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**THE RELATION BETWEEN DURATION OF FIXED ORTHODONTIC  
 TREATMENT AND ORAL HYGIENE STATUS AMONG STUDENTS OF FACULTY  
 OF DENTISTRY UNIVERSITAS MUSLIM INDONESIA 2017**

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**ABSTRACT**

**Background:** Fixed orthodontic treatment is now widely used in society, but people often do not realize the risks of using this appliance such as the rise of oral hygiene and caries problem. The design of this appliance is more difficult to clean than removable orthodontic appliance so it can cause a variety of oral disease if long-term fixed orthodontic treatment is required and the cleanliness of the teeth and mouth is not maintained. According to RISKESDAS 2013, Ministry of Health of Indonesia reported that the prevalence of oral disease reached 25.9%. The results showed an increase in the prevalence of oral disease compared to RISKESDAS 2007 results. **Objective :** to investigate the relation between duration of fixed orthodontic treatment and oral hygiene status among the students of Faculty of Dentistry Universitas Muslim Indonesia 2017. **Method :** The study was conducted as an analytic observational study with cross-sectional study design. Samples of this research were students of Faculty of Dentistry, Universitas Muslim Indonesia, Makassar, Indonesia. Oral hygiene status were analyzed using Attin Index. The result was statistically analyzed with Chi-Square test. **Results :** The p value of this research was less than 0.05, therefore the results of this research are statistically significant. **Conclusion :** Hypothesis was accepted and showed that there was a significant relation between the duration of fixed orthodontic treatment and oral hygiene status among the students of Faculty of Dentistry Universitas Muslim Indonesia 2017.

**Keywords :** Duration of Fixed Orthodontic Treatment, Oral hygiene Status, Attin Index.

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**INTRODUCTION**

Orthodontic treatment is one type of treatment in the dentistry which aims to obtain aesthetically dentofacial appearance by eliminating crowding of the teeth, correcting the rotational and apical deviations of the teeth, correcting the inter-incisal relation and achieving a normal occlusion.<sup>1</sup> In addition, orthodontic treatment also aims to improve the health of the periodontium and the health of dentistry.<sup>2</sup> Fixed orthodontic devices is

now widely used in the wider community. Adults and children use fixed orthodontic appliance not only for dental and oral care but also as part of their lifestyle.<sup>3</sup>

Based on the results of Household Health Survey (SKRT) conducted by Indonesian Ministry of Health (MOH) in 2010, it is stated that 63 Indonesians suffer from dental and oral diseases. Data from the 2013 Basic Health Research (RISKESDAS), issued by the Indonesian Ministry

of Health, reported that the prevalence of dental and oral disease problems in Indonesian population reached 25.9%. These results indicate that there is an increase in the prevalence of dental and oral problems by 2.7 when compared to the results of the 2007 RISKESDAS.<sup>4</sup>

Communities are often not aware of the risk when it comes to the usage of fixed orthodontic appliance such as oral hygiene problems.<sup>3</sup> Good oral and dental hygiene affect oral health, whereas poorly maintained oral hygiene can cause various kinds of diseases in the oral cavity as a result of accumulation of debris and calculus. The duration of orthodontic treatment will affect the health of the mouth and teeth.

Orthodontic treatment especially fixed orthodontic appliance can have an impact in the form of oral cavity changes and oral flora composition. An increase in the amount of plaque can cause dental caries, as a result of the difficulty for oral hygiene procedures in orthodontic patients. Orthodontic treatment with fixed orthodontic components such as the use of brackets and bands can be a place for plaque accumulation due to an increase in biofilm formation after insertion.<sup>3</sup> Assessment of plaque scores is important as an evaluation to assess oral hygiene of individuals with fixed orthodontics appliance. The basis commonly used for plaque scoring is in numerical categorical scales or indexes. Plaque indices developed from year to year, including Loe and Silness, O'Leary, Quigley and Hein which have been modified to become the Turesky Index and Bonded Bracket Index. In addition, there is a plaque index discovered by Attin which can be used to measure high-risk areas around the wire. The plaque index according to Attin was calculated after plaque examination on the incisors, caninus, first premolar, and second premolar. Attin Plaque Index was chosen because this measurement is very easy to perform.

Based on the background of previous research conducted in Manado, it is stated that oral and dental hygiene status of a person using fixed orthodontic appliance is classified as fair on average, the researcher is interested to do the same research in Makassar about the relation between duration of fixed orthodontic treatment and oral hygiene status among the students of Faculty of Dentistry Universitas Muslim Indonesia.

## METHODS

The type of this study is an observational analytic, using a cross-sectional study design. This study was conducted at the Faculty of Dentistry, Universitas Muslim Indonesia (FKG UMI) Makassar in January 2017. The population in this study was comprised of fixed orthodontic appliance users among all FKG UMI students in a total of 39 people. The inclusion criteria for this study were students who is using fixed orthodontic appliance for more than 1 month, using a complete bracket in the maxilla and mandible, willing to be the study sample proven by the willingness to fill out approval letter as a study sample and being cooperative in data collection. Students who have good oral hygiene status were included in the exclusion criteria. Total Sampling was the sampling method used for this study.

Oral hygiene data collection was done by gathering and examining study samples in an empty classroom provided in Faculty of Dentistry, Universitas Muslim Indonesia. Examination was carried out for 4 days and each class was examined based on the day which had been specified.

Oral hygiene examination was carried out based on Attin Index by applying disclosing solutions on the surface of the examined teeth. The examined teeth were comprised of incisors, canines, first premolars, and second premolars in the maxilla and mandible. Attin plaque index was used because it is easy to perform and can be used for the identification of high-risk areas around the wire. The assessment of all samples was carried out by the researcher with the company of an assistant to hold the LED lights along the examination. Each area which discovered with plaque was then given the points. The number of points in each tooth ranged from 1-3, then the plaque score was recorded with Attin Index.

The average amount of Attin plaque index was obtained by examining the teeth and looking for specific part where plaque can be discovered, then the data was added to the following formula:

$$Plaque\ Index = \frac{total\ plaque\ score\ x\ 100}{number\ of\ teeth\ x\ 3}$$

Attin plaque index category is based on the average number of plaques that appear on the

surface of the teeth to determine oral hygiene in the category of very good, good, fair, poor.

- Very good oral hygiene (PI <20%)
- Good oral hygiene (PI 20-39%)
- Fair oral hygiene (PI 40-69%)
- Poor oral hygiene (PI 70-100%)

Distribution of the study samples based on sex is presented in table 1. The study subjects were amounted to 39 people based on the inclusion criteria, which categorized by sex and comprised of higher number in female samples than male. This can be seen in Table 1 below.

**Table 1.** Samples Distribution of Fixed Orthodontic Users by Sex

Sex	N	%
Male	5	12,8
Female	34	87,2
<b>Total</b>	<b>39</b>	<b>100%</b>

Table 2 shows the study subjects based on age at Faculty of Dentistry, Universitas Muslim Indonesia. The highest number of respondents were categorized in 19 years old group which comprised of 13 people (33.3%), followed by 21 years old group comprised of 8 people (20.5%), 22 years old group comprised of 8 people (20.5%), 21 years old group comprised of 8 people (20.5%), 20 years old group comprised of 6 people (15.4%), and 18 years old group comprised of 3 people (7.7%). While the least number of respondent categorized under 17 years old was comprised of 1 person (2.6%).

**Table 2.** Distribution and Frequency by Age.

Age (years)	n	%
17	1	2,6
18	3	7,7
19	13	33,3
20	6	15,4
21	8	20,5
22	8	20,5
<b>Total</b>	<b>39</b>	<b>100</b>

Table 3 shows the number of respondents based on the duration of fixed orthodontic treatment in FKG UMI. The highest number of respondents were 23 people (59%) which use fixed orthodontic appliance for more than 12 month, while 16 others (41%) were using fix orthodontic appliance for less than 12 month in duration.

**Table 3.** Distribution and Frequency of Fixed Orthodontic Users based on the Duration of treatment in FKG UMI 2017 .

Duration of Fixed Orthodontic Treatment	n	%
<12 months	16	41
≥12 months	23	59
<b>Total</b>	<b>39</b>	<b>100</b>

Table 4 shows the distribution and frequency of oral hygiene examination results using Attin Index. It can be seen that the highest number of respondents were mostly classified in good category (20-39%) which comprised of 14 people (35.9%) among the subjects. Eleven respondents (28.3%) were classified in fair category (40-69%), five respondents (12.7%) in very good category (<20%), while nine respondents (23.1%) in poor category (70-100%).

**Table 4.** The Distribution and Frequency of Oral Hygiene Status amongs Students in FKG UMI 2017

Attin Index	N	%
Very Good (<20%)	5	12,8
Good (20 – 39%)	14	35,9
Fair (40 – 69%)	11	28,2
Poor (70 - 100%)	9	23,1
<b>Total</b>	<b>39</b>	<b>100</b>

Table 5 shows the relation between duration of fixed orthodontic treatment and oral hygiene status among FKG UMI students in 2017. The table shows that the highest number of samples consisted of 11 people (28.2%) with <12 months fixed orthodontic treatment duration were classified in good category of Attin Index score. The lowest number of samples consisted of 1 people (2.6%) with <12 month orthodontic treatment duration were classified in poor category of Attin Index score. Meanwhile, the highest number of samples with ≥12 months fixed orthodontic treatment

duration comprised of 9 people (23.1%) were classified in good category of Attin Index score. The lowest number of samples with  $\geq 12$  month orthodontic treatment duration comprised of 3 people (7.7%) were classified in poor category of Attin Index score.

The result of chi-square test analysis obtained  $p=0.003$  which means that  $p<0.05$ . This result indicates that  $H_0$  is rejected and  $H_a$  is accepted stating that there is a relation between the duration of fixed orthodontic treatment and oral hygiene status among students in FKG UMI Makassar 2017

**Table 5.** The Relation between Duration of Fixed Orthodontic Treatment and Oral Hygiene Status Among The Students of Dentistry Faculty Universitas Muslim Indonesia 2017

Variable		Attin Index								<i>p</i>
		Very Good		Good		Fair		Poor		
		n	%	n	%	n	%	n	%	
<b>Duration of Fixed Orthodontic Treatment</b>	<12 months	2	5,1	11	28,2	2	5,1	1	2,6	0,003
	$\geq 12$ months	3	7,7	3	7,7	9	23,1	8	20,5	

## DISCUSSION

Based on all fixed orthodontic treatment respondents at Faculty of Dentistry Universitas Muslim Indonesia, it was obtained that 39 respondents were comprised of 87.2% female and 12.8% male. This study shows that female respondents were more dominant than male respondents. This was also strengthened by Momongan (2014) which stated that 39 respondents in her study were also comprised of 92.3% female and 7.7% male. This is in accordance with the orthodontic theory where orthodontic treatment is more frequently done by female than male because of female tendency to prioritize aesthetics so that they are very concerned about the health and regularity of their teeth.<sup>6</sup> Momongan et al. (2014), said that female were less confident when there was a malposition in their teeth which reduced their aesthetic value.<sup>4</sup> Male doesn't pay much attention to their teeth so that many users of fixed orthodontic appliance are notably female.<sup>7</sup> Aesthetics is one indication of orthodontic treatment in adults. Aesthetics in dentistry aims to create beauty and attractiveness to increase patients' self-esteem. This will make them feel satisfied with an important part of their body, so that they can be more expressive and feel socially valued. In general, the patient's reason to get orthodontic treatment is dissatisfaction with the appearance of his teeth.<sup>8</sup> Irregular tooth placement can lead to

unharmonious and less aesthetic facial appearance. This can lead to unhealthy mental development such as low self-esteem, discomfort when expressing opinions, shyness and so on.<sup>9</sup>

According to Gill's (2015) theory, smile is an important component of attractive facial appearance. Malocclusion or irregular teeth can affect self-esteem and social interaction and can be the focus of banter. Individuals with the same degree of malocclusion can experience different psychological effects, depending on their self-esteem. Therefore, it cannot always be assumed that any dental irregularities will require treatment in terms of psychological benefits. However, evidence shows that orthodontic treatment can increase self-esteem and psychological health in those whose malocclusions affect their psychology.<sup>10</sup>

The results of this study indicate that the highest number of samples is at the age of >18. According to Rahardjo's theory (2009), 18-years-old individual belongs to the category of adults, namely people whose growth has been stopped, depending on race, and gender. However, recent study shows that there is still a change until the age of 30. This change doesn't have a significant meaning in the use of fixed orthodontic appliance.<sup>10</sup>

There are various reasons why adults want orthodontic treatment. Breece and Nieberg's (1986) study found that most respondents of adult orthodontic patients chose appearance as the main motivation of their treatment.<sup>12</sup>

Based on the result of the study, it is found that the average students using fixed orthodontic appliance for  $\geq 12$  months was amounted to 23 people (59%). According to Steven's theory (2012), the treatment duration for orthodontic appliance varies according to the difficulty of the case. The average estimated duration for orthodontic treatment is 2 years but in reality the duration is often 50% longer than expected which usually occurs in adolescents. The use of this orthodontic appliance can be even longer in adults because of the presence of higher complexity in each case. This is supported by Yovela and Krisnawati (2009) study at the University of Indonesia Faculty of Dentistry which stated that the teeth in adult patients require long-term orthodontic treatment.<sup>12</sup> According to Ravenske et al (2014), the ideal time required in orthodontic treatment is 1 year 6 months to 3 years depending on the severity of the malocclusion of the patient itself. If the condition of the teeth still requires treatment then patient should use fixed orthodontic appliance.<sup>5</sup>

The results of oral hygiene examination using Attin Index on students of the Faculty of Dentistry at Universitas Muslim Indonesia showed that most of the study subjects examined had good oral hygiene (35.9%), 28.2% had fair oral hygiene, 23,1% had poor oral hygiene and 12.8% had very good oral hygiene. The result of the study found among students in FKG UMI shows that oral hygiene status of respondents using fixed appliance <12 months are comprised of 11 people (28.2%) in good category of attin index score. According to study conducted by Ravenske et al. (2014) in Manado 9 Public High School, it is showed that this study obtained the same result as the the one conducted in FKG UMI. Ravenske (2014) research showed that the dental and oral hygiene status of students who used a 1-year fixed orthodontic appliance were classified in good category in the average, while those who use fixed orthodontic appliance for more than 2 years were classified in fair category.<sup>4</sup> The status of dental and oral hygiene of students at the Faculty of Dentistry at Universitas Muslim Indonesia is relatively good. Oral hygiene is influenced by oral hygiene maintenance behavior in each individual. Researcher assumes that the results of this study are

influenced by oral hygiene behavior of dental students. This can also be influenced by the learning process gained through dental programme. These assumptions are supported by research conducted by Stany Cecilia (2013) which shows that students with fixed orthodontic treatment in the Faculty of Dentistry, Sam Ratulangi University, Manado were classified in good to fair categories of oral hygiene status.<sup>3</sup> This is supported by Basuni, et al. (2014) study which showed that the level of education had an influence on oral hygiene index. This study discovered that oral hygiene index was best found at the level of high school education and the worst category was found at non-educated community. This is in accordance with Pintauli's (2012) study which stated that someone who has low level of education is likely to have less knowledge about dental and oral health.<sup>14</sup>

Oral health has an important role as a healthy indicator of living components. Oral hygiene that isn't maintained properly will cause various diseases in the oral cavity. Oral hygiene is largely determined by behavior. Improper maintenance of oral hygiene will cause easy accumulation of plaque, albial material, and calculus which will ultimately be detrimental to periodontal health. Poor oral hygiene can cause complications such as gingivitis, halitosis, xerostomia, plaque formation and dental caries.

Ramadhan, et al (2016) said that one of the efforts to prevent and overcome dental health problems is through a dental health education approach.<sup>15</sup> Dental health education delivered to a person is expected to change behavior and gain individual dental health knowledge to shift unhealthy behavior toward healthy habit.<sup>14</sup> In addition, dental health and good oral hygiene are also influenced by the role of dentists in providing motivation and instruction during fixed orthodontic treatment. Dentists need to provide the right motivation and instructions from the beginning to the end of the fixed orthodontic treatment so that patients can care more about the health of their mouth and teeth.<sup>3</sup> But in this study, the dental and oral hygiene status of students at the Faculty of Dentistry Universitas Muslim Indonesia was generally good because it was influenced by the knowledge gained while undergoing their study in dentistry programme. This can also increase student's knowledge about maintaining dental and oral hygiene, especially when undergo fixed orthodontic treatment. Based on chi-square analysis, it can be concluded that there is a relation between the duration of fixed orthodontic treatment

and oral hygiene status among students in Faculty of Dentistry at Universitas Muslim Indonesia.

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