ATLANTIS PRESS

Advances in Health Sciences Research (AHSR), volume 14

1st International Conference on Inter-Professional Health Collaboration (ICIHC 2018)

The Effectiveness Of Different Toothbrush Type On Plaque Removal In Orthodontic Patients

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Abstract *- **Background: Current treatment of fixed orthodontic currently used by many, not only for orthodontic treatment but also part of a modern lifestyle. Treatment of fixed orthodontic is treatment aimed to fix malocclusion and increase awareness of dental care, mastication function, and esthetic. Aims: This research is to acknowledge the effect of orthodontic toothbrush, soft and flat toothbrush and zigzag from toothbrush to decrease index plaks for the fixed orthodontic user. Methods: Quasi-experimental research design and data gathering of primary, collected plaque index examination, before and after brushing with an orthodontic toothbrush, soft and flat toothbrush, and zigzag form toothbrush, using diagnose set with tooth examination format — research sample from six students from the Department of Dental Nursing of Poltekkes Kemenkes Jambi. Sample gathered with purposive sampling technic with the criteria of a fixed orthodontic user on upper and lower jaws. Results: The study on the effect of the orthodontic toothbrush is useful on the reduction index on fixed orthodontic users with t count value of 31.524 and significant at 0.000 (p<0.05). The uses of bristle toothbrushes are beneficial to reduce the index on orthodontic devices with a t count of 11.483 and a significant at 0.000 (p<0.05). The use of effective zig zag bristles on the loss index for fixed orthodontic users allows with a t count of 7.084 and a significance at 0.001 (p<0.05). Conclusion: The use of a better toothbrush for zigzag bristles towards cutting the plaque index in fixed orthodontic wearers. For fixed orthodontic users. To use an orthodontic toothbrush, because it is more effective against reducing the index and using the recommended brushing technique, circular modification bass.***

Keywords: Fixed orthodontic, orthodontic toothbrush, flat, soft and zig zag

I. INTRODUCTION

Fixed orthodontic toothbrush care currently has been used by many. Infants and Adults have to utilize fixed orthodontic toothbrush not only for dental care but instead, and it is part of the lifestyle [1]. Based on previous research, the result showed that most of adult orthodontic patient did the treatment for appearance aspect [2]. Orthodontic treatment is part of dental care not only for fixing malocclusion, but also to increase dental health, mastication function, verbal ability, and esthetic [3]. Orthodontic treatment is divided into two types which are fixed orthodontic and removable orthodontic [4]. FIxed orthodontic based on several components such as a bracket, archwire, band, auxiliaries and many other components which installed on the teeth surface [5]. Fixed orthodontic is only applied and removed by the dentist while removable orthodontic can be applied by the patient him or herself [6]. However, the general application the public does not realize like oral hygiene in the use of removable orthodontic. Use of removable orthodontic is also impacted effects on oral hygiene changing and flora composition on the oral cavity [1]. Oral hygiene is proclaimed to be the essential part that can affect plaque accumulation that usually happens in around bracket [7]. On the previous study found it is dominant in the servixal bracket and under the archwire [3]. Attached to the plague, longer than it should increase the risk of caries, gingivitis, and the possibility of periodontal disease [8].

Plaque is the thin layer, uncolored, contains bacteria, and attached to the teeth surface that can form anytime. If the plaque above combined with sugar which contains in consultation intake, it will form acidity. The acidity that contains in oral cavity within an extended period will destroy hard tissue of teeth which will demineralized email surface and formed caries [9]. Oral hygiene situation on orthodontic treatment is something of a challenge. If there is no motivation to keep oral hygiene with care; thus, the damage can be worse and orthodontic treatment will be useless [10]. Based on research, stated that plaque index before utilization [11]. Prevention happened in periodontal disease and teeth of caries must be based on good plaque control [10]. Od all types of plaque control, the most straightforward method, safe, also, effective is brushing. The most important factor that affects brushing effectivity in plaque removal is a toothbrush type [12]. The toothbrush is the prominent tool in mechanically plaque control [8]. Dentist instruction to conduct procedural oral hygiene at home is crucially needed especially the toothbrush type. Nowadays, innovation in this department has been done regularly such as; electric toothbrush, orthodontics toothbrush, oral irrigator, dental floss, and interdental toothbrush [13]. Use of fixed orthodontic is recommended to use specially designed toothbrush which have inline brush shorter than the on the top and bottom side of the toothbrush head, to help remove plaque round bracket [14].

On this research, three types of toothbrush will be utilized; orthodontic toothbrush, soft toothbrush, and zigzag toothbrush. The orthodontic toothbrush is designed explicitly for the orthodontic patient. The cause of this design is to create art at around bracket and arch wire[15]. A soft toothbrush is the one that obtains soft surface while the zig-zag toothbrush is the one that does not have a level brushing aspect which suitable for whether arc or convex on the teeth surface [16].

Choosing suitable toothbrush has to be considered on an individual's need [17]. In tooth brushing, various aspects need to be considered. Some experts have created various methods of teeth brushing with a manual toothbrush that has been developed suitable with each condition [8]. Tooth brushing method that has made recommendations for fixed orthodontic is using circular bass modification [18]. Based on the research that has been done by Winatha in 2014, plaque index decrease on a user of a specially modified orthodontic toothbrush is more effective compared to the one that uses the nonorthodontic manual toothbrush in comparison with a fixed orthodontic user.

For now, there are six dentistry students at Poltekkes Kemenkes Jambi that uses fixed orthodontic and does not yet acknowledge recommending toothbrush while treated orthographically. Based on that fact, this research aimed to conduct on the comparison between the effectivity of orthodontic toothbrush, soft and flat toothbrush, and a zigzag toothbrush to the decrease of plaque index on a fixed orthodontic user of Poltekkes Kemenkes Jambi Dentistry.

II. METHODS

The research design is experimental pre-test and post design. Population in research is fixed orthodontic user in Dentistry of Poltekkes Kemenkes Jambi. The sample in this research taken with purposive sampling technic with fixed orthodontic criteria on upper and lower jaws. Stages of research implementation are as follows:

First-day research

1. Subject consumed provided biscuit.
2. After 30 minutes, plaque examination conducted (pre-test) with disclosing solution and then plaque index summed with Orthodontic Plaque Index (OPI).
3. Subject asked to brush their teeth using orthodontic toothbrush and toothpaste for 2 minutes.
4. Examination after index plaque counted (post-test) with disclosing solution application on the tooth surface which placed on a bracket, proceed to take note on OPI.

Second-day examination

1. Subject consumed provided biscuit.
2. After 30 minutes, plaque examination conducted (pre-test) with disclosing solution and then plaque index counted with Orthodontic Plaque Index (OPI).
3. Subject asked to brush their teeth using a soft toothbrush and toothpaste for 2 minutes.
4. Examination after index plaque counted (post-test) with disclosing solution application on the tooth surface which placed on a bracket, proceed to take note on OPI.

Third day

1. Subject consumed provided biscuit.
2. After 30 minutes, plaque examination conducted (pre-test) with disclosing solution and then plaque index counted with Orthodontic Plaque Index (OPI).
3. Subject asked to brush their teeth using a zig-zag toothbrush and toothpaste for 2 minutes.
4. Examination after index plaque counted (post-test) with disclosing solution application on.

Data that have been taken later on processed through steps; editing, coding, entry data, and cleaning. There are two analyses which are analysis university to describe data distributing of each independent variable (orthodontic, soft and flat, and zigzag toothbrush). It will be described later on through the table. Bivariate analysis is to acknowledge id there is any difference between before and after treatment. The statistical test that utilized is Mann-Whitney with zero hypotheses determined by the value of $p< 0,05$ (valued)

III. RESULT

This research conducted plaque measurement, before and after toothbrushing with each toothbrush. Later on, the data can be processes by paired t-test to compare before and after tooth brushing, knowing the effectivity of the toothbrush. Before statistical test to distinguish the effectivity of orthodontic, soft flat and the zigzag toothbrush to the decrease of plaque index on fixed orthodontic users, normality test data utilize Shapiro-Wilk statistical test.

TABLE I. NORMALITY TEST PLAQUE INDEX PRE-TEST AND POST-TEST ORTHODONTIC TOOTHBRUSH, SOFT FLAT, ZIG ZAG TOOTHBRUSH ON FIXED ORTHODONTIC USERS

Plaque Index	***Shapiro-Wilk***		
	Statistic	**df**	**Sig.**
Pre-test orthodontic Toothbrush	.963	6	.841
Post-test orthodontic Toothbrush	.973	6	.912
pre-test orthodontic Toothbrush	.911	6	.443
post-test orthodontic Toothbrush	.901	6	.380
pre-test Zig Zag Toothbrush	.990	6	.988
post-test Zig Zag Toothbrush	.985	6	.943

Notes *) Significant on > 0,05**.**

Based on table 1, it is shown that the Shapiro-Wilk statistical test gained a significant plaque index whether on pre-test and post-test. Each is greater than 0,05, which means that plaque value index on pre-test and post-test distributed normally. Therefore, the statistical test is utilizing a paired t-test.

TABLE II. AVERAGE PLAQUE INDEX PRE-TEST AND POST-TESTORTHODONTIC TOOTHBRUSH ON FIXED ORTHODONTIC

Plaque Index	Mean	SD	Min – Max
Pre-test orthodontic toothbrush	77.50	6.834	67 – 88
Post-test orthodontic toothbrush	11.67	9.688	0 – 26

Based on Table 2 show that different mean value between plaque index on pre-test condition (77.5) and plaque index on post-test condition (11.67). Meaning that mathematically, there is a plaque difference index before and after using an orthodontic toothbrush for fixed orthodontic users.

TABLE III. AVERAGE PLAQUE INDEX PRE-TEST AND POST-TEST, SOFT FLAT TOOTHBRUSH ON FIXED ORTHODONTIC USERS.

Plaque Index	Mean	SD	Min – Max
Pre-test soft flat toothbrush	68.67	15.253	48 – 95
Post-test soft flat toothbrush	9.67	6.683	1 – 17

Based on table 3. Shown that different mean value between plaque index on pre-test (68.67) and plaque index on post-test (9.67). Meaning that mathematically, there is an indication between before and after on utilization of soft flat toothbrush on fixed orthodontic users.

TABLE IV. AVERAGE PLAQUE INDEX ON THE PRE-TEST AND POST-TEST ZIG-ZAG TOOTHBRUSH ON FIXED ORTHODONTIC USERS.

Plaque Index	Mean	Std. Deviation	Min – Max
Pre-test Zig zag toothbrush	62,83	20.556	31 – 91
Post-test Zig zag toothbrush	7,33	4.844	3 – 14

Based on table 4. Shown that different mean value between plaque index on pre-test (62.83) and plaque index on post-test (4.33). Meaning that mathematically, there is an indication between before and after on utilization of zig-zag toothbrush on fixed orthodontic users.

TABLE V. THE EFFECTIVITY OF ORTHODONTIC TOOTHBRUSH IN DECREASING PLAQUE INDEX ON THE FIXED ORTHODONTIC USER.

Plaque Index	T	Df	Sig. (2-tailed)
Pre-test orthodontic Toothbrush Post-test orthodontic Toothbrush	31,524	5	.000*
Pre-test soft flat Toothbrush Post-test soft flat Toothbrush	11.483	5	.000*
Pre-test Zig zag Toothbrush Post-test Zig Zag toothbrush	7.084	5	.001*

Based on table 5 showed the utilization of orthodontic, soft flat, and zig zag is effective in decreasing plaque index on fixed orthodontic users. However, of all three toothbrushes, the most effective one is orthodontic toothbrush which showed a significant decrease in plaque index of t count as much as 31.524 and significance on 0.0000 ($p < 0.05$)

IV. DISCUSSION

1. Research Hinderance
   This research is possible to have a bias conclusion because the sample of this research is the students of dentistry, therefore. It cannot represent the general perception of orthodontic users. Continuous research should be conducted on a general mass.
2. The effectivity of orthodontic, soft flat and zig zag toothbrush towards index plaque decreases on orthodontic users.

This result of this research has not yet been able to give any empirical evidence regarding the effectivity of orthodontic toothbrush is better than soft and or zigzag toothbrush towards the decreasing number of plaque index. It is possible the effectiveness not only depends on the shape and softness of the toothbrush but also the method of utilizing it.

Suggestion on utilizing manual toothbrush that has a straight flat top, flat handle in line with the point of the toothbrush, and even brushing. Many researchers suggest flat toothbrush to be used by the general public. This research is supported by Sriyono (2005) that perceived flat toothbrush is more effective than any other toothbrush that has three sides in plaque cleaning[17].

On the previous research that has been done by Sukmawaty in 2011 regarding the comparison between orthodontic toothbrush with a conventional toothbrush in decreasing plaque index of the fixed orthodontic device, with the number of research subject of 80 dentistry students at Universitas Sumatera Utara (USU) [19]. Divided into two significant distinctions, 40 students utilizing conventional

toothbrush while the other 40 utilize orthodontic toothbrush. The research was done during one day with the technique that is commonly used by each. Time for tooth brushing takes three days, utilizing Podshadley dan Haley plaque measurement. Gathered the average plaque index on students that use the specialized toothbrush, before treatment is 5.42 and after treatment of 2.46. The value index of Podshadley dan Haley is categorized wrong and middle.

In this matter, it can be concluded that there is a significant difference in the average plaque index while using an orthodontic toothbrush. It happens because students of Poltekkes Kemenkes Jambi, know how to use the fixed orthodontic device and have learned how to take care of gum and teeth properly. Other than that, V-shape design toothbrush that has with brush shorter in the middle compared to the others around it can reach excess food that sticks in teeth surface and around the bracket, especially at around gingiva side with Bass modification circular technic [18].

Specially modified toothbrush for orthodontic users can give a higher degree of impact when uses, especially cleansing orthodontic wire and the bottom of the teeth. In the appearance of shorter brush in the middle of the toothbrush point can reach the deepness of the bracket; therefore, toothbrush action is not hindered. The toothbrush action can remove excess food bacteria that hide on incisor or occlusive and gingival and bracket crown. On the other hand, the lateral side of the toothbrush has a more extensive degree of brush that can reach the tooth surface that can cover interdental [20].

V. CONCLUSION

1. The use of orthodontic toothbrush could be practical towards the degradation of the plaque index. A user of fixed orthodontic is shown as: the value of t is calculated around 31.524 and the significance at 0.000 (p<0, 05).
2. The uses of bristle toothbrush are also useful in the declining plaque index. A user of fixed orthodontic is shown as: the value of t is calculated around 11,483 and the significance at 0.000 (p<0, 05).
3. Those who use zig zag bristle toothbrush also have effectiveness in the declining of the plaque index. A user of fixed orthodontic is shown as: the value of t is calculated around 7,084 and the significance at 0,001 (p<0, 05).
4. The use of orthodontic toothbrush has a better effectivity than the bristle toothbrush and zig zag bristle toothbrush on the declining of plaque index towards fixed orthodontic users.

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