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Ceramic Bracket with Herbal Dentifrices–Comparative Clinical and Microbiological study

Dr. Aseem Sharma[1], Dr. Sachin Upadhyay[1*], Dr. Neelam Chauhan[2], Dr. Deepak Phor[3], Dr. Gaurav Didhra[4], Dr. Mandeep Nain[5]

[1]Sr.Lecturer, Department of Orthodontics and Dentofacial Orthopaedics, Himachal Institute of Dental Sciences, Paonta Sahib, Himachal Pradesh, India
[2]Consultant Orthodontist at Kullu Smiles Dental, Laser and Cosmetic Clinic, NH-21, Inner Sarwari Bazar Rd, opposite State Bank of India, Sultanpur, Kullu, Himachal Pradesh 175101, India
[3]Sr, Lecturer, Department of Orthodontics and Dentofacial Orthopaedics, Yamuna Dental College, Yamunanagar, Haryana, India
[4]M.D.S. (Department of Periodontics and Implantology), Director at Dent-O-Care, Basdehra, Mehatpur, Himachal Pradesh 174315, India
[5]P.G. Student (Department of Prosthodontics), DAV Dental College, Yamunanagar, Haryana, India

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***Corresponding author**: Dr. Sachin Upadhyay

Abstract **Original Research Article**

Background: To ascertain if herbal dentifrices have an effect on Streptococcus mutans count in orthodontic patients with Ceramic brackets. ***Material and method:*** Patient had tooth No's 35 included in the study with Ceramic bracket bonded. Dentifrices tested was Herbal based. Conventional tooth paste was considered as control group. ***Result:*** Paired T test compared the means of Streptococcus mutans count around ceramic bracket at different time intervals. ***Conclusion:*** This shows ceramic bracket has statistically significant reduction of Streptococcus mutans with herbal toothpaste.

Keywords: Ceramic Bracket, Herbal, Streptococcus mutans.

INTRODUCTION

Streptococcus mutans is a potent initiator of caries because there are a variety of virulence factors unique to the bacterium and play an important role in caries initiation. Firstly, Streptococcus mutans is an anaerobic bacterium known to produce lactic acid as part of its metabolism. Secondly, there is the ability of Streptococcus mutans to bind to tooth surfaces in the presence of sucrose by the formation of water-insoluble glucans, a polysaccharide that aids in binding the bacterium to the tooth [1]. The most important virulence factor is the acidophilcity of Streptococcus mutans. Unlike the majority of oral microorganisms, Streptococcus mutans thrives under acidic conditions and becomes the dominant bacterium in cultures with permanently reduced pH [2]. Though, brushing teeth twice a day is considered reasonably effective in plaque and bacterial count reduction, the common prevalence of gingival inflammation in orthodontic patients often suggests inadequate oral hygiene procedures in most patients. As bacteria in dental plaque is one of the main factors causing periodontal inflammation; careful plaque control is very important .The extrinsic variables affecting the bacterial count (besides the confounding intrinsic host factors) may be considered to be the type of tooth brush used by the patient and the method of brushing, the effect of the dentifrice used and the quality and quantity of orthodontic attachments in the oral cavity. Neem (Azadirachtaindica) is a tropical evergreen tree native to India and is also found in other southeast countries. In India, neem is known as "the village pharmacy" because of its healing versatility, and it has been used in Ayurvedic medicine for more than 4,000 years due to its medicinal properties. Neem is also called 'arista' in Sanskrit- a word that means 'perfect, complete and imperishable'. The seeds bark and leaves contain compounds with proven antibiotic, antiseptic, antiviral, antipyretic, anti-inflammatory, anti-ulcer and antifungal uses [4]. Hence, this study of microbiological assay of Streptococcus mutans with an objective to study the performance and measure the efficacy of toothpastes- Neem, Meswak, Babool and Pomegranate based herbal toothpaste with ceramic Bracket is done.

AIM AND OBJECTIVES

To ascertain if herbal dentifrices have an effect on Streptococcus mutans count in orthodontic patients with ceramic brackets.

MATERIAL AND METHOD

Nature of Study

Randomized, prospective, cross sectional single blinded microbiological assay study with each patient acting his /her own control in this study.

Area of Study

Department of Orthodontics and Dentofacial Orthopedics, Divya Jyoti College of Dental Sciences and Research and Microbiological Assay was conducted in Divya Jyoti Hospital.

Ethical Clearance

This study was approved by Institutional Committee (IEC No DJD/IEC/2014/A-001). A written consent was taken from each participating subject.

Inclusion Criteria

- Patient with similar socioeconomic strata & common food habits.
- Patients free of oral/parental antibiotics for one month.
- No periodontal & systemic disorders
- Patients with no crowding and who have had alignment and leveling completed.

Dentifrices

S. No	Details	Code
1	**Himalaya Herbals Dentifrice** (Himalaya Global Holding Ltd.) Containing Neem, Meswak Babool and Pomegranate	**Y (Blue)**

Bracket Type

S. No	Bracket type
1	**CeramicBracket (Monocrystalline)** [Radiance 0.22 slot (Rhomboidal) MBT American Orthodontics]

Ceramic Bracket

Steps and Time Interval of Study

- Each group consists of 30 teeth with 30 brackets to be tested.
- Each patient served as his/her own control as 1 types of bracket were tested in the same mouth at the same time period.
- Each patient had tooth No's 35 included in the study with ceramic bracket bonded.
- Dentifrices tested was Herbal based.
- The dentifrices were dispensed into 5ml bottles coded as **Y** for Herbal toothpaste – Neem, Babool, Meswak and Pomegranate. Color Coding of Dentifrices
- Conventional tooth paste was considered as control group.

S. No	N	Type	Bracket Bonded on Tooth Number
I	30	**Ceramic** Rhomboidal MBT	35

CODES	COLOR	DENTIFRICES
Y	White	**Herbal Based Toothpaste** (Herbal Global Holding Ltd Toothpaste)

Ice Box
Plaque Collection and Transportation

Plaque Collection and Transportation

- Plaque sample placed in 5ml sterilized vials with1ml distill water.
- Sterilized vials were transported in icebox to the lab.
- The bacteriological study was conducted by Dilution Plating Method.
- The growth media used was Mutans-Sanguis Agar.

Oral Hygiene Instructions

- The subjects were given oral hygiene instructions & requested to refrain from using any other oral hygiene products like mouthwash etc.
- The subjects were instructed to follow standard oral hygiene regime which included brushing twice a day with toothpaste as prescribed in the study regime.
- The patients were advised to rinse thoroughly after every meal.

Table Shows: Time Interval of Tooth Paste Usage

TOOTHPASTE	TIME INTERVAL
Baseline without use of study Dentifrices	1st to 2nd Day
Herbal (Y)	3rd to 8 th Day

Table Shows: Time Interval of Plaque Collection

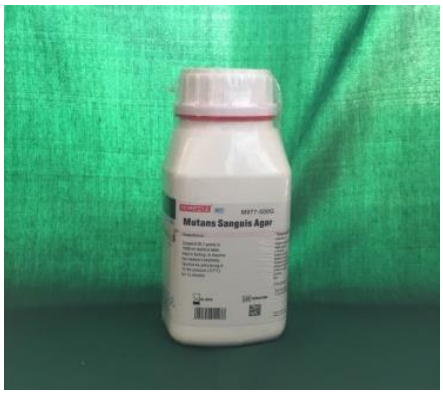
Sample Count	Time Interval	Day Count
Sample **No.1** (baseline without use of study dentifrices)	**(T_1)** (Start of study)	Day : **1**
Sample **No.2**	**T_2**	Day : **3**
Sample **No.3**	**T_3**	Day : **8**

Plaque Collection Method

- Patients were requested to refrain from eating or drinking 1 hour prior to sample collection.
- Plaque sample was collected by Four Pass Technique at midmorning (11 a.m.).
- In this technique the explorer tip is moved around the circumference of the bracket at the bracket tooth interface.
- Four passes, along the tooth at the bracket interface at the gingival, mesial, distal, and occlusal aspects are done to avoid overloading the instrument tip.
- This is considered an effective method of obtaining the total plaque .Plaque samples were placed in sterilized vials having distilled water in it.

Laboratory Equipment's

Hot Plate



Mutans Sanguis Agar

Laminar Air Flow

Distilled Water

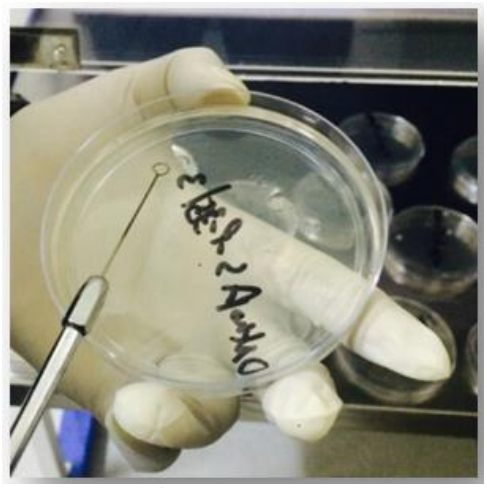
Wire Loop

Micropipette

Sterilization of Diluted Agar Medium in Autoclave

Petridishes Placed Inside Incubator

Solidification of Agar Medium in Laminar Air Flow



Spreading of Plaque Sample over Petridish

Incubator

S. No	Item
1	Autoclave
2	Hotplate
3	Petridish
4	Micropipette
5	Laminar flow Cabinet
6	Conical flask
7	Cotton Plug
8	Sterilized Wire loop
9	Incubator
10	Disposable gloves
11	U shape flask
12	Disposable Mouth mask

RESULT

Days	Mean difference	T	d.f.	P value
Day 1-Day 3	0.16667	1.223	29	0.231*
Day 3-Day 8	0.70000	5.114	29	0.000***

***Highly Significant p <0.001, **Significant p < 0.05,*Not Significant p >0.05

Table Shows: Comparison of Means of Streptococcus mutans Count at Different Time Intervals around Ceramic Bracket by Paired T – Test.

- Paired T test compared the means of Streptococcus mutans count around Ceramic bracket at different time intervals.
- Difference between Day 3 & Day 8 with herbal dentifrice was highly significant statistically
- Difference between Day 1 & Day 3 was not significant.
- The mean difference between Day 3 & Day 8 is 0.70000.

DISCUSSION

The increased time and difficulty of maintaining good oral hygiene during orthodontic treatment are challenges faced by patients and the levels of oral bacteria have been reported to increase five folds due to the orthodontic devices and attachments [1]. Emilson CG [7] stated that most orthodontic patients are not able to perform effective plaque control, and therefore develop mild to moderate gingivitis during treatment with fixed appliances. Microorganisms play a major role in causation of WSL and dental caries. Entire removal of microorganism from the oral cavity is difficult but their count can be reduced with the help of various preventive measures so that it becomes less cariogenic. The market is flooded with numerous bracket types of different biomaterials. Literature evidences that adherence of plaque to the fixed appliance is largely contributed by the bracket material [2] as it could play a role in the degree of bacterial adhesion and plaque accumulation as well as in the risk of development of WSL. The initial affinity of bacteria to solid surfaces is due mostly to electrostatic and

hydrophobic interactions. Surfaces with high surface free energy more easily attract bacteria such as S.mutans [3]. Currently Self Ligating Brackets are being driven by manufacturers as having a hygiene advantage, while many studies have reported in the contrary [5]. The results of the current research study showed significant reduction around ceramic bracket with herbal toothpaste. The value of current study suggests that herbal dentifrices have good antimicrobial effects on caries producing bacteria, thus can be used in orthodontic patients and as a regular home care preventive aid in combating dental caries. Simultaneously, the world of cleansing agents has also widened and a fresh interest in 'organic plant based products is on the rise as alternative medicine is widely propagated and practiced. Numerous companies are manufacturing herbal dentifrices with neem, meswak, babool, pomegranate, essential oils and others in varying combinations or stand alone. Studies have shown that these agents act by competitively inhibiting the pathogenic bacteria because they have greater adhesion to the tissues and thus have a beneficial effect on oral health. Neem leaves extract exhibited antibacterial effect towards Streptococcus mutans and different concentration of neem leaves extract influenced the inhibition of Streptococcusmutans [9].

CONCLUSION

This shows Ceramic bracket has statistically significant reduction of Streptococcus mutans with herbal toothpaste.

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