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Stainless Steel Bracket with Herbal Dentifrices – Comparative Clinical and Microbiological study

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Abstract **Original Research Article**

Background: To ascertain if herbal dentifrices have an effect on Streptococcus mutans count in orthodontic patients with Stainless steel bracket. ***Material And Method:*** patient had tooth No's 12 included in the study with Stainless steel 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 stainless steel bracket at different time intervals. ***Conclusion:*** This shows Stainless steel bracket has statistically significant reduction of Streptococcus mutans with herbal toothpaste.

Keywords: Stainless steel Bracket, Herbal, Streptococcus mutans.

INTRODUCTION

The orthodontist as the clinician is continuously challenged to curb and eliminate White Spot Lesions (WSL) in their patients during orthodontic treatment due to alterations in the oral flora and plaque accumulation leading to enamel decalcification. It is a well-known fact that control of microbial biofilm often prevents gingival/ periodontal inflammation and dental caries. Orthodontic patients are faced with the hazard of increased retention of food particles and plaque accumulation due to the presence of multiple attachments like brackets and other auxiliaries in the oral cavity forming encatchment areas for plaque. This results in oral ecological changes with low pH environment and increased proportions and absolute number of salivarymutans. Meswak Salvadorapersica (Meswak) is a medicinal herbal plant which has been used for centuries as oral hygiene tools .Chemical analysis of S. persicademonstrated the presence of many components exhibiting antimicrobial effect. Meswak (*Salvidorapersica*) contains salvadorine and trimethylamine, which are shown to exhibit anti-bacterial effects on cariogenic[3] bacteria such as *Streptococcus mutans*. It has been shown that these active principles support periodontal health, reduces the accumulation of biofilm-like dental plaque formation and exhibits fungistatic activity against *Candida albicans*[3].Meswak is available in two forms namely meswak sticks and meswak tooth paste. Natural herbal chewing sticks, popularly known as meswak or Sewak or Peelu Stick, are amongst the traditional dental hygiene aids common in India, the majority of the Arabian states, and many African regions. The World Health Organization (WHO) endorsed the usage of the meswak for its oral cleanliness features and scientific research therefore validating its anti-bacterial and plaque preventing qualities.

AIM AND OBJECTIVES

To ascertain if herbal dentifrices have an effect on Streptococcus mutans count in orthodontic patients with stainless steel 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	**Stainless Steel Bracket** [Mini Master series 0.22 slot (Rhomboidal) MBT American Orthodontics]

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 12 included in the study with stainless steel 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	**Stainless Steel** Rhomboidal MBT	12

CODES	COLOR	DENTIFRICES
Y	lue	**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

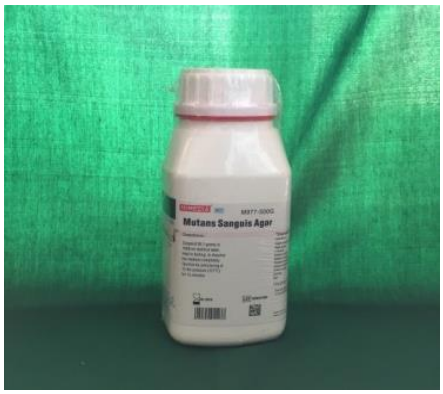
Sample Count	Time Interval	Day Count
Sample **No.1** (baseline without use of study dentifrices)	**(T_1)** (Start of study)	Day : **1**
Sample **No.2**	**T_2**	Day : **3**
Sample **No.3**	**T_3**	Day : **8**

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

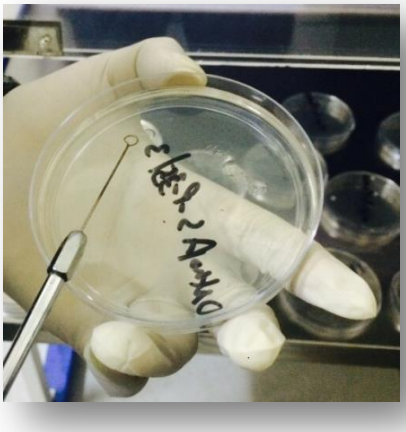
Wire Loop

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	1.153	29	0.258*
Day 3	-	Day 8	0.13333	1.278	29	0.211*

***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 Stainless Steel Bracket by Paired T – Test.

- Paired T test compared the means of Streptococcus mutans count around SS 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 statistically significant.
- The mean difference between Day 3 & Day 8 is 0.13333.

DISCUSSION

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 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. 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 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. The results of the current research study showed significant reduction around stainless steel 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.

CONCLUSION

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

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