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CORRELATIVE STUDY BETWEEN MALOCCLUSION SEVERITY LEVEL AND ORAL HYGIENE STATUS AMONG STUDENTS AT SMP LPP WAKAF FOUNDATION UNIVERSITAS MUSLIM INDONESIA IN 2017

(Research report)

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ABSTRACT
Background: *Malocclusion is a dentofacial growth deviation that interferes with mastication, deglutination, speech and facial harmony. In Indonesia, the prevalence of malocclusion is constantly high (around 80%) which reached 90% among school-age adolescents in 1983 and 89% in 2006. Malocclusion condition, especially crowding, can generate plaque accumulation and calculus formation because of toothbrush inability to outreach interdental areas in crowded teeth.* ***Aims:*** *To determine the correlation between malocclusion severity level and oral hygiene status among class VII and VIII students at SMP LPP YW Universitas Muslim Indonesia Makassar in 2017.* ***Methods:*** *This study is an observational analytic study using cross-sectional design. Target population is class VII and VIII students at SMP LPP YW Universitas Muslim Indonesia Makassar. The data was collected using ICON and OHI-S assessment method. Statistical analysis was performed using Spearman test.* ***Results:*** *The results showed p value = 0.01 which means that there was a significant correlation between malocclusion severity level and oral hygiene status with r = 0.314.* ***Conclusion:*** *There is a significant correlation between malocclusion severity level and oral hygiene status among class VII and VIII students at SMP LPP YW Universitas Muslim Indonesia Makassar in 2017.*

Keywords: *Malocclusion, oral hygiene status, prevalence.*

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INTRODUCTION

In Indonesia, the prevalence of malocclusion is considerably high which reaches 80% among national population. This high prevalence can also be found among school-age adolescents where 90% were affected with malocclusion in 1983 and 89% in 2006. A study by Astuti (2011) also confirms that 60.2% adolescents were inflicted by this condition. Evaluating the necessity of treatment need, several types of occlusion index are presented to categorize malocclusion. One of them is *Index of Complexity, Outcome and Need* (ICON).[1,2,3]

Deviation in normal occlusion is known as malocclusion. It is a discrepancy in dentofacial growth which interferes with mastication, deglutination, speech, and facial symmetry. Broadly speaking, the etiology of malocclusion can

be categorized into genetic and local factors. The local factors themselves might includes premature loss, tooth persistence and trauma.[4,5]

Index of Complexity, Outcome and Need (ICON) is comprised of 5 components, each of which has different weights according to their concerns. First component is adapted from IOTN aesthetical section. Other components include upper jaw diastema, crossbite, open bite/anterior overbite, and anteroposterior relation of buccal segment. This index is frequently used to assess severity level of malocclusion. Malocclusion has been an immense problem for dental and oral health as it is ranked third after dental caries and periodontal diseases.[2,3]

Oral and dental heath among Indonesian society is habitually related to oral and dental hygiene. In regard of their growth and development, adolescents often experience various health problems and one of them is oral and dental hygiene issues. Unmaintained oral hygiene causes oral diseases as the consequence of food debris and calculus formation. Debris is food accumulation on dental surface which develops into plaque if left in abeyance. Dental plaque is a soft biofilm comprised of bacterial colonies which reproduce in the established matrix and adheres tightly to the surface of the teeth. If remains unclean, the plaque will develop into calculus. Calculus is a hard deposit resulted from dental plaque mineralization which attach around dental crown and root surface.[6,7,8,9,10]

Previous study by Denloye among adolescents in Nigeria reported average score of 1.57 for *Debris Index* (DI) and 1.48 for *Calculus Index* (CI) in respective population. The average score of *Oral Hygiene Index Simplified* (OHI-S) in male respondents reached 3.09 and classified in poor category, while female respondents obtained 2.94 to be classified in fair category. Using *Oral Hygiene Index Simplified* (OHI-S) by Green and Vermillion, oral hygiene index is assessed using this common parameter.[6,7,8]

Oral Hygiene Index Simplified (OHI-S) consists of two components: debris index and calculus index which are scored from 0-3. The examination includes six tooth surfaces which are buccal or labial surface of maxillary right first molar, maxillary right central incisor, maxillary left first molar, mandibular left central incisor, lingual surface of mandibular right and left first molar.[6]

Malocclusion condition, especially crowding, can promote calculus formation. It is attributed by the difficulty in tooth brushing where debris is frequently inaccessible and adheres in the interdental part of crowding area. This condition then contributes to plaque accumulation and calculus formation.[1,6]

This study aims to discover the correlation between malocclusion severity level and oral hygiene status among class VII and VIII students at SMP LPP YS Universitas Muslim Indonesia Makassar year 2017.

MATERIAL AND METHODS

This is an observational analytic study conducted at SMP LPP YW Universitas Islam Indonesia Makassar on January 2017. Target population was class VII and VIII students at SMP LPP YW Universitas Muslim Indonesia Makassar. Samples were obtained using *purposive sampling* technique based on the designated requirements. The number of sample was calculated using Slovin's formula in total of 148 students. Inclusion criteria is class VII and VIII students at SMP LPP YW Universitas Muslim Indonesia Makassar, with complete permanent teeth until first premolar, not conducting any orthodontics treatment, not obtaining any scaling treatment for the past 6 months and agree to attend at the time of assessment. Whereas exclusion criteria is comprised of students who use dentures, presented with interproximal caries and occlusal caries extending to the whole cusp, currently ill, and disagree to participate at the time of assessment.

Malocclusion severity level was measured using *Index of Complexity Outcome and Need* (ICON), where each score of the five ICON components in study models and progress models were documented. Later, the score was multiplied using standard which is possessed by each component (IOTN aesthetic component 7, crossbite 5, anterior vertical relation 4, diastema/upper jaw crowding 5, buccal segment anteroposterior relation 3). The result was subsequently calculated. The total score acquired from respective addition were then used as a guide to determine treatment need and malocclusion severity level. ICON

assessment was categorized into <29 = easy; 29-50 = mild; 51-63 = moderate; 64-77 = difficult; >77 = very difficult.[5,3]

Oral hygiene index assessment using *Oral Hygiene Index Simplified* (OHI-S) was performed by calculating *Debris Index* (DI) and *Calculus Index* (CI). The assessment was conducted on upper right first molar, upper right first incisor, upper left first molar, lower left first molar, lower left first incisor, and lower right first molar.[11]

OHI-S = D.I score + C.I score

Gender	N	%
Male	83	56,1
Female	65	43,9
Total	148	100

OHI-S formula: OHIS = DI score + CI score

OHI-S score: Good OH = 0.0-1.2; Fair OH = 1.3-3.0; Poor OH = 3.1-6.0.11

Instruments used were rubber bowl and spatula, impression tray, dental mirror, explorer, nierbeken, LED (*Light Emitting Diode*) lamp, stationery, toothbrush, bow, and copper wire. Meanwhile, required material were comprised of masker, handscoon, water, alginat, gips, cotton, 70% alcohol, betadine, toothpaste, informed consent paper, ICON status paper, OHI-S status paper.

Prior to the assessment, students were notified about research procedures. Informed consents were then distributed to be filled as the statement of disposition. Moreover, students were instructed to brush their teeth to equalize oral cavity condition before assessing oral hygiene status and obtaining dental impressions. OHI-S was subsequently assessed using *Oral Hygiene Index-Simplified* (OHI-S). Following the assessment, dental impression was later obtained by initially fitting the tray into dental arches to determine the size for each sample. After mixing impression material (alginat), dental impression was obtained and casted with dental gypsum to obtain study model. Study model was assessed using *Index of Complexity, Outcome and Need* (ICON) and *Spearman* correlation test was used to analyze the consecutive result.

RESULT

Distribution and frequency of class VII and VIII students at LPP YW Universitas Muslim Indonesia Makassar year 2017 based on gender, class and malocclusion severity level using *Index of Complexity, Outcome and Need* (ICON) was presented in table 1, 2 and 3 as follow.

Table 1. Distribution and frequency of class VII and VIII students at SMP LPP YW Universitas Muslim Inonesia Makassar year 2017 based on gender

Table 2. Distribution and frequency of class VII and VIII students at SMP LPP YW Universitas Muslim Indonesia Makassar year 2017 based on class

Class	N	%
VII	58	39,2
VIII	90	60,8
Total	148	100

Table 3. Distribution and frequency of class VII and VIII students at SMP LPP YW Universitas Muslim Indonesia Makassar year 2017 based on *Index of Complexity, Outcome and Need* (ICON)

Malocclusion Category	N	%
Easy	55	37,2
Mild	59	39,9
Moderate	11	7,4
Difficult	17	11,5
Very Difficult	6	4,1
Total	148	100

Distribution and frequency of class VII and VIII students at SMP LPP YW Universitas Muslim Inonesia Makassar 2017 based on oral hygiene status using *Oral Hygiene Index* (OHI-S) is presented in table 4.

Malocclusion	Oral Hygiene Status						Total		R	*p-value*
	Good		Fair		Poor					
	N	%	N	%	N	%	N	%		
Easy	42	29,1	13	8,1	0	0,0	55	100		
Mild	35	23,0	24	16,9	0	0,0	59	100		
Fair	5	3,4	6	4,1	0	0,0	11	100	0,314	0,01
Difficult	8	5,4	9	6,1	0	0,0	17	100		
Highly Difficult	1	0,7	3	2,0	2	1,4	6	100		
Total	61,5		37,2		1,4		100			

Table 4. Distribution and frequency class VII and VIII students of SMP LPP YW Universitas Muslim Inonesia Makassar year 2017 based on oral hygiene status

Oral Hygiene Status	N	%
Good	91	61,5
Fair	55	37,2
Poor	2	1,4
Total	148	100

Table 5. Correlation between malocclusion severity level and oral hygiene status among class

VII and VIII students at SMP LPP YW Universitas Muslim Indonesia Makassar year 2017

Table 1 demonstrates that the highest frequency is comprised of 83 male respondents (56.1%). Female samples are less frequent which composed of 65 respondents (43.9%) among 148 total samples (100%).

Table 2 presents the highest data frequency which is constituted by 80 students from class VIII (60.8%). Meanwhile, the lowest frequency was found to be 58 samples (10.1%) among class VII students in the total of 148 respondents (100%).

Table 3 illustrates 55 samples (37.2%) which are classified into easy malocclusion category, 59 samples (39.9%) in mild malocclusion category, 11 samples (7.4%) in fair category, and 17 samples in difficult category (4.1%) among 148 total samples (100%).

Table 4 depicts good oral hygiene status among 91 samples (61.5%), fair category among 55 samples (37.2%) and poor category in 2 samples (1.4%) among 148 total samples (100%).

Table 5 shows that easy malocclusion severity level with good oral hygiene can be found among 42 samples (29.1%), while 13 others (8.1%) were classified in fair category. No sample was

reported in poor oral hygiene category. Malocclusion severity level in very difficult category was comprised of 1 sample (0.7%) with good oral hygiene status, 3 samples (2.0%) with fair oral hygiene status, and 2 samples (1.4%) in poor category. The correlation coefficient (r) value illustrates 0.314 and p value = 0.01.

This value testifies the correlation between malocclusion severity level and oral hygiene status among class VII and VIII students at SMP LPP YW Universitas Muslim Indonesia Makassar 2017.

DISCUSSION

Based on the result of sample frequency and distribution, class VII and VIII students at SMP LPP YW Universitas Muslim Indonesia 2017 is comprised of 93 male students (56.1%) and 65 female students (43.9%) in the total of 148 samples (100%) based on gender. This data illustrates that male students experience malocclusion more frequent than female students.

While conducting the experiment at SMP LPP YW Universitas Muslim Indonesia Makassar, author perceives that this result is caused by male students' enthusiasm to participate in this study compared to female students which tend to be more unconfident and shy when their teeth assessed.

This result is supported by Asef Karim *et al* previous study in 2015 about orthodontic treatment need assessed using *Index of Complexity,*

Outcome and Need (ICON) among adolescents in Canada. It is mentioned that male respondents possess higher level of malocclusion severity than female (19% and 13% in very difficult category). Different result is obtained by Monica at SMP 2 Bitung where more female students presented in the study. It is also confirmed by Hedayati study at 2007 in Iranian which concluded that female respondents is more aware in their teeth condition and appearance while male respondents are less care about these problems. This study result is different than Monica and Hedayani's because the number of male sample at SMP LPP YW UMI Makassar is higher than female.[12,13,14]

Based on malocclusion severity level, the result of sample distribution and frequency in class VII and VIII students at SMP LPP YW Universitas Muslim Indonesia 2017 reports that easy malocclusion category was found among 55 samples (37.2%), mild malocclusion category among 59 samples (39.9%), moderate malocclusion category among 11 samples (7.4%), difficult malocclusion category among 17 samples (11.5%) and very difficult category among 6 samples (4.1%) in the total of 148 samples (100%). This illustrates that students at SMP LPP YW Universitas Muslim Indonesia Makassar are generally categorized in mild and easy malocclusion category which amounted in 59 samples and 55 samples (39.9% and 37.2%) respectively, while the least data is presented by 6 samples (4.1%) in very difficult category.

This study used *Index of Complexity, Outcome and Need* (ICON) as measuring tool to assess malocclusion severity level among study samples. This index possesses 5 assessment components to be scored. After the calculation, mild malocclusion category (39.9%) obtained the highest samples frequency. If sorted by inclusion criteria, a part of study samples should be categorized as difficult malocclusion as the average crowding condition is presented among the samples. Nevertheless, the result is different after assessed using *Index of Complexity, Outcome and Need* (ICON) which merely presented a few number in difficult malocclusion category (11.5%).

Index of Complexity, Outcome and Need (ICON) is used to assess malocclusion severity level. This index is comprised of 5 components namely aesthetic, crossbite, anterior vertical relation, diastema/upper arch crowding and buccal segment anterior relation. Each component possesses definite standard to be multiplied with each component score and enumerated. The sum was eventually classified into malocclusion category.[3]

The result of this study is emphasized by Aikins *et al* study in 2011 about malocclusion severity level among adolescents at Rivers State, Nigeria. The study demonstrates that simple and mild malocclusion categories were obtained in 42.6% and 28.3% samples respectively. While Utomi *et al* (2007) conducted a study at Nigeria and obtained similar result that malocclusion severity level mostly found in easy and mild malocclusion category. This result is different with Hariyanti *et al* (2011) study about malocclusion severity level using I*ndex of Complexity, Outcome and Need* (ICON) at RSGM-P UNAIR, where the highest number of samples was classified in fair malocclusion category (40%) and the least was found in very difficult malocclusion category. From this study, it can be obtained that the result is different than Hariyanti *et al* study because mild malocclusion category (39.9%) is the most frequent category to be found.[15,16,3]

The result of data distribution and frequency based on oral hygiene status among class VII and class VIII students at SMP LPP YW Universitas Muslim Indonesia 2017 depicts good oral hygiene status among 91 samples (61.5%), fair oral hygiene status among 55 samples (37.2%), and poor category status among 2 samples (1.4%) in the total of 148 samples (100%). It is illustrated that students at SMP LPP YW Universitas Muslim Indonesia Makassar mostly possess good oral health category and the least number in poor oral hygiene category.

From this result, it can also be observed that students at SMP LPP YW Universitas Muslim Indonesia Makassar acquire high awareness in tooth brushing. Author assumes that low *Oral Hygiene Index Simplified* (OHI-S) score was obtained since the samples were instructed to brush their teeth to equalize oral condition prior to the examination thus this affect *Debris Index* (DI)

score by reducing plaque and food debris. However, calculus could not be eliminated by tooth brushing thus *Calculus Index* (CI) will remain unaffected. In accordance with the theory, dental plaque is generally found in the posterior teeth and lingual surface of the teeth. Crowding teeth become one of the risk factor in plaque formation. Dental plaque is a soft deposit attached closely on tooth surface, comprised of reproducing microbiology in intercellular matrix when proper tooth brushing is neglected. If left unclean, calcified plaque will soon transform into calculus.[11]

Similar result is found in Momonang *et al* (2014) study about oral hygiene status among SMA Negeri 9 Manado students. The samples were mostly classified in good oral hygiene category (56.4%) and no samples in poor category. Although the result of the study demonstrates good level of awareness in maintaining oral hygiene status, several students also illustrate less awareness by having smoking habit which affecting oral hygiene status. There is also Lesar *et a*l study in 2015 about oral hygiene status at SMP Advent Watulaney Kabupaten Minahasa which declares that the students were mostly classified in fair oral hygiene category (65.08%). The result by Lesar *et al* is different than the conducted study because good oral hygiene status (61.5%) is reported as the most frequent category.[17,7]

The result of the study reveals that lower malocclusion severity level will result in better oral hygiene status. The higher malocclusion severity level is, the poorer the oral hygiene will be. This study concedes that crowding become one of influencing factors for oral hygiene status. It is caused by inaccessible food debris by tooth brush which attached in crowded area thus causing the accumulation of plaque and the formation of calculus. Oral hygiene status should be maintained to prevent plaque and calculus as it is an etiology for dental caries and periodontal disease. Oral hygiene itself is an effort to maintain the health and hygiene of oral and dental tissues via tooth brushing and flossing to eliminate plaque and food debris between the teeth. Considered as one of modifying factors, oral hygiene maintenance behavior is important where habitual formation can be obtained from environment such as daily life experience. The samples who frequently tooth brushing twice a day, in the morning and night, will require no scaling treatment for the last 6 months.[1,6,18]

The result of correlative study between malocclusion severity level and oral hygiene status is also demonstrated by Sasea *et al* (2013) who investigate about crowded teeth and oral hygiene status relationship among college students at Faculty of Dentistry UNSRAT. This study indicates that students with crowded teeth possessed fair oral hygiene status (66.67%). A study by Tiwari *et al* (2016) about the relation of malocclusion and oral hygiene status among elementary students at Bhopal city also depicts the same result as this study. It is obtained that the higher malocclusion severity level is, the poorer oral hygiene status will be.[1,19,18] Based on this study, it can be concluded that there is a correlation between malocclusion severity level and oral hygiene status among class VII and VIII students at SMP LPP YW Universitas Muslim Indonesia Makassar year 2017.

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