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Association of tooth brushing behavior with oral hygiene index among students using fixed appliance

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Abstract. Uses of fixed appliance have become popular recently. The purpose of its use is to correct malposition of teeth in order to normalize the masticatory function and to eliminate the accumulation of food remain between the teeth. These will prevent the formation of caries and any periodontal tissue disease. Fixed appliance patients must routinely maintain their oral hygiene. This study was an analytical survey with cross-sectional design to know the relationship between behavior in tooth brushing of students using the fixed appliance and oral hygiene in Poltekkes Kemenkes Medan. The average of Oral Hygiene Index – Simplified (OHIS) value of students using fixed appliance (2.68) was still above national target which is ≤ 2 , and there was a relationship between behavior in tooth brushing of students using the fixed appliance and oral hygiene ($p < 0.02$). In conclusion, to get good oral hygiene and to prevent caries formation and periodontal disease patients using fixed appliances should maintain their dental health.

1. Introduction

Health is a condition which everyone should achieve. According to WHO, health is a state of complete physical, mental and socioeconomic well-being. As stated by Health Law No. 36 of 2009 Subsection 93 paragraph 1 and 2, dental and oral health service is performed to keep and improve the public health level carried out by prevention and treatment of dental disease and dental health rehabilitation which can be done by local government and personal dental health practice, school and communities.

Health behavior is a response to stimuli or an object related to the disease. The regional health research shows that 80% population have malocclusion.[1] Malocclusion can be corrected by uses of the fixed appliance. Malocclusion is defined as local misalignment of teeth or jaws mal-relation of sagittal, vertical, or transversal line.[2] In malocclusion, the upper and lower jaws are not in the proper position.[3]

A study showed that 85.58% of 2074 school student (12-15 years old) have malocclusion requiring orthodontic care.[4] The care improves the physical health (temporomandibular joint abnormalities, gingival and tooth trauma), articulation and masticatory function. Furthermore, another study states that correction for tooth malocclusion should be done as early as possible.[5]

Fixed appliance or fixed orthodontic appliance is a device directly attached to the tooth surface. It corrects tooth function in mastication and aesthetical. The attachment of fixed appliance to tooth surface causes a problem in tooth cleaning. It tends to form plaque around the bracket at tooth surface



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and dentin at free gingival. Correction using fixed appliance requires times. Thus, the patients using fixed appliance have to know dental health must be taught the right to maintain their dental health to prevent the formation of plaque in order to achieve good oral hygiene. Plaque retention will induce the formation of caries and periodontal infection. Plaque bacteria on the teeth is the main cause of gingivitis which is the incipient stage of periodontal tissue damage.[6]

2. Material and Methods

Cross-sectional study is done in Poltekkes Kemenkes Medan among students with fixed appliances. Oral hygiene measured by Oral Hygiene Index-Simplified (OHI-S). This index consists of an oral debris score and calculus score. Numerical values are assigned to the six indicator teeth according to extraneous deposits present. The six surfaces examined for the OHI-S are selected from four posterior and two anterior teeth. Meanwhile, knowledge, attitude and practices are measured using questionnaires. Univariate and bivariate analysis is performed.

3. Results

Out of 69 respondent, 41 students with high knowledge (59.4%), 43 students with a good attitude (62.3%) and 30 students had a good practice on oral hygiene (43.4%). Results are depicted in Table 1.

Table 1. Knowledge, attitude, and practice of oral hygiene.

	<i>n</i>	(%)
Knowledge		
High	41	59.4
Average	24	38.4
Low	4	5.8
Attitude		0.285
Good	43	62.3
Moderate	19	27.5
Bad	7	10.2
Practice		
Good	30	43.4
Moderate	26	37.7
Bad	13	18.8

Table 2 showed that 73.9% of student are on fair criteria of OHI-S with an average value of 2.64 and decay average value of 2.13. This means that on average each respondent had a decay of two teeth. The calculation obtained from the number of cavities of each respondent divided by the total respondent.

Table 2. OHI-S categories and average value.

	<i>N</i>	(%)	OHI-S Average Value	Decay Average Value
Good	0	0		
Fair	51	73.9	2.64	2.13
Poor	18	26.1		
Total	69	100		

OHI-S Good (0-1.2) Fair (1.3-3.0) Poor (3.1-6.0)

In table 3 it is illustrated that 44 out of 69 students had crowded teeth without extraction (63.8%) and 39 students with gingivitis in 1 region (56.5%). Only 14 students (20.3%) had healthy gum.

Table 3. Oral condition.

	<i>n</i>	(%)
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Oral Condition		
Tooth condition		
Crowded without tooth extraction	44	63.8
Crowded with tooth extraction	14	20.3
Uncorrected diastema	11	15.9
Gingiva Condition		
Well	14	20.3
Gingivitis on 1 region	39	56.5
Gingivitis > 1 region	16	21.2

Table 4. Association of knowledge, attitude and practice with OHI-S.

	OHI-S				Total	p-value
	Fair		Poor			
	n	%	n	%		
Knowledge						
Good	30	43.5	11	15.9	41	0.528
Fair	17	24.6	7	10.2	24	
Poor	4	5.8	0	0	4	
Total	51	73.9	18	26.1	69	
Attitude						
Good	32	46.3	11	16	43	0.042
Fair	16	23.2	3	4.3	19	
Poor	5	7.3	2	2.9	7	
Total	53	76.8	16	23.2	69	
Practice						
Good	30	43.5	0	0	30	0.000
Fair	16	23.2	10	14.4	26	
Poor	5	7.3	8	11.6	13	
Total	51	74	18	26	69	

Table 4 shows that both attitude and practice had a significant association with OHI-S with a p-value of 0.042 and 0.000 respectively but not the respondent's knowledge with p 0.528.

4. Discussion

Theory stated that the application, conservation and removal of fixed orthodontic appliances must be performed by an orthodontist.[7] In contrary, this study found that the most commonly used fixed appliances are students from the Dental Nursing Department (66.7%). Out of this number, only 2.9% are performed by orthodontic. Out of total, only 59.4% did their treatment at orthodontist which is the right place for an installment of fixed orthodontic and 37.7% visit a dental assistant instead. This practice may be done due to a lower cost. However this later leads to an unwanted outcome. Treatment measures are given by dental assistant most often are not in accordance with existing provision. This study found that there are 63.8% crowded teeth without removal. Meanwhile, a fixed dental appliance should be securely fitted to a patient's teeth. Thus it can change the position accurately to create the desired effect. The purpose of tooth extraction in this matter is to provide crowded gear space so that the position of the teeth is neat.

The average OHI-S of 2.64 is considered fair and still higher than the national target of ≤ 2 . To perform tooth conservation, there is a major need to know properly the target of conservation namely correct tooth alignment as well as maintenance of oral hygiene during the conservation.[8] The patients should be aware and able in preventing the plaque accumulation. Research in Pakistan mentioned that bracket on the tooth surface inhibits the tooth brushing which is consequently formed a plaque around the bracket.[9] This is agreed by a study in Indonesia which mentioned that the use of special tooth brush would remove plaque from tooth surface easier and avoid bracket damage during tooth brushing.[10] It has been explained that pellicle with no microbes will be formed on the tooth

surface after tooth brushing.[11] The plaque will be formed once the pellicle was colonized by microbes. Plaque contains food remain, microbes, protein, and saliva. Plaque is continuously formed in theoral cavity and will be removed after tooth brushing. The OHI-S value greatly affected by having a meal and not followed by tooth brushing.[13]

We found that there was a relationship between attitude and practice with OHI-S. Attitude is a closed reaction to a certain stimulus or subject. Attitude is not considered as actions, but is a predisposition of action.[14] Attitude is a readiness to react to a particular object in a certain environment as a consequence of expression of the object. Meanwhile, practice is affected by perception. However, it needs other factors or supporting conditions such as utilities. This study found that most respondents did not use a special toothbrush in the process. This was probably due to lack of information during the installation of the fixed appliance. Aside, the price of the special toothbrush is quite high. Among those who used the fixed appliance, a special toothbrush is needed because it can clean the food remain between the teeth and on the bracket which usually cannot be clean by regular tooth brush.[15]

5. Conclusion

This study found that the practice of tooth conservation did not meet the standard procedures. There was a high number of crowded teeth without extraction (63.8%), and 56.5% experienced gingivitis at I region with decay rate 2.13. The average value of OHI-S among the respondents is still above the national target. It is recommended to anyone that needs a fixed appliance to visit an orthodontist. A commitment of users to manage a good oral hygiene is greatly needed as well.

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