THE RELATIONSHIP BETWEEN DURATION OF FIXED ORTHODONTIC TREATMENT WITH PERIODONTAL STATUS AND TREATMENT NEEDS AMONG STUDENTS IN THE FACULTY OF DENTISTRY UNIVERSITAS MUSLIM INDONESIA MAKASSAR IN 2017

Triana Amaliah Jayanti, Yustisia Puspitasari, Nurfadhilah Arifin
Faculty of Dentistry, Universitas Muslim Indonesia
Kakaktua, 27 A, Makassar, Sulawesi Selatan, Indonesia, 90133
Email. triana_amaliah@yahoo.com

ABSTRACT

Background: The interest and awareness for maintaining oral health is increasing. It is not only confined to fillings and extractions, but also extend to orthodontic treatment. Orthodontic treatment aims to get normal occlusion, improves the health of the periodontal, dental health and facial aesthetics. Increased interest in orthodontic treatment was due to the high prevalence of malocclusion. The prevalence of malocclusion in Indonesian is still very high which is about 80% of the population. Orthodontic treatments change the circumstances surrounding the oral cavity, so that orthodontic appliance users who do not maintain oral hygiene are at risk for periodontal disease. **Objective:** to determine relationship between duration of the fixed orthodontic treatment with periodontal status and treatment needs among students in the Faculty of Dentistry, Universitas Muslim Indonesia Makassar in 2017. **Materials and methods:** This study is observational analytical study with cross sectional study design. The samples were 35 students in Faculty of Dentistry UMI Makassar using fixed orthodontic appliance. The method of data collection that checks the periodontal status and treatment needs was done by using an a Community Periodontal Index of Treatment Need (CPITN). The statistical analysis was done by using Chi-Square test. **Results:** Based on the statistical test, it is shown that there were relationship between duration of fixed orthodontic treatment with periodontal status ($p = 0,004 < 0,01$) and the periodontal treatment need ($p = 0,004 < 0,01$). **Conclusion:** There is relationship between duration of fixed orthodontic treatment with periodontal status and treatment needs of the students in the Faculty of Dentistry, Universitas Muslim Indonesia in 2017.

Keywords: Fixed orthodontic, duration of fixed orthodontic treatment, CPITN.

Correspondence: Triana Amaliah Jayanti, Faculty of Dentistry, Universitas Muslim Indonesia, Kakaktua, 27 A, Makassar, Sulawesi Selatan, Indonesia, 90133, Email. triana_amaliah@yahoo.com

INTRODUCTION

The interest and awareness for maintaining oral health is increasing. It is not only confined to fillings and extractions, but also extend to orthodontic treatment. Orthodontic treatment aims to get normal occlusion, improves the health of the periodontal, dental health and facial aesthetics. Increased interest in orthodontic treatment was due to the high prevalence of malocclusion. The prevalence of malocclusion in Indonesian is still very high which is about 80% of the population and ranked third after dental caries and periodontal disease. Today, many people use fixed or removable orthodontic appliances. Users of orthodontic appliance are particularly susceptible to poor oral hygiene.[1,2,3,4]

Orthodontic treatment changes circumstances surrounding the oral cavity, such as increased number of plaques and changes in flora composition. Users of orthodontic appliance who don't maintain oral hygiene can be at risk for caries and periodontal disease. According to Ristic and Coworker (2007), there was a significant increase in clinical and microbiological parameters of periodontal disease after 3 months of fixed orthodontic appliance placement. This causes oral hygiene in orthodontic patients should always be maintained.[2,5,4]

The results of successful orthodontic treatment also depend heavily on the patient's periodontal status. Periodontal health is an important factor used to evaluate the success of

orthodontic treatment. Periodontal complications are reported to be one of the most common side effects associated with orthodontics. Periodontal complications associated with orthodontics are gingivitis, periodontitis, gingival recessions or hipertrophy, and alveolar bone loss. Plaque is the most important factor in the initiation, progression, and recurrence of periodontal disease.[2,6]

Assessment of periodontal disease requires an accurate index that not only assesses the factors that cause periodontal disease, but also describes the disease. The index which includes the required category is the CPITN (community periodontal index for treatment need) which has been proven to be useful in assessing periodontal status, planning periodontal treatment needs, and evaluating changes in periodontal status.[7]

Study conducted by Badei and Suhad (2013) on "Periodontal health status and treatment need among Iraqi orthodontic patients wearing fixed appliance" shows the result of concern about the periodontal health status of patients using fixed orthodontic appliance.[7]

Based on previous observations, students at the Faculty of Dentistry of Universitas Muslim Indonesia mostly used fixed orthodontic appliance both on the maxillary and mandibular teeth (both jaws) and only on one jaw, so the researcher is interested to do research about relationship between duration of fixed orthodontic treatment with periodontal status and treatment needs of students in the Faculty of dentistry, Universitas Muslim Indonesia Makassar.

METHODS

This study is observational analytical study with cross sectional study design. The study was conducted at Faculty of Dentistry Universitas Muslim Indonesia (FKG UMI) Makassar in January 2017. The population of this study: all students of FKG UMI using fixed orthodontic appliance. The samples of this study that meet inclusion criteria were 35 people. The inclusion criteria for this study: students of UMI FKG who were using fixed orthodontic appliances in maxillary and mandibular teeth, and willing to participate in the study, and willing to fill out the approval sheet. Students who have systemic factors or diseases included in exclusion criteria. Sampling was done by total sampling method.

Community Periodontal Index for Treatment Need (CPITN) is the official index used by WHO to measure the condition of periodontal tissue and treatment need by using a special probe. The sample was examined based on 6 sextant teeth.

Maxillary :
Sextant 1   : 17 – 14
Sextant 2   : 13 – 23
Sextant 3   : 24 – 27

Mandibular :
Sextant 4   : 37 – 34
Sextant 5   : 33 – 43
Sextant 6   : 44 – 48

From each sextant only one tooth examined, the upper right first molar (16), the upper right central incisor (11), the upper left first molar (26), the lower left first molar (36), the lower left central incisor (31), lower right first molars (46), and tooth changes should be in accordance with predetermined rules. Examination of samples was performed by using mirrors and periodontal probes. In each tooth, the probing was done at least at six points around the tooth: mesiofacial, midfacial, distofacial, mesiolingual or mesiopalatal, midlingual or midpalatal, and distolingual or distopalatal. Probing by the probe tip slowed into the gingival sulcus so that the probe is parallel to the long axis of the tooth. Particularly for the mesiofacial and distofacial point, the probing behind the archwire, whereas for the midfacial point in front of the bracket will be done with a slight tilt but still cultivated parallel to the long axis of the tooth. The most severe findings on the index were listed in the CPITN scoring table as the score of each sextant corresponding to the sextant of the index tooth being examined.

Sextant 1	Sextant 2	Sextant 3
Sextant 6	Sextant 5	Sextant 4

Individual tooth codes are as follows:
- Code 0   : healthy periodontal tissue
- Code 1   : gingival bleeding after probing
- Code 2   : supragingival or subgingival calculus present
- Code 3   : pathologic pockets of 4 to 5 mm
- Code 4   : pathologic pockets of 6 mm or more.

The treatment needs of the highest CPITN scores with rules based on the following treatment levels:
- TN 0   – code 0 (healthy) – no treatment
- TN I   – code 1 – improvement in oral hygiene – I.
- TN II   – code 2 and 3 – I + scaling.
- TN III   – code 4 – I + II + complex periodontal treatment.

All samples were divided into 2 groups based on the duration of the use of fixed orthodontic appliance: >12 months and ≤12 months.

RESULT

The study was conducted at Faculty of Dentistry Universitas Muslim Indonesia, Makassar. Study subjects amounted to 35 people. By sex, the number of female subjects was higher than male (Table 1).

Table 1. Distribution and Frequency of Fixed Orthodontic Users by Sex

Sex	n	%
Male	4	11,4
Female	31	88,6
Total	35	100,0

Sourced: Primary Data, 2017

Data (Table 2) shows the number of samples in the age of 19 (28.6%) and the number of samples in the age of 18 (2.9%). Table 3 shows the amount of fixed orthodontic appliance users in duration of >12 months was higher than the users in duration ≤ 12 months.

Table 2. Distribution and Frequency of Users by Age

Age	n	%
17	1	2,9
18	3	8,6
19	10	28,6
20	6	17,1
21	7	20,0
22	8	22,9
Total	35	100,0

Sourced: Primary Data, 2017

Table 3. Distribution and Frequency Fixed Orthodontic Users by Duration of Fixed Orthodontic Treatment

Duration of treatment	n	%
≤12 months	15	42,9
> 12 months	20	57,1
Total	35	100,0

Sourced: Primary Data, 2017

The distribution and frequency of the periodontal status of fixed orthodontic appliance users in the Faculty of Dentistry of Universitas Muslim Indonesia can be differentiated based on CPITN score (code) criteria. The results of the study (table 4) showed that most samples have a code 2 which means that there was a supra or subgingival calculus of 14 people (40.0%) whereas no samples have 4-5 mm pockets (code 3) and 6 mm pockets or more (code 4).

Table 4. Distribution and Frequency of Periodontal Status Fixed Orthodontic Users

Periodontal Status (code)	n	%
0	12	34,3
1	9	25,7
2	14	40,0
3	0	0
4	0	0
Total	35	100,0

Sourced: Primary Data, 2017

The distribution and frequency of periodontal needs of fixed orthodontic appliance users in the Faculty of Dentistry of Universitas Muslim Indonesia can be differentiated based on the level of CPITN treatment needs. The results of the study (table 5) shows that most of the samples were in the level II treatment need which means in the need of instructions for oral hygiene and scaling. Respondents who need level III treatment did not exist, which means no respondent require DHE, scaling, and complex treatment.

Table 5. Distribution and Frequency of Periodontal Treatment Need in Fixed Orthodontic Users

Treatment Need (Level)	n	%
0	12	34,3
I	9	25,7
II	14	40,0
III	0	0
Total	35	100,0

Sourced: Primary Data, 2017

Table 6. The relationship between duration of fixed orthodontic treatment and periodontal status
Sourced: Primary Data, 2017

Duration of treatment	Periodontal Status (code)												p-value
	0		1		2		3		4		Total		
	n	%	n	%	n	%	n	%	n	%	n	%	
≤ 12 months	4	26,7	8	53,3	3	20,0	0	0	0	0	15	100	
> 12 months	8	40,0	1	5,0	11	55,0	0	0	0	0	20	100	0,004
Total	12	34,3	9	25,7	14	40,0	0	0	0	0	35	100	

Tabel 7. The relationship between duration of fixed orthodontic treatment and periodontal treatment need

Duration of treatment	Periodontal Treatment Need (level)										p-value
	0		I		II		III		Total		
	n	%	n	%	n	%	n	%	n	%	
≤ 12 months	4	26,7	8	53,3	3	20,0	0	0	15	100	
> 12 months	8	40,0	1	5,0	11	55,0	0	0	20	100	0,004
Total	12	34,3	9	25,7	14	40,0	0	0	35	100	

Sourced: Primary Data, 2017

Table 6 shows that most of the samples ≤12 months in code 1 were 8 people (53.3%). Most of the sample on the duration of use >12 months in code 2 were 11 people (55.0%). Statistical test results obtained *p-value* (0.004) < 0.01 which means that there is a relationship between duration of fixed orthodontic treatment and periodontal status. This indicates that H_0 rejected and H_a accepted.

Table 7 shows that most of the sample on the duration of the use less than ≤ 12 months were found in the need for TN level I and were amounted to 8 people (53.3%). While most of the sample on the duration of use > 12 months were found in TN level II and were amounted to 11 people (55.0%). Statistical test results obtained *p-value* (0.004) < 0.01 which means that there is a relationship between duration of fixed orthodontic treatment and periodontal treatment needs. This indicates that H_0 rejected and H_a accepted.

DISCUSSION

Based on all the samples which consisted of fixed orthodontic appliance users, it is known that the number of female users is more dominant than male. This is in accordance with orthodontic theory in a journal written by Vika Oktaviani, 2016 that orthodontic treatment are mostly performed by female compared to male because of the tendency of female who prefer aesthetics so that they are more concerned with their health and regularity of their teeth. Female are less confident when there is a malposition in the teeth that reduces her aesthetic value. Esthetics are one indication of orthodontic treatment in adults. In general the patient's reason for orthodontic treatment is dissatisfaction with the appearance of their teeth. The location of irregular teeth can lead to the form of a face that is not harmonious and less aesthetic. This can lead to unhealthy mental development such as low self-esteem, not free to expression opinions, timidity and so on. Male doesn't pay much attention to this so that many users of fixed orthodontic appliance are female. This study is in accordance with Ravenske et al's study, 2014 showed that of 39 samples, 36 people (92.3%) are female, while 3 are male (7.7%).[8,9,10,11]

Based on the results of study conducted on the students at the faculty of dentistry, Universitas Muslim Indonesia, it is shown that the largest number of samples are aged over 18 years old. An 18-year-old person belonging to the adult category, an adult is a person whose growth has ceased, depending on race and sex. Studies showed that changes still occur until the age of 30. This change has no significant meaning for the use of fixed orthodontic appliances. There are various reasons why adults want orthodontic treatment. A studies conducted by Breece and Nieberg, 1986 states that the majority of respondents of orthodontic adult patients who was researched chose the appearance as the main motivation for orthodontic treatment. This is supported by studies conducted by Nurul Waqiah, 2014 in Makassar which showed the result that the majority of orthodontic appliance users are dominated by students, and the samples of this studies also dominated by people aged 19-40.[12,13,14]

Based on the results of the study on the students of FKG UMI, it is found that the average number of students using fixed orthodontic appliance for >12 months are 20 people (57.1%). According to the theory, the duration of treatment of orthodontic appliance varies according to the difficulty of the case. The average estimated treatment time is 2 years but in reality the treatment time is often 50% longer than expected, usually it occurs in adolescents and even the use of orthodontic devices may be longer in adults because of more difficult cases. This is supported by study conducted by Yovela, 2009 at the Faculty of Dentistry, Universitas Indonesia was showed the result that adult patients have treatment with a long period of orthodontic appliance. 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 of fixed orthodontic appliances. This study is also in line with study conducted by Dian Ricky, 2015 at the Faculty of Dentistry of Universitas Muslim Indonesia showed that the number of students who use orthodontic appliance for >12 months is more than the students using orthodontic for less than 12 months.[15,13,11,16]

The results of the study on the students of the Faculty of Dentistry of Universitas Muslim Indonesia (FKG UMI) using fixed orthodontic appliance shows the highest periodontal status is code 2 which means that supra- or subgingival calculus is present, while the highest treatment need is the level II treatment need which means the treatment need are instruction of oral hygiene and scaling. This can occur due to lack of oral hygiene maintainance. Users of fixed orthodontic appliances complain of difficulty in cleaning the teeth and mouth because of the components of fixed orthodontic appliance. But sometimes the user's own negligence is for not following the oral hygiene instructions so that there is an increase of plaque accumulation on the fixed orthodontic appliance component, especially in the marginal area of the gingiva thus impacting the health of the periodontal tissues. In addition, plaque and calculus also depend on the patient's regularity of scaling. Periodontal problems in orthodontic users can be resolved with oral hygiene instructions in the form of plaque control and professional scaling to remove calculus from the tooth surface so that plaque accumulation factor can be eliminated. This study is in accordance with study conducted by Badeia and Suhad, 2013 in

Iraq on Periodontal health status and treatment need among Iraqi orthodontic patients wearing fixed appliance indicates that the highest periodontal status code 2 which means that supra- or subgingival calculus are present, whereas the highest periodontal treatment need is level II which means the need oral hygiene instruction and scaling.[17,7]

The results of this study showed that no samples were having a code 3 which means have a pocket 4 - 5 mm and a code 4 which means have a pocket 6 mm or more, so no samples require more complex treatment. This may be because the samples are students of Faculty of Dentistry (FKG) who have knowledge of periodontal health while undergoing orthodontic treatment so there is no result in more severe periodontal destruction such as loss of attachment and increased pocket depth. This study is not in line with study conducted by Dr. Bhageshwar Dhami et al., 2013 in Nepal which showed 81.1% of all samples using orthodontic appliance were having code 3 and 4 using the CPITN (Community Periodontal Index of Treatment Need).[18]

The results of study on students using fixed orthodontic appliances at the Faculty of Dentistry of Universitas Muslim Indonesia (FKG UMI) indicate that there is relationship between duration of fixed orthodontic treatment with periodontal status and treatment need. This is because after placement of fixed orthodontic appliance can form a new plaque retention around the bracket, so the number of supragingival plaque and aerobic bacteria increase. The longer the use of fixed orthodontic appliances without good oral hygiene control will result in the continuous accumulation of plaque which will result in inflammation of the dental supporting tissues. According to Ristic and Coworker (2007), there was a marked increase in clinical and microbiological parameters of periodontal disease after 3 months of placement of fixed orthodontic appliance. This study is in line with study conducted by Nasir et al. (2011) in Pakistan on the impact of orthodontic treatment on periodontal health showed the result that there was a relationship between increased periodontal disease with orthodontic treatment. This study is also in line with study conducted by Badeia and Suhad (2013) in Iraq indicating that there was a relationship between long term fixed orthodontic appliances with periodontal status as there was an increase in CPITN code. Another study that also supports this study is study conducted by Istiana, 2013 which showed that the longer the use of fixed orthodontic appliance, the greater the value of gingival hyperplasia index.[19,5,7,20]

Fixed orthodontist user must understand and be aware of the impact of fixed orthodontic appliances on oral health. Users of fixed orthodontic appliance should commit to increase attention to oral hygiene and oral health. Fixed orthodontic appliances contribute to plaque retention and interfere with oral hygiene. Clinical and experimental studies have shown that the main etiology of inflammation in periodontal tissue is the presence of plaques and supragingival and subgingival bacteria. During orthodontic treatment, it is necessary to prevent the plaque buildup so that good oral hygiene will be obtained. Good oral hygiene is also influenced by the role of the dentist in providing the correct motivation and instruction from the beginning to the end of fixed orthodontic treatment. Routine controls to check oral hygiene of fixed orthodontic appliance users should be performed once a month.[21,8]

Based on the discussion above, it can be concluded that there is relationship between duration of fixed orthodontic treatment with periodontal status and treatment need among students in Faculty of Dentistry Universitas Muslim Indonesia Makassar in 2017.

REFERENCES
1. Herwanda, Rafinus A., Lindawati. *Pengetahuan Remaja Usia 15-17 Tahun di SMAN 4 Kota Bansa Aceh Terhadap Efek Samping Pemakaian Alat Ortodonti Cekat. Journal of Syiah Kuala Dentistry Society*. 2016; 1(1): 79.
2. Baheti, M.J., Nandlal G.T., Saurav D.B. *Oral Health in Orthodontic treatment: Preventive and Innovative Approach. journal of dentofacial sciences*. 2014; 3(3): 39-46.
3. Oley, A.B., Anindita, Michael. A.L. *Kebutuhan Perawatan Ortodonti Berdasarkan Index of Orthodontic Treatment Need pada Usia Remaja 15-17 Tahun. Journal e-GiGi*. 2015; 3(2) : 292.
4. Galag, C.J.R., Anadita, Olivia, W. *Status Kebersihan Mulut Pada Pengguna Alat Ortodonti Cekat Berdasarkan Oral Hygiene Index Simplified di SMAN 1 Manado. Jurnal e-GiGi*. 2015; 3(2) : 298-299.
5. Nasir, N. Sarah, A. Ulfat, B. Atta, U. *Effect Of Orthodontic Treatment On Periodontal Health, Pakistan Oral & Dental Journal*. 2011; 30(1) : 111-113.
6. Alfuriji S. Nora, A. Nasir, A. Ali. Moatazbellah, A. Nasser A. Amrita, G. *Review Article :The Effect of Orthodontic Therapy on Periodontal Health: A Review of the Literature. International Journal of Dentistry*. 2014; 1-8.
7. Badeia, R.A, Suhad M.A. *Periodontal health status and treatment need among Iraqi orthodontic patients wearing fixed appliance*, 2013; 10(1), 43-51.
8. Oktaviani, V. Oedijani, S. *Perbedaan Indeks Hygiene Oral dan pH Plak Kelompok Pemakai dan Bukan Pemakai Pesawat Ortodonti Cekat. Jurnal Kedokteran Diponegoro*. 2016; 5(1) : 54-55.

9. Hamsiah, S. *Perawatan Ortodonsi pada Orang Dewasa dengan Alat Cekat*. Makassar : Fakultas Kedokteran Gigi Universitas Hasanuddin. 2003. Page : 30.

10. Mokhtar, M. *Dasar-Dasar Ortodonti (Pertumbuhan dan Perkembangan Kraniodentofasial)*, Medan:Bina Insani Pustaka. 2002. Page : 1-3.

11. Momongan, R.E. Benedictus S. Juliatri. *Status Kebersihan Gigi dan Mulut Siswa SMA Negeri 9 Manado Pengguna Alat Ortodontik Cekat*. Universitas Sam Ratulangi Manado. 2015; 3(1) : 3-4.

12. Rahardjo, P. *Ortodonti Dasar*. 1st Ed. Surabaya : Airlangga University Press. 2009. Page : 90-91.

13. Yovela. Krinawati. *Penatalaksaan Kasus Protrusif Gigi Anterior Atas dengan Kelainan Periodontal pada Pasien Dewasa. Indonesian Journal of Dentistry*. 2009; 16(1) : 25, 30.

14. Waqiah, N. *Persepsi Masyarakat Terhadap Perawatan Ortodontik yang dilakukan oleh Pihak Non* Profesional. Bagian *ortodonti Universitas Hasanuddin*. 2014. Page : 23.

15. Guttenberg, S.A., 2012, *Cosmesis of The Mouth, Face and Jaws,* Willey-Blackwell, USA. Page : 39.

16. Rickyrianto, D. *Hubungan Lama Pemakaian Piranti Ortodonti Cekat dengan terjadinya Resesi Gingiva Pada Mahasiswa FKG UMI Makassar Tahun 2015*. Fakultas Kedokteran Gigi Universitas Muslim Indonesia. 2016. Page : 34.

17. Lastianny, S. F. *Dampak Pemakaian Alat Ortodontik Terhadap Kesehatan Jaringan Periodontal. Universitas Gadjah Mada*. 2012; 19(2) : 182.

18. Dhami, B. Priti, S. Rabindra M, Jyoti D. *Assessment of Periodontal Health in Nepalese Orthodontic Patients. Orthodontic Journal of Nepal*. 2013; 3(1) : 27.

19. Sandic, M. Z. Popovic B. Carkic J. Nikolic N. Glisic B. *Changes in Subgingival Microflora after Placement and Removal of Fixed Orthodontic Appliances*. 2014; 142(5-6) : 304.

20. Istiana, Y. Hartanti. *Pengaruh Lama Pemakaian Alat Ortodontik Cekat Terhadap Terjadinya Gingivitis Hiperplasia. Prodi Pendidikan Kedokteran Gigi FKIK UMY*. 2013. Page. 3.

21. Florman, M. *Soft Tissue Maintenance During Orthodontic Treatment*. ADA. 2007. Page : 2.