

DENTIN
JURNAL KEDOKTERAN GIGI
Vol VII. No 1. April 2023

**CORRELATION BETWEEN THE SEVERITY LEVEL OF MALOCCLUSION
AND ORAL HYGIENE STATUS IN STUDENTS AT SMPN 1
MARABAHAN**

Dilla Mayarani¹⁾, Diana Wibowo²⁾, Aulia Azizah³⁾

¹⁾Faculty of Dentistry, Lambung Mangkurat University, Banjarmasin Indonesia

²⁾Departement of Orthodontics, Faculty of Dentistry, Lambung Mangkurat University, Banjarmasin Indonesia

³⁾Departement of Public Dental Health, Faculty of Dentistry, Lambung Mangkurat University, Banjarmasin Indonesia

ABSTRACT

Background: Malocclusion can affect oral hygiene through several circumstances, one of which is the attachment of debris and calculus due to difficulties in tooth brushing. Debris will be inaccessible and attached to the interdental part of the teeth which causes the accumulation of plaque as well as calculus.

Purpose: The purpose of this research was to analyze about correlation between the severity level of malocclusion with the OHI-S status in students at SMPN 1 Marabahan. **Material and Methods:** This research is an observational analytic study using cross sectional approach. The sample size in this research was 46 samples of SMPN 1 Marabahan student. Data collection was performed using IOTN-DHC and OHI-S. Data analysis consisted of univariate analysis which described the character from each variable and bivariate analysis which connected two variables with spearman test. **Results:** The severity level of malocclusion at SMPN 1 Marabahan based on the highest IOTN-DHC was in the great need for orthodontic treatment category comprising of 19 respondents (41.30%). The oral hygiene status based on the highest OHI-S was in the category of poor with a total of 24 respondents (52.17%). **Conclusion:** There is a correlation between the severity level of malocclusion and oral hygiene. Higher severity level of malocclusion will affect oral hygiene status.

Keywords: Adolescent, IOTN-DHC, Malocclusion, OHI-S, Oral hygiene.

Correspondence: Dilla Mayarani, Faculty of Dentistry, Lambung Mangkurat University, Jalan Veteran No. 128B, Banjarmasin 70249, Indonesia; E-mail: dillamayarani@gmail.com

INTRODUCTION

Dental and oral health are primary components of physical wellness, if oral health is disturbed then it will generally affect the body. The 2018 National Basic Research result shows that the prevalence of dental and oral health cases was 57.6%. South Kalimantan is one of Indonesia provinces that had a moderately high number of dental and oral health problems that was 60% and Barito Kuala Regency has the highest case of dental and oral health problems in South Kalimantan that was 48.6%. One of the dental and oral health problem is malocclusion.^{2,3}

Malocclusion is a deviating occlusion in which there is a condition of irregular teeth and abnormal position in the dental arch. Malocclusions characteristics are missing teeth, overjet, crossbite, displacement, and overbite.

Malocclusion can happen at any age, one of which is adolescent. The 2013 National Basic Health Research shows that the prevalence of malocclusion on 12-14 years of age in South Kalimantan was 15.6%.^{1,13,2}

Malocclusions severity level is measured with various tools, one of which is using Index of Orthodontic Treatment Need (IOTN). IOTN is an index that used to see the impact of malocclusion towards the condition of someones psychosocial and dental and oral health. IOTN is divided into two components which are AC (Aesthetic Component) and DHC (Dental Health Component). DHC is an index that used to record criteria of posterior teeth occlusal that gives effect towards long-term dental and oral health.^{1,4}

Malocclusion can affect oral hygiene, one of which is attachment of the debris and calculus

due to the difficulty in tooth brushing. The debris cannot be accessed and attached to the interdental part which causes the accumulation of plaque and calculus. The result of Counsul et al (2017) research in 7th and 8th grade students at SMP LPP YW Universitas Muslim Indonesia shows that there was a correlation between malocclusion severity level with oral hygiene status, so it can be concluded that lower malocclusion severity level will result in better dental health status.¹⁰

Oral health assessment can be measured with Oral Hygiene Index Simplified (OHI-S). It is determined by adding Debris Index Simplified (DI-S) and Calculus Index Simplified (CI-S). OHI-S assessment including six surfaces of index teeth which are labial surface or the buccal of maxillary right first molar, maxillary left first molar, mandible left central insisivus, and mandibular right first molar that are examined using explorer or probe and dental mirror.^{5,6}

This research was conducted at SMP Negeri 1 Marabahan. SMP Negeri 1 Marabahan is a school that is located in Barito Kuala Regency, South Kalimantan Province. The result of preliminary study of 15 students obtained 60% students were experiencing malocclusion, so the researcher feel the need to examine malocclusion cases and OHI-S status in students of SMPN 1 Marabahan. This result justifies the determination of research location.

Based on the description above, the researcher is interested in doing a research to discover the correlation between the severity level of malocclusion in students at SMPN 1 Marabahan which is measured based on the Index of Orthodontic Treatment Need–Dental Health Component (IOTN-DHC) and oral hygiene status with Oral Hygiene Index Simplified (OHI-S).

MATERIALS AND METHODS

This research was begun by collecting research permission and ethical clearance issued by Health Research Ethical Committee of Dental Faculty Lambung Mangkurat University No. 031/KEPK-FKGULM/EC/I/2020. This study is an observational analytic study with cross sectional approach which is the research data was taken at one time. The population of this study was all students at SMPN 1 Marabahan that are 294 students. The amount of sample was calculated with simple random sampling technique with inclusion criteria, which were students in mix or permanent dentition, experiencing malocclusion, submitting informed consent from the parents, and willing to be examined. The exclusion criteria were student

that uses denture, student that is undergoing orthodontics treatment and student that shows gag reflex at the impression of the dental arch. The tools used in this research were mask, gloves, dental apron, calipers, iron ruler, scalloped mold spoon, rubber bowl, alginate spatula, gypsum spatula, IOTN examination paper. The materials used in this research were normal setting alginate, type 3 gypsum, tissues, disclosing agent, vaseline, cotton palate, and water.

The operator visited the research site to make a sample selection randomly. The research procedure was specified to the respondents who were also required to submit informed consents after their willingness to participate in the study. Oral hygiene was examined and assessed by the operator. The procedure was initiated by the preparation of dental impression. The researcher also made preparations before jaw molding, by giving instructions to wear apron and adjust in the impression tray that suits the mouth. Further, upper and lower jawa were impressed using alginate. The casting was also performed using type 3 gypsum. The cast that had already set was measured with calipers and iron ruler, then adjusted to IOTN component. The obtained data from IOTN-DHC and OHI-S then proceeded and analyzed.

The data were retrieved using IOTN-DHC and OHI-S. Univariate analysis was conducted to describe the characteristics of each variable that are independent variable (malocclusion severity level) and dependent variable (students OHI-S status). Each datum was presented in the form of a table. Bivariate analysis is an analysis used to analyze two variables. Research on two variables is commonly aimed to describe data distribution, to test the difference and measured the correlation between two researchs variables. Bivariate analysis was directed to determine the correlation between independent variable (malocclusion severity level) and dependent variable (students OHI-S status) using spearman correlation test.¹⁶

RESULT

Based on IOTN-DHC assessments, malocclusion severity level of students at SMPN 1 Marabahan obtained was presented in the table below:

Table 1. Frequency Distribution of Malocclusion Severity Level Based on Index of Orthodontic Treatment Need–Dental Health Component (IOTN-DHC) in students of SMPN 1 Marabahan.

Malocclusion Severity Level	Total (n)	Percentage (%)
No need for Orthodontic treatment	2	4.35%
Little need for Orthodontic treatment	2	4.35%
Moderate need for orthodontic treatment	9	19.57%
Great need for Orthodontic treatment	19	41.30%
Very great need for Orthodontic treatment	14	30.43%
Total	46	100%

Based on table 1, it is obtained that the samples were mostly assessed in great need for orthodontic treatment category comprising of 19 respondents (41.30%) compared to other categories.

Based on OHI-S assessments, oral hygiene status in students at SMPN 1 Marabahan was presented on the below table:

Table 2. Frequency Distribution of Oral Hygiene Status Based on Oral Hygiene Index Simplified (OHI-S) in students of SMPN 1 Marabahan

Oral Hygiene Status	Total (n)	Percentage (%)
Good	4	8.70%
Fair	18	39.13%
Poor	24	52.17%
Total	46	100%

Based on table 2 the highest average score of OHI-S is in poor category that is 52.17%. The higher the malocclusion severity level, the more it affects oral hygiene status.

Table 3. Frequency Distribution of Malocclusion Severity Level Using Index Of Orthodontic Treatment Need-Dental Health Component (IOTN-DHC) and Oral Hygiene Status Using Oral Hygiene Index Simplified (OHI-S) in Students of SMPN 1 Marabahan.

Malocclusion Severity Level (IOTN-DHC)	Oral Hygiene Status			
	Good	Moderate	Bad	Total
No need for Orthodontic treatment	1	1	0	2
Little need for Orthodontic treatment	1	1	0	2
Moderate need for Orthodontic treatment	1	7	1	9
Great need for Orthodontic treatment	1	7	11	19
Very great need for Orthodontic treatment	0	2	12	14
Total	4	18	24	46
Significance	0.000005*			
Correlation Coefficient	0.619			

Based on table 3 adverd that the most assessed malocclusion severity level (IOTN-DHC) was in very great need for orthodontic treatment categories with a poor oral hygiene status. That was observed in 12 respondents. The second most frequent is great need for orthodontic treatment category of IOTN-DHC with a bad status of OHI-S that is 11 respondents.

Bivariate analysis is consisted of inferential statistic methods that can be used to analyze two research variables data. A research of two variables is usually subjected to describe data distribution, test the difference and measure the correlation between two variables. Bivariate analysis was directed to see the correlation of the independent variable (malocclusion severity level) to the dependent variable (students OHI-S status) with a spearman correlation test.

Spearman test resulted in a value of 0.000005 ($p < 0.05$) as presented in table 3. Based on table 3, there is a significance of severity level of malocclusion with OHI-S status in this research that is 0.000005 which disclosed a correlation between malocclusion severity level with OHI-S

status. This corresponds to the research hypothesis that there is a correlation between malocclusion severity level and OHI-S status in students at SMPN 1 Marabahan. Correlation coefficient value in this research is 0.619 (strong correlation).

DISCUSSION

The most frequent malocclusion severity level based on IOTN-DHC is in the category of great need for orthodontic treatment that is 41.30% and very great need for orthodontic treatment that is 30.43%. The result of researcher observation shows that the most occurrent dental problem is missing teeth and displacement of contact. Many students experienced missing teeth, one of which is caused by deciduous tooth extraction from early age. If the space of missing teeth is not replaced in a long time and prothesis or dentures are not installed, it will cause the drifting of dental inclination which later covers the edentulous space, the resulted in malocclusion and other dental health problems.⁷ Deciduous teeth function as a guide for permanent teeth eruption. If the teeth are extracted early, then permanent teeth will lose its direction so that it will not erupt in appropriate place resulting in malocclusion.⁸

The highest prevalence of oral hygiene status based on OHI-S index in students was the poor category that was 52.17%, fair category that was 39.13%, and good category that was 8.70%. Malocclusion condition is frequently found at the age of 12-14 years. Malocclusion also causes problems in teeth brushing such as difficulty of bristle to access interdental area resulting in plaque and calculus accumulated.^{9,10}

The most frequent severity level of malocclusion and oral hygiene status is the very great need for Orthodontic treatment category with a total of 12 respondents. The second most frequent is IOTN-DHC of great need for orthodontic treatment category and poor OHI-S category with a total of 11 respondents. Based on the aforementioned data, the higher the malocclusion severity level, the worse the OHI-S status will be. This result corresponds with a research by Counsul at SMP LPP YW Universitas Muslim Indonesia that found 91 respondents in good category (61.5%), 55 respondents fair category (37.2%), and 2 respondents poor category (1.4%). Lower malocclusion severity level will result in better OHI-S status and higher malocclusion severity level will cause poor oral health.¹⁰

The significance of malocclusion severity level with OHI-S status was 0.000005 with 0.619 correlation coefficient. The closeness of

correlation between variables can be seen from correlation coefficient in which greater value will indicate stronger correlation. Correlation coefficient in this research is 0.619 which means that the variables in this research are strongly correlated.¹⁴ This result corresponds to a research by Counsul that the correlation between the severity level of malocclusion with Index Of Complexity Outcome and Need (ICON) and OHI-S obtained 0.01 sig. value while correlation coefficient was 0.314 (weak correlation).¹⁰ A research by Muzzaki at SMPN 1 Marabahan found the significance value between IOTN-DHC and PIDAQ was 0.00001 with 0.636 correlation coefficient (strong correlation).¹¹

The only index used by the researcher was IOTN-DHC rather than other indexes such as IOTN-AC because IOTN-AC examination is quite subjective since it is assessed by looking at 10 photos of anterior teeth that were concerned. When actual examination was performed, the original state of the teeth reveals many debris and calculus. Whereas, IOTN-DHC assessed subjectively by examining the teeth and measuring by recording the occlusal criteria of the worst posterior teeth malocclusion which affects dental health and long-term function that correlates with OHI-S examination. This matter shows that the appearance of an anterior teeth that are ideal or attractive may not necessarily have other anomaly teeth. IOTN-DHC assessment also differ in term that the evaluation is performed not only in the anterior but also posterior teeth.¹⁷

The advantage of IOTN index includes the evaluation in study model or direct examination to patient teeth, uncomplicated use, tested and verified validity as well as the realibility, and the assessment of occlusal index based on the requirement level criteria of the orthodontic treatment.¹⁵

Management for malocclusion of the teeth is by conducting proper tooth brushing technique. Many tooth surfaces will be difficult to access with toothbrush bristles, especially the interdental part, resulting in the need of dental floss to clean food debris that is attached on the surface to the teeth, gargling with oral antiseptic to inhibit the growth of bacteria-caused plaque in oral cavity and routine dental visit for scaling and root planning.¹²

It can be concluded that there is a correlation between the severity level of malocclusion and oral hygiene status. Higher severity level of malocclusion will affect the status of oral hygiene.

REFERENCES

1. Rahardjo P. *Ortodonti Dasar Edisi 2*. Surabaya: Airlangga University Press; 2012. P. 198-204.
2. Kementerian Kesehatan RI, laporan Hasil Kesehatan Dasar (Kemenkes) Provinsi Kalimantan Selatan Tahun 2013. Jakarta: Badan Penelitian Dan Pengembangan Kesehatan Departemen Kesehatan RI. 2013. P. 115-129.
3. Kementerian Kesehatan RI, laporan Hasil Kesehatan Dasar (Kemenkes) Provinsi Kalimantan Selatan Tahun 2018. Jakarta: Badan Penelitian Dan Pengembangan Kesehatan Departemen Kesehatan RI. 2018. P.1-5.
4. Gill D. *Orthodontics at a glance*. Jakarta: EGC; 2014. P. 25-30.
5. Wahyuningsih S, Hardjono S, Suparwati S. Perawatan Maloklusi Angle Klas I dengan Gigi Depan Crowding Berat dan Cross Bite menggunakan Teknik Be pada Pasien dengan Kebersihan Mulut Buruk. *Maj Ked Gi*. 2014; 21(2): 205-211.
6. Soeprapto A. *Buku Pedoman Dan Tatalaksana Praktik Kedokteran Gigi*. Yogyakarta: STPI Bina Insan Mulia; 2017. P.103-142.
7. Novianty SI. Penggunaan Pir T-Loop untuk Perbaikan Inklinasi (Mesial Tipping) Gigi Molar Kedua Permanen Rahang Bawah. *ODONTO Dental Journal*. 2017; 4(2): 143-148.
8. Rezalinoor MA, Kurniawan FKD, Wibowo D. Gambaran Tingkat Kebutuhan Perawatan Ortodonti di SMPN 2 Takisung Berdasarkan Index Of Orthodontic Treatment Need. *Dentino Jurnal Kedokteran Gigi*. 2017; II (2): 188-193.
9. Bahirrah S. Relationship of Crowded Teeth and Oral Hygiene Among Urban Population in Medan. *IOP. Conf. Series Earth and Environmental Sciences*. 2018; 1-10.
10. COUNSUL R, Puspitasari Y, Aslan S. Correlative Study Between Malocclusion Severity Level and oral Hygiene Status Among Students at SMP LPP Waqaf Foundation Universitas Muslim Indonesia in 2017. *Dentino Jurnal Kedokteran Gigi*. 2019; IV(1): 87-93.
11. Muzakki ER, Wibowo D, Rasyid NI. Correlation Between Orthodontic Treatment Needs and Psychosocial Condition of Adolescents in SMPN 1 Marabahan. *Dentino Jurnal Kedokteran Gigi*. 2020; V(1): 39-43.
12. Nurlila RU, Fua JL, Meliana. Pengaruh Pendidikan Kesehatan terhadap Pengetahuan tentang Kesehatan Gigi pada Siswa di SD Kartika XX-10 Kota Kendari tahun 2015. *Jurnal Al-Ta'dib*. 2016; 9(1): 104-105.
13. Bakar A. *Buku Kedokteran Gigi Klinis Ed.2*. Yogyakarta: CV. Quantum Sinergis Media; 2012. P.124
14. Safitri WR. Analisis Korelasi Pearson dalam Menentukan Hubungan antara Kejadian Demam Berdarah dengue dengan Kepadatan Penduduk di Kota Surabaya pada Tahun 2012-2014. *Scientific Journal Of Nursing*. 2016; 2(2): 1-9.
15. Avinash B, Shialinga BM, Balasunramanian S, Shekar S. The Index of Orthodontic Treatment Need – A Review. *International Journal of Recent Scientific Research*. 2015; 6(8): 5389-5835.
16. Dahlan S. Besar Sampel Dalam Penelitian Kedokteran dan Kesehatan Seri 1 Edisi 6. Jatinangor: Epidemiologi Indonesia; 2014. P. 88-95.
17. Kolonio FE, Anindita PS, Mintjelungan CN. Kebutuhan Perawatan Ortodonti Berdasarkan Index Of Orthodontic Treatment Need Pada Siswa Usia 12-13 Tahun Di SMP Negeri 1 Wori. *Jurnal e-Gigi (EG)*. 2016; 4(2): 262-263.