEW OF LITERATURE

Isabela Albuquerque Passos et al (2010) determined the pH and sucrose concentrations (SC) of pediatric liquid drugs of long-term use by children in order to evaluate the potential risk for dental caries and dental erosion. After assessing the pH, they analyzed 71 aqueous medicine samples for sucrose by the Lane–Eynon general volumetric method. The pH and SC values were calculated according to therapeutic action. It was concluded that the pediatric medicines studied have a high SC and low pH, which vary according to therapeuticclass, daily dose, and brand. Caution about dental

caries, dental erosion, and systemic diseases such as diabetes mellitus is warranted when these medicines are ingested frequently [6]

Ana Carolina Valinoti et al (2008) evaluated the effects of acidic medicine under pH-cycling conditions, on the surface degradation of four composite resins. The specimens were finished and polished with aluminum oxide discs, and the surface roughness was measured by using a profilometer. In conclusion, although the roughness was slightly affected, the pH-cycling and acidic medicines caused surface degradation of the composite resins evaluated.Titratable acidity seemed to play a more crucial role on surface degradation of composite resins than pH [7].

Eduardo Moreira da Silva et al (2008) analyzed the relationship between the solubility and salivary sorption of a hybrid (Filtek P 60) and a nanofilled resin composite (Filtek Supreme), and evaluated the influence of the light-activation mode on these properties. Two light-activation modes were used: Conventional(C; 850mW/cm2 for 20 s) and Soft-start (SS; 100-1,000 mW/cm2 for 10 s + 1,000 mW/cm2 for 10 s). The DC (%) was evaluated by FT-Raman spectroscopy. The solubility and salivary sorption were measured after immersion in artificial saliva for 7 days. Findings suggested that nanofilled composites may present higher degradation in the oral environment than hybrid ones. Soft-start light-activation mode may increase the solubility of resin composites[8].

Mali et al (2006) conducted a study with the aim of evaluating and comparing the microleakage of glass ionomer, composite resin and composers. Class V cavities were made in thirty intact caries free premolars and restored with restorative materials to be tested respectively. The teeth were thermo cycled and subjected to silver nitrate dye penetration. They were subsequently sectioned buccolingually. Micro leakage was evaluated under a stereomicroscope and data subjected to statistical analysis. The study concluded that micro leakage was evident in all restorative materials, with glass ionomer showing maximum leakage followed by composite resin. Compomer demonstrated the best results with minimum leakage [9].

MATERIALS AND METHOD

Commonly used pediatric drugs such as Moxclav (Ranbaxy),Asthalin (CIPLA) ,Paracetamol (CITADEL) will be used for this study. The commonly used restorative materials like Glass Ionomer Cement (FUJI) and Composite resin (3M) will be used to check their solubility and microleakage.

SOLUBILITY OF RESTORATIVE MATERIALS

40 disc shaped specimens (1 mm thick and 6 mm in diameter) will be fabricated using a teflon mold. Twenty discs will be prepared for each study material. Discs will be placed in dessicator containing fresh dried silica gel and then transferred to an oven at 37 degree to remove the excess moisture. After 24 hours the discs will be repeatedly weighed until a constant mass is obtained ($\mathbf{m_1}$).

The discs will be then immersed in artificial saliva and pediatric drugs, at 37 degree for 7 days. They will be then washed in distilled water, dried at room temperature for 15 min and will be weighed again to get the final mass of the material on the disc ($\mathbf{m_2}$). The thickness and diameter of the discs will be measured at four points with a digital caliper and the volume (v) will be calculated in mm^3. The values of solubility (SL) will be obtained using the following equation.

$$\mathbf{SL} = \frac{\mathbf{m_1 - m_2}}{\mathbf{v}}$$

MICROLEAKAGE OF RESTORATIVE MATERIALS

40 extracted teeth with exfoliative mobility which are free of caries and restoration, will be selected, cleaned and stored in normal saline, at room temperature. On each tooth, two class V cavities will be prepared one on buccal and other on lingual side, of standard size 3×2×2 mm, 1.5 mm occlusally from CEJ using a round /straight fissure/inverted cone diamond points of an airotor hand piece(NSK,Japan) under constant water spray. The prepared cavity will be cleaned thoroughly with water and dried gently and will be divided into two groups. One group for composite restorations and other for glassionomer restorations. It will be then stored in distilled water for 24hrsafter which

they will be placed in separate test tubes each containing different pediatric drugs and then will be thermocycled at 500 cycle for 8 hours. Subsequently the samples will be coated completely with nail varnish leaving 2 mm of restorative margins around the restorations. The samples will then be placed in 2% methylene blue dye for 24 hrs at room temperature. Each crown would then be sectioned buccolingually using diamond cutting discs mounted on a slow speed straight handpiece under water coolant .The specimens will then be examined under a stereomicroscope under 16× magnification to measure the depth of dye penetration . The following criteria will be followed to score dye penetration

0-no penetration

1-leakage less than half or equal to gingival or occlusal wall

2-leakage more than half of gingival or occlusal wall and up to the axial wall

3-leakage along the axial wall [9].

RESULT

Results would be based on analysis of data obtained in the study. The statistical analysis of the data would be done using SPSS software.

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MINDS/PG-ETHICAL/11/2017-18 Date:26.10.2017

ETHICAL CLEARANCE CERTIFICATE

Dissertation Topic :- Effect Of Pediatric Drugs On Solubility And Microleakage Of Restorative Materials Used In Primary Teeth

Nature of Project :- Masters of Dental Surgery

Student Name :- DR.MRIDHUL M U

Guide Name :- Dr.Ambili Ayilliath

On behalf of the Mahe Institute of Dental Sciences & Hospital, Mahe, U.T.of Puducherry, Ethical Committee, hereby give ethical approval in respect of undertakings contained in the above mentioned Research work. The Researcher Student may therefore commence with the research work as from the date of this certificate, using the reference number indicated above.

Dr.Babu Raveendran,
Chairman

Dr.Anil Melath
Principal

CONSENT LETTER OF SUBJECTS

I have no objection in my childs extracted tooth being used as part of the study entitled **Effect of pediatric drugs on solubility and microleakage of restorative materials used in primary teeth.** I understand that my child's identity will not be disclosed to any one without my permission and the data collected will be utilized only for research for the benefit of the patients. I have the right to withdraw from the study at any moment and the data so far collected will be utilized only with my permission.

Note: The consent letter will be printed in English as well as in the language of the subjects. If the subject is illiterate, it will be read by one of the close relatives of the subject and will be signed and/or Thumb impressed by both of them.

Signature/ Thumb impression of the subjects

Name

Signature of the relative

Name and relation

രക്ഷിതാവിന്റെ സമ്മതപത്രം

എന്റെ മകൻ / മകൾ---------- " EFFECT OF PEDIATRIC DRUGS ON SOLUBILITY AND MICROLEAKAGE OF RESTORATIVE MATERIALS USED IN PRIMARY TEETH''

എന്ന പ്രസ്തുത പഠനത്തിന്റെ ഭാഗമാവുന്നതിൽ എനിക്ക് യാതൊരു വിധ എതിർപ്പും ഇല്ലെന്നും, എന്റെ മകൻ / മകളുടേയോ പേരോ മേൽവിലാസമോ വെളിപ്പെടുത്തുക ഇല്ലെന്നും, ഈപഠനത്തിൽനിന്നും ശേഖരിക്കുന്ന വിവരങ്ങൾ ദുരുപയോഗം ചെയ്യില്ലെന്നും, ഈ പഠനത്തിൽനിന്നും എപ്പോൾ വേണമെങ്കിലും പിൻമാറാനുള്ള അവകാശമുണ്ടെന്നും, പഠനവിവരങ്ങൾ എന്റെ അനുവാദത്തോടുകൂടിയേ ഉപയോഗിക്കുകയുള്ളൂ എന്നും ഞാൻ മനസ്സിലാക്കുന്നു.

കുറിപ്പ് : രക്ഷിതാവിന്റെ സമ്മതപത്രം ഇംഗ്ലീഷിലും മലയാളത്തിലും അച്ചടിക്കുന്നതാണ്. പങ്കെടുക്കുന്ന ആൾ നിരക്ഷരനാണെങ്കിൽ അവരുടെ സാന്നിദ്ധ്യത്തിൽ അടുത്ത ബന്ധു വായിച്ച് കേൾപ്പിക്കുന്നതായിരിക്കും.

രക്ഷിതാവിന്റെ ഒപ്പ് / കൈവിരലടയാളം :

രക്ഷിതാവിന്റെ പേര് :

ബന്ധുവിന്റെ ഒപ്പ് / കൈവിരലടയാളം :

ബന്ധുവിന്റെ പേരും ബന്ധവും :

PONDICHERRY UNIVERSITY

MAHE INSTITUTE OF DENTAL SCIENCES AND HOSPITAL

DEPARTMENT OF PEDODONTICS AND PREVENTIVE DENTISTRY

PROFORMA OF THESIS SUBMITTED IN PARTIAL FULFILLMENT FOR

DEGREE OF MASTER OF DENTAL SURGERY IN PEDODONTICS AND PREVENTIVE DENTISTRY

CEPHALOMETRIC EVALUATION OF THE PRE – TREATMENT AND POST -TREATMENT CHANGES AFTER THE CORRECTION OF CLASS II DIVISION I MALOCCLUSION WITH TWIN BLOCK APPLIANCE IN MIXED DENTITION

BY

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INTRODUCTION

Twin block appliance is a functional jaw orthopedic appliance developed by Scottish Orthodontist William Clark in the year 1977[1].The twin block appliance is composed of maxillary and mandibular retainers that fit tightly against the teeth, alveolus and adjacent supporting structures. This appliance consists of upper and lower blocks with occlusal inclined planes that interlock at a 70^0 angle and guide the mandible forwards and downwards. Twin block appliance is the most common appliance used in the treatment of class II malocclusions. It is considered that the twin block is better tolerated by patients than all the appliances, for the treatment of developing class II malocclusion [2].A high percentage of child patients present with Class II malocclusion, and the search is still on for the most effective means of modifying maxillary or mandibular growth preferentially, in class II malocclusion. Previous clinical studies have shown that the functional appliances have been indicated with varying degree of success in achieving skeletal correction in developing malocclusions [3]. Very little has been reported in scientific literature, however with regard to the effectiveness of the widely used twin block functional appliance in mixed dentition and the skeletal, dental, and soft tissue changes it brings about in children.

Physical attractiveness plays a vital role in social interaction and dealing with people in society. The face is the first structure to be noticed and people with well- proportioned and attractive faces are perceived as being more outgoing, friendly, and socially competent, optimistic, intelligent and confident. No study has yet been done in children of Mahe, who were treated with twin block therapy

AIM AND OBJECTIVES

1. To evaluate thepre-treatment and post- treatment cephalometrical records, on the dental, skeletal, and soft tissue and incisor relationship, with twin block functional appliance, in class II malocclusion patients, in and around Mahe,U.T of Pondicherry.
2. To compare the dental, skeletal and soft tissue points, in pre-treatment and post treatment cephalograms, in these children.

REVIEW OF LITERATURE

Ehsani et al (2015) conducted a study on the effect of short term treatment produced by twin block appliance. They concluded that proclination of lower incisors, retroclination of upper incisors; distal movement of upper molars and/or mesial movement of lower molars, increase in mandibular length, and/or forward movement of the mandible were consistently seen with the twin block therapy. Clinically, significant restraint of maxillary growth was not found. Although the mandibular body length is increased, the facial impact of it is reduced by the simultaneous increment of the facial height[4]

Trenouth et al (2012) conducted a study on a randomized clinical trial of two alternative designs of twin block appliance and they concluded that there was a statistically significant change in the ANB angle[5]

Mills CM et al (2000) conducted a study on post treatment changes after the successful correction of class II malocclusion with twin block appliance and they found that, in the post treatment phase, the change in mandibular unit length for the twin block group was 6.0 mm, over a 36-month period. There was a slight reduction in mandibular growth rate after treatment, much of the significant increase in mandibular length achieved during the active phase was still present 3 years later when the subjects had matured into the permanent dentition stage[6]

Parkin NA et al (2001) in their study on comparison of two modifications of twin block appliance in matched class II samples, the results demonstrated that the addition of headgear to the appliance resulted in effective vertical and sagittal control of the maxillary complex and thus maximized the class II skeletal correction[7]

Sidlauskas (2005) conducted a study on effect of twinblock appliance in treatment of skeletal and dentoalveolar changes in class II div 1 malocclusion and found clinically significant increases in mandibular length (net effect 2.3 mm) and reduced the over jet (net effect 4.9 mm). Modification of the twin block appliance by acrylic extension to cover the edges of lower incisors reduced the dentoalveolar tipping and maximized the skeletal changes[8]

MATERIALS AND METHODS

After getting clearance from the Ethical Committee of Mahe Institute of Dental Sciences and Hospital, Mahe the study would be conducted in the Department of Pedodontics with Preventive Dentistry. Among the patients referred to the Pediatric Department of our college, this study would be conducted on 20 class II patients, in mixed dentition period, who have been treated with twin block therapy.

Each patient who meets the following criteria would be chosen for the study.

1) Skeletal class II malocclusion

2) Full cusp class II molar relationship

3) An angle of ANB of 5^0 or greater at the start of treatment.

INCLUSION CRITERIA

- Skeletal class II relationship measured on cephalometric radiograph.
- Patients having Class II canine and molar relationship.
- Over jet>5 mm
- Children from whom parental consent can be obtained
- Children who are healthy and do not have any systemic diseases

EXCLUSION CRITERIA

- Medically compromised patients, physically /mentally challenged patients will be excluded.
- Patients who have severe maxillary prognathism/mandibular deficiency which needs surgical intervention.

DESIGN OF TWIN BLOCK

The twin block appliance used for treatment consists of maxillary and mandibular removable acrylic plates retained with 0.8mm Adams clasps on the first permanent molars. A passive maxillary labial bow is present to aid anterior retention and to retrocline maxillary incisors, if they are proclined.The mandibular acrylic plate has 0.9mm ball clasps on the mandibular incisor interproximal areas.

All patients were instructed to wear the appliance 24 hours per day. The pre-treatment cepalometric head films for the group will be taken using standard cephalometric x ray equipment (T1) .The length of the time required to achieve a class I molar relationship would be assessed. Appointments during twin block phase will be scheduled at intervals of 8 weeks. Lateral head films would be obtained again at the post treatment follow up stage (T2). T1 and T2 cephalometric head films will be traced and analyzed by one of the authors manually and digitally. A number of skeletal and dental and soft tissue points would be selected to determine the craniofacial pattern, post treatment.T1(pre) and T2(post) cephalograms taken using standard cephalometric x ray equipment would be used for the analysis. Main skeletal variables that would be compared would include ANB, and GoGn-SN. Dentoalveolar variables include U1-SN, and IMPA. Soft tissue variable compared include 'z' angle.

RESULT

Results would be obtained by comparing the skeletal, dental, and soft tissue values between the groups. Statistical analysis would be done using SPSS software.

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MINDS/PG-ETHICAL/10/2017-18 Date:26.10.2017

ETHICAL CLEARANCE CERTIFICATE

Dissertation Topic :- Cephalometric Evaluation Of The Pre – Treatment And Post Treatment Changes After The Correction Of Class II Division I Malocclusion With Twin Block Appliance In Mixed Dentition.

Nature of Project :- Masters of Dental Surgery

Student Name :- DR.BIMAL RAG B R

Guide Name :- Dr.Rajamani T

On behalf of the Mahe Institute of Dental Sciences & Hospital, Mahe, U.T.of Puducherry, Ethical Committee, hereby give ethical approval in respect of undertakings contained in the above mentioned Research work. The Researcher Student may therefore commence with the research work as from the date of this certificate, using the reference number indicated above.

Dr.Babu Raveendran,
Chairman

Dr.Anil Melath
Principal

REQUEST FOR PARTICIPATION

I, Dr.Bimalrag.B.R. request you to be kind enough to allow your child to volunteer as a subject in the research project entitled CEPHALOMETRIC EVALUATION OF PRE-TREATMENT AND POST-TREATMENT CHANGES AFTER THE CORRECTION OF CLASS II DIVISION I MALOCCLUSION WITH TWIN BLOCK APPLIANCE IN MIXED DENTITION under the joint supervision of Prof. (Dr.) Rajamani.T. No invasive procedure will be under taken on your child and no drugs will be given as a part of the study. Your child's identity will not be disclosed to any one without your permission and the data collected will be utilized only for academic purpose and research for the benefit of the patients. You have the right to withdraw from the study at any moment and the data so far collected will be utilized only with your permission.

Note:- The request letter will be printed in English as well as in the language of the subjects. If the subject is illiterate, it will be read by one of the close relatives of the subject in his presence.

Dr. Bimalrag.B.R.

(Investigator)

Prof (Dr.) Rajamani.T.

(Guide)

CONSENT LETTER OF SUBJECTS

I have no objection in my child participating in the study entitled "CEPHALOMETRIC EVALUATION OF PRE TREATMENT AND POST TREATMENT CHANGES AFTER THE CORRECTION OF CLASS II DIVISION I MALOCCLUSION WITH TWIN BLOCK APPLIANCE IN MIXED DENTITION''.I understand that my child's identity will not be disclosed to any one without my permission and the data collected will be utilized only for academic purpose and research for the benefit of the patients. I have the right to withdraw from the study at any moment and the data so far collected will be utilized only with my permission.

Note: The consent letter will be printed in English as well as in the language of the subjects. If the subject is illiterate, it will be read by one of the close relatives of the subject and will be signed and/or Thumb impressed by both of them.

Signature/ Thumb impression of the subjects

Name

Signature of the relative

Name and relation

പങ്കുചേരാനുള്ള അഭ്യർത്ഥന

ഡോക്ടർ ബിമൽരാഗ് എന്ന ഞാൻ " CEPHALOMETRIC EVALUATION OF THE PRE-TREATMENT AND POST TREATMENT CHANGES AFTER THE CORRECTION OF CLASS II DIVISION I MALOCCLUSION WITH TWIN BLOCK APPLIANCE IN MIXED DENTITION." എന്ന ആശയത്തിൽ എന്റെ പഠനത്തിന്റെ ഭാഗമായി താങ്കളുടെ കുട്ടി പങ്കുചേരണമെന്ന് വിനീതമായി അഭ്യർത്ഥിക്കുന്നു. പ്രൊഫ: ഡോ. രാജാമണിയുടെ കീഴിലായിരിക്കും ഈ പഠനം നടക്കുക. താങ്കളുടെ കുട്ടിക്ക് ഈ പഠനം കൊണ്ട് യാതൊരു ബുദ്ധിമുട്ടും ഉണ്ടായിരിക്കുകയില്ല എന്ന് ഞങ്ങൾ ഉറപ്പ് തരുന്നു. രണ്ട് എക്സ് -റേ മാത്രമായിരിക്കും ഞാൻ താങ്കളുടെ കുട്ടിയിൽ നിന്നും ശേഖരിക്കുക. താങ്കളുടെ സമ്മതമില്ലാതെ ഈ വിവരങ്ങൾ ആരുമായും കൈമാറുകയോ, ചർച്ചചെയ്യുകയോ ഇല്ല. പഠനസംബന്ധമായ ആവശ്യങ്ങൾക്ക് മാത്രമേ അത് ഉപയോഗിക്കുകയുള്ളൂ. ഏത് നിമിഷവും ഈ പഠനത്തിൽനിന്നും താങ്കൾക്ക് പിൻമാറാവുന്നതാണ്. അതുവരെ ശേഖരിച്ച വിവരങ്ങൾ താങ്കളുടെ സമ്മതത്തോടെ മാത്രമേ ഉപയോഗിക്കുകയുള്ളൂ.

കുറിപ്പ് : രക്ഷിതാവിന്റെ സമ്മതപത്രം ഇംഗ്ലീഷിലും മലയാളത്തിലും അച്ചടിക്കുന്നതാണ്. പങ്കെടുക്കുന്ന ആൾ നിരക്ഷരനാണെങ്കിൽ അവരുടെ സാന്നിദ്ധ്യത്തിൽ അടുത്ത ബന്ധുവായിച്ച് കേൾപ്പിക്കുന്നതായിരിക്കും

ഡോ: ബിമൽരാഗ്

(ഇൻവെസ്റ്റിഗേറ്റർ)

പ്രൊഫ. ഡോ.രാജാമണി

(ഗൈഡ്)

രക്ഷിതാവിന്റെ സമ്മതപത്രം

എന്റെ മകൻ / മകൾ---------- " CEPHALOMETRIC EVALUATION OF THE PRE-TREATMENT AND POST TREATMENT CHANGES AFTER THE CORRECTION OF CLASS II DIVISION I MALOCCLUSION WITH TWIN BLOCK APPLIANCE IN MIXED DENTITION ''

എന്ന പ്രസ്തുത പഠനത്തിന്റെ ഭാഗമാവുന്നതിൽ എനിക്ക് യാതൊരു വിധ എതിർപ്പും ഇല്ലെന്നും, എന്റെ മകൻ / മകളുടേയോ പേരോ മേൽവിലാസമോ വെളിപ്പെടുത്തുക ഇല്ലെന്നും, ഈപഠനത്തിൽനിന്നും ശേഖരിക്കുന്ന വിവരങ്ങൾ ദുരുപയോഗം ചെയ്യില്ലെന്നും, ഈ പഠനത്തിൽനിന്നും എപ്പോൾ വേണമെങ്കിലും പിൻമാറാനുള്ള അവകാശമുണ്ടെന്നും, പഠനവിവരങ്ങൾ എന്റെ അനുവാദത്തോടുകൂടിയേ ഉപയോഗിക്കുകയുള്ളൂ എന്നും ഞാൻ മനസ്സിലാക്കുന്നു.

കുറിപ്പ് : രക്ഷിതാവിന്റെ സമ്മതപത്രം ഇംഗ്ലീഷിലും മലയാളത്തിലും അച്ചടിക്കുന്നതാണ്. പങ്കെടുക്കുന്ന ആൾ നിരക്ഷരനാണെങ്കിൽ അവരുടെ സാന്നിദ്ധ്യത്തിൽ അടുത്ത ബന്ധു വായിച്ച് കേൾപ്പിക്കുന്നതായിരിക്കും.

രക്ഷിതാവിന്റെ ഒപ്പ് / കൈവിരലടയാളം :

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MAHE INSTITUTE OF DENTAL SCIENCES AND HOSPITAL

DEPARTMENT OF PERIODONTICS

PROFORMA OF THESIS SUBMITTED IN PARTIAL FULFILLMENT FOR DEGREE OF MASTER OF DENTAL SURGERY IN PERIODONTICS

"COMPARATIVE EVALUATION OF CLINICAL CHANGES AND MICROBIAL FLORA ASSOCIATED WITH USAGE OF MOUTH WASHES CONTAINING GREEN TEA, CHLORHEXIDINE (0.2%) AND ESSENTIAL OILS IN PATIENTS UNDERGOING ORTHODONTIC THERAPY"

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INTRODUCTION

Periodontal disease results from a complex interplay between the subgingival biofilm and host immune inflammatory events that develop in the gingival and periodontal tissues in response to the challenge presented by the bacteria.[1]Various chemical agents have been advocated for the prevention of dental plaque which are either available as dentifrices or in the form of mouth wash.[2]

The ability of essential oil mouth wash to reduce plaque can be attributed to its broad antimicrobial range, its ability to penetrate plaque and kill the bacteria inside the biofilm.

Chlorhexidine is regarded as the gold standard for the prevention of the dental plaque and is associated with certain side effects. Hence there is a need for a naturally occuring indigenous and cost effective oral hygiene aid. Green tea (*camellia sinesis*) is a powerful antioxidant and has anti-inflammatory properties.[3]

Orthodontic brackets, wires and bands provide favorable sites for biofilm formation. Oral hygiene measures with adequate tooth brushing and adjunctive use of mouthwashes may be required for effective plaque control in patients undergoing orthodontic treatment.

AIM OF THE STUDY

To evaluate and compare the antimicrobial potential of mouth washes containing Green tea, Chlorhexidine (0.2%) and Essential oil in patients undergoing orthodontic therapy.

OBJECTIVE OF THE STUDY

1. To evaluate the clinical changes before and after the use of Green tea, Chlorhexidine (0.2%) and Essential oil mouth washes in patients undergoing orthodontic therapy
2. To evaluate the antimicrobial properties of the three mouthwashes in patients undergoing orthodontic therapy.
3. To compare the clinical changes and antimicrobial properties of the three mouthwashes in patients undergoing orthodontic therapy.

HYPOTHESIS

- Null Hypothesis : There is no significant difference between the clinical and antimicrobial properties of Green tea, Chlorhexidine (0.2%) and Essential oil mouth washes in patients undergoing orthodontic therapy.
- Alternate hypothesis : There is a significant difference between the clinical and antimicrobial properties of Green tea, Chlorhexidine (0.2%) and Essential oil mouth washes in patients undergoing orthodontic therapy.

REVIEW OF LITERATURE

1. **Awadalla et al. [4] 2011**, studied the effect of 2% green tea on oral health in 25 subjects and showed marked reduction in gingival bleeding and inhibition of salivary and plaque streptococcus mutans growth by preserving the plaque pH towards neutrality.

2. **Sriparna et al. [2] 2015**,conducted a study to evaluate the effects of commercially available green tea mouth wash with listerine and chlorhexidine mouth washes in 48 patients with gingivitis and showed that green tea was equally effective in reducing periodontal indices as chlorhexidine and can be used as effective antiplaque agent that is comparable to chlorhexidine

3. **Priya et al. [5]2015,**compared chlorhexidine and green tea mouth washes in the management of dental plaque induced gingivitis in 15 subjects and showed that there was a significant decrease in bleeding index in both the groups and green tea mouth wash resulted in statistically significant decrease in bleeding index compared to chlorhexidine group.

4. **Ramya et al. [6]2017,** conducted a study to compare the efficiency of green tea, listerine, and chlorhexidine mouth wash in 20 orthodontics patients undergoing fixed appliance therapy and concluded that the mean gingival and plaque index score was reduced in all three groups. However, green tea mouth wash was estimated to have the highest mean difference among three mouth washes.

5. **Kaur et al .[7] 2017** ,conducted a study to compare the antiplaque efficacy of green tea catechin mouth wash with 0.12% chlorhexidine gluconate in 30 participants., the plaque score were compared and the difference between the green tea catechin and chlorhexidine mouth wash was determined . The results showed that both green tea and chlorhexidine have comparable results in plaque reduction.

MATERIALS AND METHOD

Source of data

Out patients from Department of Orthodontics, Mahe Institute of Dental Sciences and Hospital, who are undergoing treatment will be selected for the study. Patient will be enrolled to the study after signing the informed consent.

INCLUSION CRITERIA

1. Subjects undergoing orthodontic treatment with fixed appliance of 0.22 slot MBT prescription.
2. Patients with minimal crowding.
3. Subjects with mild to moderate gingivitis.
4. Patients with minimum 20 teeth.
5. Systemically healthy patients.
6. Patients who had not undergone any periodontal therapy for past 6 months.

EXCLUSION CRITERIA

1. Pregnant and lactating women.
2. History of smoking and alcohol consumption.
3. Any history of antibiotic intake within last three months.
4. History of allergy to chemical or any herbal products.

METHODOLOGY

Sixty patients of age group 13-35 yrs with minimal crowding were selected for this study. Subjects with minimal crowding will be selected based on the Little's Irregularity Index score range up to 3. The gingival health status and presence of bleeding on probing will be assessed by Gingival index by Loe and Silness (1963) and Papillary bleeding index (PBI) by Muhleman and Saxer (1975) respectively. Plaque samples will be collected and send for microbiological analysis to estimate colony forming units.The subjects will receive complete oral prophylaxis initially.

The subjects are randomly allocated to one of the following group. Each group consist of 20 subjects. Group I : Green tea mouth wash (10ml to be rinsed for 30 seconds twice daily) , Group II : Chlorhexidine mouth wash(0.2%) (10ml to be rinsed for 30 seconds twice daily), Group III : Essential oil mouth wash (10ml to be rinsed for 30 seconds twice daily) .All participants will be asked to use orthodontic tooth brush during the study phase. After the 14th day and 21st day the subjects will be recalled and the gingival and bleeding indices will be recorded. Supra gingival plaque sample will be collected using a sterile jaquette scaler for microbiological analysis.

MARGINAL PLAQUE COLLECTION

Marginal plaque along the gingival margin will be collected from all the teeth present. The site is isolated from saliva by applying cotton rolls and will be gently dried with a three way syringe to avoid contamination.With the help of sterile jaquette scaler, marginal plaque samples are collected and are immediately transported to the laboratory in brain heart infusion broth as the transport medium and further microbial analysis will be done.

MICROBIOLOGICAL ANALYSIS

Samples are incubated in 37°C under aerobic conditions. Samples inoculated in to different medias (Blood agar, Chocolate agar, MacConkey agar) and incubated to 37°C under aerobic conditions. Then colony formations are counted by using colony counter.

STATISTICAL ANALYSIS

Data will be expressed in terms of mean and standard deviation. Comparison between the groups will be done using ANOVA with post hoc test or Kruskal Wallis test. Pair wise comparisons between the time points within each group will be done using Paired t –test or Wilcoxen sign rank test. $P<0.05$ will be considered significant.

RESULT

Result of the study will depend on the variation in clinical parameters assessed and also subjected to statistical analysis.

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MAHE INSTITUTE OF DENTAL SCIENCES

DEPARTMENT OF PERIODONTICS

CONSENT FORM

I.....P/o/G/o.....hereby give my consent to perform the dental procedure upon me/my ward . I declare that the entire procedure / study has been completely detailed to me and understand that the data collected will be used only for research and publication purpose of study entitled "COMPARITIVE EVALUATION OF CLINICAL CHANGES AND MICROBIAL FLORA ASSOCIATED WITH USAGE OF MOUTH WASHES CONTAINING GREEN TEA, CHLORHEXIDINE (0.2%) AND ESSENTIAL OILS IN PATIENTS UNDERGOING ORTHODONTIC THERAPY" by DR KRISHNA PRIYA under the guidance of DR ANIL MELATH. I agree to abide the rules and regulations of this hospital. I have signed this consent form without any pressure and in my full sense.

Date :

Signature/Thumb impression of the subject.

Signature of the Doctor.

സമ്മതപത്രം

ഞാൻ ..... രക്ഷിതാവ്/ രക്ഷാകർത്താവ്, എനിക്ക്/ എന്റെ മകനായ/ മകളായ / ബന്ധുവായ / ..... ദന്ത ചികിത്സ ചെയ്യുന്നതിന് പൂർണ്ണ സമ്മതമാണെന്നും, ഈ ചികിത്സാ രീതിയെക്കുറിച്ചുള്ള എല്ലാ വിശദ വിവരങ്ങളും ഡോക്ടർ എനിക്ക് ബോധ്യപ്പെടുത്തിത്തന്നിട്ടുണ്ടെന്നും, എന്നിൽ നിന്നും ശേഖരിച്ച വിവരങ്ങൾ ഡോക്ടർ അനിൽ മേലത്തിന്റെ മേൽ നോട്ടത്തിൽ പഠനം നടത്തുന്ന ഡോക്ടർ കൃഷ്ണപ്രിയയുടെ "കംപാറെറ്റീവ് ഇവാല്യുവേഷൻ ഓഫ് ക്ലിനിക്കൽ ചെയ്ഞ്ചസ് ആന്റ് മൈക്രോഫ്ളോറ അസോസിയേറ്റഡ് വിത്ത് യൂസേജ് ഓഫ് മൗത്ത് വാഷസ് കൺടെയിനിങ്ങ് ഗ്രീൻ ടീ, ക്ലോർ ഹെക്സിഡിൻ (0.2%) ആന്റ് എസ്സൻഷിയൽ ഓയിൽസ് ഇൻ പേഷിയൻസ് അണ്ടർ ഗോയിങ്ങ് ഓർത്തോഡോന്റിക്സ് തെറാഫി" എന്ന പഠനത്തിനും പ്രസിദ്ധീകരണത്തിനും മാത്രമാണ് വിനിയോഗിക്കുന്നതെന്നും ബോധ്യപ്പെട്ടിട്ടുണ്ട്.

ഞാൻ ഈ ഹോസ്പിറ്റലിന്റെ നിയമ-നടപടി ക്രമങ്ങൾ കൃത്യമായി പാലിക്കുമെന്നും സ്വന്തം ഇഷ്ട പ്രകാരവും പൂർണ്ണ ബോധ്യത്തോടെയുമാണ് ചികിത്സക്ക് തയ്യാറായതെന്നും ഇതിനാൽ സമ്മതിച്ചിരിക്കുന്നു.

സ്ഥലം പേര്

തീയ്യതി ഒപ്പ്

ഡോക്ടറുടെ ഒപ്പ്

MAHE INSTITUTE OF DENTAL SCIENCES

DEPARTMENT OF PERIODONTICS

PROFORMA

SL.NO:

Name: OP No:

Age: Date:

Sex: PhNo:

Occupation: Address:

Chief complaint:

History of presenting illness:

Medical history:

Drug history:

Past dental history:

GINGIVAL INDEX

18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38

Scoring:

INFERENCE

PAPILLARY BLEEDING INDEX

18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38

Scoring:

INFERENCE

LITTLE'S IRREGULARITY INDEX

0 : Perfect alignment

1-3: Minimal irregularity.

4-6: Moderate irregularity.

7-9: Severe irregularity.

10: Very severe irregularity.

MAHE INSTITUTE OF DENTAL SCIENCES & HOSPITAL

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MINDS/PG-ETHICAL/01/2017-18

Date:26.10.2017

ETHICAL CLEARANCE CERTIFICATE

Dissertation Topic :- Comparative Evaluation Of Clinical Changes And Microbial Flora Associated With Usage Of Mouth Washes Containing Green Tea, Chlorhexidine (0.2%) And Essential Oils In Patients Undergoing Orthodontic Therapy

Nature of Project :-Masters of Dental Surgery

Student Name :- DR.KRISHNA PRIYA.B

Guide Name :-Dr.Anil Melath

Co-Guide Name :-Dr.Subair.K

On behalf of the Mahe Institute of Dental Sciences & Hospital, Mahe, U.T.of Puducherry, Ethical Committee, hereby give ethical approval in respect of undertakings contained in the above mentioned Research work. The Researcher Student may therefore commence with the research work as from the date of this certificate, using the reference number indicated above.

Dr.Babu Raveendran,
Chairman

Dr.Anil Melath
Principal