

Comparison of Plaque Removal Efficacy of Modified Bass Technique and Charter's Technique in Orthodontic Patients

ANEELA SHABBIR¹, KAWISH SYED², AIMEN SAMREEN KHAN³, SYEDA LALARUKH SABA SHAH⁴, AHMED⁵, NAWAL NOOR⁶

^{1,5,6}Postgraduate Residents,

²Associate Professor, Department of Periodontology, Sardar Begum Dental College & Hospital, Ghandhara University, Peshawar

³Postgraduate Resident, Department of Dental materials, Ripah International Dental College, Islamabad

⁴Assistant Professor, Department of Community & Preventive Dentistry, Lahore Medical & Dental College, Lahore

Correspondence to Dr. Syeda Lalarukh Saba Shah, E-mail: lalarukhshah1@gmail.com, Cell: 0311-9111928

ABSTRACT

Aim: To compare the efficacy of modified bass technique and charters technique in plaque removal among orthodontic patients.

Study design: Single Blind Randomized control trial

Place and duration of study: Department of Periodontology, Sardar Begum Dental College Peshawar from 1st July 2022 to 31st December 2022.

Methodology: Forty six patients undergoing orthodontic treatment were enrolled. Patients were divided into two equal groups using lottery method. Group A used Modified Bass technique and Group B used Charter's brushing technique. Plaque scores were measured by principal investigator and were recorded on the Online Periodontal Chart of University of Berlin. Plaque score was recorded on all sides of the tooth in relation to bracket (mesial, distal, gingival, occlusal) using dental explorer after disclosing plaque by plaque disclosing tablet.

Results: There were 24 (52.2%) females and 22 (47.8%) males. The mean plaque score for Group A was 25.76 and for Group B was 27.64, with no statistical difference after the test was applied.

Conclusion: The modified Bass and Charters brushing techniques showed similar results in plaque removal efficacy. Scrubbing is the simplest and most often used cleaning procedure.

Keywords: Plaque, Fixed appliances, Brushing techniques, Efficacy

INTRODUCTION

Periodontal diseases and tooth decay with time have gained worldwide attention¹. The decayed tooth has affected more than 25% of the world population that is why it is considered to be the most prevalent disease². Periodontitis is one of the top seven most common diseases affecting the global population, affecting approximately 10% of the global population. These two main dental diseases have had a very significant impact on the global economic status, and according to a WHO survey, approximately 7-9% of the budget is allocated for improving dental health³. As a result, extra care must be taken to prevent the preceding dental diseases⁴.

The accumulation of dental plaque is recognized as a significant cause of periodontal disease and tooth caries⁵. Thus the thorough plaque removal is essential in the prevention of periodontal disease and tooth decay, especially in people who have the local agents in the oral cavity that contain and prove to be a major factor in harboring dental plaque⁶. The temporary and fixed orthodontics is one of them. Many intercessions, including chemical, mechanical and biological methods, have been used to effectively remove dental plaque⁷.

Tooth brushing and interdental aid fall under mechanical methods, which come in a variety of shapes and sizes⁸. Chemical cleaning (mouthwashes) and pastes are two chemical methods, although recent studies on some probiotics and vaccines are being conducted among the numerous methods⁹. It has been recognized by universal protocols that effective plaque removal is vital to prevent tooth caries and inflammatory diseases like gingivitis and periodontal disease¹⁰. The orthodontic element is the main concern in the accumulation of biofilms, which may lead to oral health issues¹¹.

The fixed dental orthodontic treatment can affect the microbial parameters by considerably raising the number of bacteria, which is only partly normalized 3 months after the removal of the orthodontic appliances¹². Among overall, professionals provide orthodontic patients with regular oral hygiene instructions (OHI), but the effectiveness of OHI may be restricted¹³. A significant aspect of encouraging orthodontic patients is the

selection of oral hygiene tools that best fulfil the needs of the individual¹⁴. These include electrical toothbrushes, orthodontic toothbrushes with various brush head designs, mouth rinses, dental floss and interproximal toothbrushes¹⁵. Tooth brushing methods to be used in orthodontic patients are charter's method, modified Stillman's, and modified bass method¹⁶.

It is likely that the scrubbing method is the simplest and most popular cleaning method¹⁷. The instructions for sulcular brushing are common for patients with periodontal disease, using vibrating movements to increase access to gingival areas. The most suggested method is the modified Bass method, which emphasizes the sulcular positioning of bristles¹⁸. Various brushing methods have been performed in patients with fixed orthodontic appliances, but no study on comparison between modified bass technique and charter technique has been undertaken so far. Due to the simplicity, convenience and adaptability of modified Bass tooth brushing technique, it would be ideal to advise this technique to patients with fixed braces if its effectiveness is proven in comparison to Charter's tooth brushing technique, the "scrubbing" is most likely the most basic and widely used cleaning method¹⁹. Another method is, Charter's technique specifies a soft/medium multi-tufted toothbrush. Bristles are placed at a 45-degree angle to the gingiva, with coronal directed bristles²⁰. Gentle vibratory movements activate the bristles, which end up lying between i.e., interproximally.

Various brushing methods have been tested in patients with fixed orthodontic appliances in previous studies, but no research comparing modified bass technique and charter technique has been conducted.

MATERIALS AND METHODS

The study was conducted at Sardar Begum Dental College and Hospital Peshawar. It was a single blind randomized controlled trial with two to three months of follow up. The sample was calculated by WHO calculator and 46 individuals were selected for sample collection. In which the sample was collected as non-probability convenient sampling technique. Twenty three (23 individuals) in each group with $\alpha=5$, 80% power of study, P_0 (test value of population proportion) = 0.45. P_a (anticipated value of population proportion). Keeping in view the losses during the study total number of patients taken will be 50, 25 in each group. Plaque

Received on 05-01-2023

Accepted on 07-03-2023

control record chart was used from Department of Periodontology, University of Bern Plaque score was assessed on all six sides of the tooth and recorded in plaque control chart. Total number of surfaces with plaque was divided by the total number of surfaces of tooth to get the mean value. Surfaces with plaque were indicated by blue and surfaces without plaque were indicated by white. Fully informed consent of the patients was taken from those who agree to participate in the study. A structured Performa was used to record the data. Patients were divided into two groups using lottery method. Group A: used Modified Bass technique. Group B: used Charter's technique. Patients between the ages 16 to 30 years, undergoing orthodontic treatment with 20 natural were included in the study. Patients with at least 20 natural teeth were included in the study. Patients with systemic disease, periodontal diseases, extensive dental restorations and dental fluorosis were excluded from the study. After approval from the Board of Advance Studies and Research (SBDC), patients who fulfilled the inclusion and exclusion criteria were recruited for the study. Data was collected from the department of Periodontology SBDC. Informed and written consent was taken from the patient. Patients were assigned randomly in two groups i.e. group A (Modified Bass Technique) was study group and group B (Charter's Technique) will be the control group by using lottery method. The independent dental investigator (colleague of principal investigator) guides the two techniques using verbal instructions and a demonstration on an orthodontic model. The Participants then asked to repeat the technique intra-orally and corrections in technique would be given to patients if necessary. The Plaque score, was recorded by using plaque disclosing tablets and measured by principal investigator (Online Periodontal Chart of University of Berlin). All patients were using the same tooth brushes (Colgate Medium Toothbrush) and same tooth pastes (Colgate Cavity Protection) use throughout the study. The clinical examination was carried out. Routine investigations were done by taking history and clinical examination. Plaque scoring was recorded on all sides of the tooth in relation to bracket (mesial, distal, gingival, occlusal) using dental explorer after disclosing plaque by plaque disclosing tablet. The explorer tip was rubbed on the surfaces of the tooth two times and will be checked for plaque after establishing that plaque is absent or

present findings will be recorded and gauze will be used to wipe the explorer tip clean proceeding to next 43 surfaces. Measurements will be taken at baseline (T₀) and after 1 month of follow up (T₁). Participant information including age and gender will be collected. To assess participant's adherence to technique instructions, self report on the technique used during the study will be collected at T₁. Mean plaque score will be calculated using silliness and lie plaque index, by dividing the sum of surfaces with plaque by total no of tooth surfaces. Final readings will be recorded after 1 month to compare it with baseline readings. Data was analyzed using SPSS=22.0. The independent t-test was applied to compare means of both groups. P value ≤ 0.05 was considered significant.

RESULTS

There were 24(52.2%) female and 22(47.8%) male with mean age was 23.45 (Table 1). There is no statistical difference between two brushing technique of plaque removal efficacy, mean plaque score for MBT was 25.76 and CBT was 27.64 (Table 2). Mean difference of both the techniques was 1.87 and there was no statistical difference between both the brushing technique and both were equally effective in plaque removal in orthodontic patients with fixed appliances after independent sample test has applied (Table 3)

Table 1: Demographic information of the patients (n=46)

Variable	No.	%
Gender		
Female	24	52.2
Male	22	47.8
Age (Years)		
16-23	22	47.8
24-31	24	52.2

Table 2: Comparison of plaque score in Modified Bass technique and Charter's brushing technique

Group	Mean \pm SD	P value
Modified Bass technique	25.76 \pm 8.74	0.251
Charter's brushing technique	27.64 \pm 6.37	

Table3: The mean difference between two brushing techniques, modified bass and charters

Plaque score	Levene's Test for Equality of Variances		t' test for equality of means			
	F	Level of Sig.	t-test	Df	Sig. (2-tailed)	Mean Difference
Equal variances assumed	0.435	0.513	-0.841	44.000	0.405	-1.878
Equal variances not Assumed			-0.819	35.901	0.418	-1.878

DISCUSSION

Oral hygiene is very important in orthodontic treatment procedures because poor oral hygiene leads to white spot lesions, caries, halitosis, gingival inflammation, plaque, calculus deposition and periodontal diseases. To achieve good oral hygiene tooth is important after placement of fixed orthodontic appliances for this purpose most effective tooth brushing technique is required to be practice to prevent the oral and tooth complications caused by poor oral hygiene. Nassar et al¹⁸ worked on scrub, MST and MBT brushing techniques. They follow up the patient for 9 month and divide the sample into 3 groups. They stated that modified bass method of tooth brushing was more effective as compare to the other two methods. In present study, mean difference of both the techniques was -1.87 and there was no statistical difference between both the brushing technique and both were equally effective in plaque reduction in orthodontic patients

A study conducted on three methods modified Stillman's modified bass and Ramfjord to evaluate the effectiveness of three methods in 30 patients with fixed orthodontic appliances from 14–22 years were included in the study. Plaque index, gingival index were selected to evaluate the three methods of plaque removal. Follow up were taken from 1-9 months. The study concluded that bass method is more effective for plaque reduction in patient with fixed appliances. Group 3 with using bass technique were 13.6%

effectiveness in plaque removal.¹⁸ In the present study both the modified bass and charters showed similar results in plaque removal efficacy in fixed orthodontic appliances, although we just checked plaque means. A study conducted by Nassar et al¹⁸ in which various brushing techniques were checked, including modified Stillman technique, Charter Brushing Technique and Scrub Brushing Technique, showed that Charter Brushing Technique was a significant reduction in plaque score. However, they didn't compare the same brushing techniques. In their study, there was a reduction in plaque scores and various indices. As in our study, the plaque score is reduced in both the brushing techniques. In our study, there is a reduction in the mean plaque score of the modified bass and charters method and no statistical difference which are approximately the same as a study conducted by Nassar et al¹⁸ published in the dental press of orthodontics in 2013 had the same results as like our study in which Bass technique was effective in the reduction of plaque and gingival index. As in our study, both groups showed plaque reduction. In our study, the mean and p-value showed that guided brushing technique causes a reduction in plaque scores which is similar to a study conducted in 2020 by Bok and Lee²¹ published in the Korean Academy of Preventive Dentistry showed the same type of recommendations as our study and recommended multiple

brushing techniques for oral hygiene in prosthodontic, orthodontic patients and general population.

A study conducted by "Ceyhan D" in Turkey²² among children showed that the horizontal scrub method was good when compared to the Fones method. Janakiram et al²³ conducted in 120 individuals age from 18 to 30 years the study showed that there was reduction in plaque practicing three brushing techniques, among three techniques modified bass technique was superior than other techniques but results of the study showed no difference between three techniques and there was no significant difference in plaque control between the three groups which is in accordance with the present study in which both brushing technique were equally effective with no statistical difference.

CONCLUSION

Both the modified Bass and Charters brushing techniques showed similar results in plaque removal efficacy. Statically there was no difference between modified and charter brushing technique. Scrubbing is most likely the simplest and most often used cleaning procedure. The effectiveness of both teeth cleaning procedure has been proven in controlled and uncontrolled research for orthodontic patients.

Recommendations: Both techniques should be given to patients having fixed orthodontic appliances, but as the duration of study was less and sample size was less, further studies should be conducted.

Conflict of interest: Nil

REFERENCES

- Inaba H, Amano A. Roles of oral bacteria in cardiovascular diseases - from molecular mechanisms to clinical cases: Implication of periodontal diseases in development of systemic diseases. *J Pharmacol Sci* 2010;113(2):103-9.
- Peres MA, Macpherson LM, Weyant RJ, Daly B, Venturelli R, Mathur MR, et al. Oral diseases: a global public health challenge. *Lancet* 2019; 394(10194):249-60.
- Frencken JE, Sharma P, Stenhouse L, Green D, Laverty D, Dietrich T. Global epidemiology of dental caries and severe periodontitis – a comprehensive review. *J Clin Periodontol* 2017; 44:S94-105.
- Jürgensen N, Petersen PE. Promoting oral health of children through schools - results from a WHO global survey 2012. *Community Dent Health* 2013;30(4):204-18.
- Gurenlian JR. The role of dental plaque biofilm in oral health. *American Dental Hygienists' Association* 2007;81(suppl 1):116.
- He XS, Shi WY. Oral microbiology: past, present and future. *Int J Oral Sci* 2009;1(2):47-58.
- Haque MM, Alsareii SA. A review of the therapeutic effects of using miswak (Salvadora Persica) on oral health. *Saudi Med J* 2015; 36(5):530.
- Sälzer S, Graetz C, Dörfer CE, Slot DE, Van der Weijden FA. Contemporary practices for mechanical oral hygiene to prevent periodontal disease. *Periodontology* 2000; 84(1):35-44.
- Hakalehto E, Adusei-Mensah F, Heitto A, Jääskeläinen A, Kivelä J, Den Boer J, Den Boer E. 4 Fermented foods and novel or upgraded raw materials for food commodities by microbial communities. *Microbiology of Food Quality: Challenges in Food Production and Distribution During and After the Pandemics*. 2021; 6:47.
- Janakiram C, Dye BA. A public health approach for prevention of periodontal disease. *Periodontology* 2000; 84(1):202-14.
- Peng L, Chang L, Liu X, Lin J, Liu H, Han B, Wang S. Antibacterial property of a polyethylene glycol-grafted dental material. *ACS* 2017; 9(21):17688-92.
- van Gastel J, Quirynen M, Teughels W, Coucke W, Carels C. Longitudinal changes in microbiology and clinical periodontal parameters after removal of fixed orthodontic appliances. *Eur J Orthodont* 2011;33(1):15-21.
- Huang J, Yao Y, Jiang J, Li C. Effects of motivational methods on oral hygiene of orthodontic patients: A systematic review and meta-analysis. *Medicine* 2018;97(47).
- Baheti MJ, Toshniwal NG. Survey on oral hygiene protocols among orthodontic correction-seeking individuals. *J Educ Ethics Dent* 2015; 5(1):8.
- Erbe C, Klukowska M, Tsaknaki I, Timm H, Grender J, Wehrbein H. Efficacy of 3 toothbrush treatments on plaque removal in orthodontic patients assessed with digital plaque imaging: a randomized controlled trial. *Am J Orthodont Dentofacial Orthop* 2013;143(6):760-6.
- Janakiram C, Taha F, Joe J. The Efficacy of plaque control by various toothbrushing techniques-a systematic review and meta-analysis. *J Clin Diag Res* 2018;12(11).
- Wainwright J, Sheiham A. An analysis of methods of tooth brushing recommended by dental associations, toothpaste and toothbrush companies and in dental texts. *Br Dent J* 2014; 217(3):E5.
- Nassar PO, Bombardelli CG, Walker CS, Neves KV, Tonet K, Nishi RN, Bombonatti R, Nassar CA. Periodontal evaluation of different tooth brushing techniques in patients with fixed orthodontic appliances. *Dent Press J Orthodont* 2013;18(1):76-80.
- Ilyas M, Ashraf S, Jamil H. Tooth brushing techniques; relative efficacy and comparison in the reduction of plaque score in 8-11 years old children. *Professional Med J* 2018;25(1):135-9.
- Brockman L. Plaque Control. *The Periodontic Syllabus*.2007:71.
- Bok HJ, Lee CH. Proper tooth-brushing technique according to patient's age and oral status. *Int J Clin Preventive Dent* 2020; 16(4): 149-53.
- Ceyhan D, Akdik C, Kirzioglu Z. An educational programme designed for the evaluation of effectiveness of two tooth brushing techniques in preschool children. *Eur J Paediatr Dent* 2018; 19: 3.
- Janakiram C, Varghese N, Venkitachalam R, Joseph J, Vineetha K. Comparison of modified Bass, Fones and normal tooth brushing technique for the efficacy of plaque control in young adults- A randomized clinical trial. *J Clin Exp Dent* 2020;12(2):e123-9.