Dental Journal
Majalah Kedokteran Gigi

Research Report

Socioeconomic status and orthodontic treatment need based on the Dental Health Component

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ABSTRACT

Background: *The dental health component (DHC) is used to assess different malocclusions by evaluating the number of teeth, overjet, overbite and contact points of each tooth. This index is subjectively influenced by socioeconomic factors.* **Purpose:** *This study aimed to determine the overview of the socioeconomic status and orthodontic treatment need based on the DHC of State 15 Medan Junior High School students.* **Methods:** *This study represented a descriptive research featuring cross-sectional design. The subjects of this study consisted of 100 high school students. This study was conducted by making dental impressions and distributing questionnaires. Data analysis was conducted with SPSS 17.0 software using a descriptive statistical test and presented in a distribution and frequency table.* **Results:** *89% of subjects demonstrated DHC levels of 1-2. 66.3% of subjects with parents of secondary education level had DHC grades 1-2, followed by 31.5% with parents of higher education level and 2.2% with parents of basic education level. The majority of subjects with DHC grades 1-2 had parents occupying class 2 jobs and the lowest number of students had parents holding class 4 jobs. The majority of the subjects with DHC grades 1-2 (77.5%) were of low income parents.* **Conclusion:** *The largest distribution of orthodontic treatment need based on DHC among students of State 15 Junior High School occurred at levels 1-2 which either required or did not require minor orthodontic treatment. The majority of the students with DHC grades 1-2 have parents of secondary education level, a class 2 job and a low monthly income.*

Keywords: *malocclusion; orthodontic treatment need; dental health component; socioeconomic status; junior high school students*

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INTRODUCTION

Malocclusion is defined as the deviation of tooth position beyond the normal jaw arch[1] whose prevalence varies worldwide. Based on a 2013 Indonesian National Health Research report, 14 provinces record oral health problems (24.9%) and the prevalence of malocclusion in Indonesia remains high, at approximately 80% of the population.[2] Based on research conducted by Wijayanti *et al.*[3] the prevalence of malocclusion among 12-14 year olds attending junior high schools in Jakarta was 83.3%, making it the third most frequent oral and dental problem after tooth caries and periodontal disease. The results of the study showed that most young children experienced malocclusion due to a lack of awareness of dental treatment and bad habits such as thumb sucking and lip biting. Therefore, efforts should be made to curb the incidence rate by means of, among other approaches, early detection and prevention of malocclusion.[3,4]

The severity of malocclusion will have an impact on oral function, occurrence of periodontal diseases and facial aesthetics.[5] Reviews of psychological studies suggest that malocclusions affecting physical appearance may have an unfavorable impact on the psychological development of adolescents.[6] Adolescence is an important stage in the life of any individual because it is the transitional period from childhood to adulthood, whereby physical, mental and psychosocial changes rapidly affect various aspects of life.[7] The need for orthodontic treatment is not only influenced by objective research, but also by subjective

judgment of aesthetics, sociocultural and socioeconomic factors.[8] According to Rahayu,[9] socioeconomics constitute a combination of education, employment and income. The research conducted by Oley et al.[5] suggests that socioeconomic status affects the need for orthodontic treatment. Parents of high socioeconomic status have a more elevated level of awareness and therefore prioritize regular visits to the dentist, whereas parents of lower socioeconomic standing lack the economic means to afford dental treatment.[5]

The index of orthodontic treatment need (IOTN) had been internationally accepted and judged to be valid, reliable and easy to use. The index of orthodontic treatment consists of two components, the aesthetic component (AC) and the dental health component (DHC).[10,11] The latter is used to objectively assess multiple malocclusions using hypodontia, overjet, crossbite, contact point and overbite measurements. DHC consists of a malocclusion severity scoring system, whereby a score of 1-2 indicates the need for mild orthodontic treatment or no treatment. A score of 3 indicates the need for borderline or moderate treatment and a score of 4-5 indicates the need for utmost care (Table 1).[8,11–13]

The study by Oley et al[5] involving 390 Tondano State 3 Junior High School students showed that, based on the DHC, 51.56% did not require treatment, 35.94% needed mild care and 12.5% were in desperate need of treatment. This high level of awareness about the desirability of visiting a dentist stems from the higher socioeconomic status of the students.[5] In addition, a study by Badran et al.[14] of 550 13-17 year old students in four public and private schools in Amman using IOTN confirmed 17.1% of children of low socioeconomic

Table 1. Dental health components of the IOTN.[13]

Grade 1 (None)	
1.	Extremely minor malocclusions including contact point displacements less than 1 mm.
Grade 2 (Mild treatment need)	
2.a	Increased overjet greater than 3.5mm, but less than or equal to 6mm with competent lips.
2.b	Reverse overjet greater than 0 mm but less than or equal to 1 mm.
2.c	Anterior or posterior crossbites with less than or equal to 1mm discrepancy between the retruded contact and intercuspal positions.
2.d	Contact point displacements greater than 1mm, but less than or equal to 2mm.
2.e	Anterior or posterior open bite greater than 1mm, but less than or equal to 2mm.
2.f	Increased overbite greater than or equal to 3.5mm without gingival contact.
2.g	Pre-normal or post-normal occlusions with no other anomalies (includes up to half a unit discrepancy).
Grade 3 (borderline/ moderate treatment need)	
3.a	Increased overjet greater than 3.5mm but less than or equal to 6mm with incompetent lips.
3.b	Reverse overjet greater than 1mm,but less than or equal to 3.5mm.
3.c	Anterior or posterior crossbites with greater than 1mm but less than or equal to 2mm discrepancy between retruded contact position and intercuspal position.
3.d	Contact point displacements greater than 2mm, but less than or equal to 4mm.
3.e	Lateral or anterior open bite greater than 2 mm,but less than or equal to 4mm.
3.f	Deep overbite complete on gingival or palatal tissues, but without trauma.
Grade 4 (Great need of treatment)	
4.a	Increased overjet greater than 6mm, but less than or equal to 9mm.
4.b	Reverse overjet greater than 3.5mm with no masticatory or speech difficulties.
4.c	Anterior or posterior crossbites with greater than 2mm discrepancy
4.d	Severe contact point displacements greater than 4mm.
4.e	Extreme lateral or anterior open bite greater than 4mm.
4.f	Increased and completed overbite with gingival or palatal trauma.
4.h	Less extensive hypodontia requiring pre-restorative orthodontic or orthodontic space closure to obviate the need for prosthesis.
4.l	Posterior lingual crossbite with no functional occlusal contact in one or both buccal segments.
4.m	Reverse overjet greater than 1mm but less than 3.5mm with reported masticatory or speech difficulties.
4.x	Presence of supernumerary teeth.
Grade 5 (Great need of treatment)	
5.a	Increased overjet greater than 9mm
5.h	Extensive hypodontia with restorative implications (more than one tooth missing in any quadrant) requiring pre-restorative orthodontics.
5.i	Impeded eruption of teeth (except for third molars) due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth and any pathological cause.
5.m	Reverse overjet greater than 3.5 mm with reported masticatory or speech difficulties.
5.p	Defects of cleft lip and palate and other craniofacial anomalies.
5.s	Submerged deciduous teeth.

status as having no malocclusion or requiring only mild care, whereas 20.3% desperately needed care. In contrast, 8.3% of children of high socioeconomic status presented no malocclusions or required only mild treatment, while 5.9% were in great need of care.[14]

The lack of research into the level of orthodontic treatment need based on the dental health component (DHC) and socioeconomic status in Medan interests researchers in determining an overview of the socioeconomic status and level of DHC-related orthodontic treatment need based among students of State 15 Junior High School, Medan.

MATERIALS AND METHODS

This study constituted descriptive research featuring a cross-sectional design. A total of 100 students of State 15 Junior High School in Medan were selected as subjects of this research with a minimum sample size of 87, determined by using a categorical descriptive formula. The institution selected constituted a public school whose students were drawn from various socioeconomic backgrounds. This study was conducted from September 2016 to February 2017. A simple random sampling method was employed whereby subjects were indiscriminately selected to participate in this study with the estimated sample size being calculated using an approximated proportion of the population. Prior to initiation of this research, ethical approval was obtained from the University of North Sumatera Health Research Ethics Committee (76/270217/KEPK FK USU-RSUP HAM/2017). The inclusion criteria were as follows: 15-17-year old State 15 Junior High School male and female students, willing to participate as research subjects, with no history of requiring orthodontic treatment and possessing complete dentition (excluding the third molars). Students suffering dental decay, with a previous history of orthodontic treatment or who were currently undergoing it or who presented observable asymmetry of the jaw were excluded from this research. The rejection criteria applied to subjects during this study included: ill-health, inability to attend school and interrupted study.

All subjects were informed that the provision of written informed consent would ensure their inclusion in this study. Data on the socioeconomic status of each consenting respondent was obtained by means of a questionnaire containing open-ended items. The intraoral condition of each subject was examined to verify the presence of decay and malocclusions before dental impressions were taken using normal-setting alginate (Hygedent, Inc., Beijing, China). Dental stone type III (Heraeus-Kulzer GmbH, Hanau, Germany) was immediately poured into the dental impressions to obtain the study model (Figure 1). Assessment of the need for orthodontic treatment was conducted by measurement of the study model applying the examination criteria of overjet, overbite, crossbite, contact point shift and hypodontia. Repeated measurements were taken by inter-operators (H.F.L. and H.P.L.) to confirm the measurement results and reduce bias. Furthermore, the results were later classified according to the level of orthodontic treatment need based on DHC.[12,14] All statistical analysis was performed with the Statistical Package for the Social Sciences (SPSS), version 17.0 (SPSS, Inc., Chicago, IL, USA) using the descriptive statistical test and presented in a distribution and frequency table.

RESULTS

The results showed that majority of the subjects did not require orthodontic treatment (DHC grades 1-2), with only a handful of students in desperate need of it (DHC grades 4-5) (Figure 2). The recording of the highest level of parental education and orthodontic treatment requirements of students based on DHC showed that a majority of those with DHC grades 1-2 had parents with a secondary education. For DHC grade 3, some subjects had ones with a secondary education, whereas some subjects had parents with a higher education. As for DHC grades 4-5, most of the students have ones who progressed to higher education. (Figure 3).

Figure 1. Clinical malocclusion as observed from the study model.

Orthodontic treatment needs based on DHC

- No Need (Grade 1-2)
- Borderline Need (Grade 3)
- Definitive (Grade 4-5)

8%
3%
89%
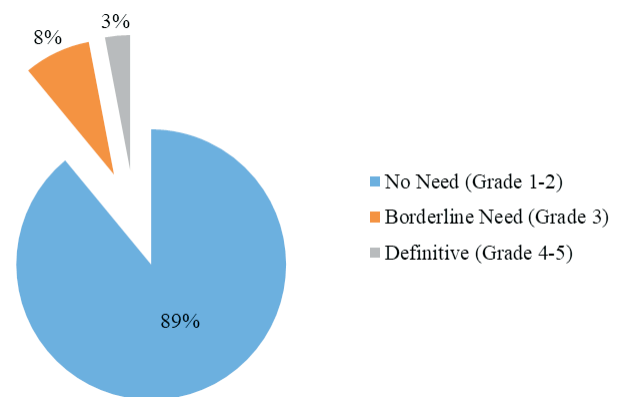
Figure 2. Distribution of orthodontic treatment needs based on DHC.

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The results of parental employment level and orthodontic treatment need based on the DHC of students showed that a majority of the subjects with DHC grades 1-2 had parents with a class 2 job, while the lowest number of students had ones occupying a class 4 job. For DHC grade 3, most subjects have parents with class 2 jobs. As for DHC grades 4-5, a majority of the subjects have ones also holding a class 2 job (Figure 4).

The results for the monthly parental income of State 15 Junior High School students and the orthodontic treatment need based on DHC showed that a majority of the subjects with DHC grades 1-2 had low income parents and the lowest percentage were those with high income parents . For DHC grade 3, a large number of subjects had low income parents. As for DHC grades 4-5, all subjects had low income parents (Figure 5).

DISCUSSION

The dental health component (DHC) is an index that objectively assesses malocclusions using overjet, overbite, crossbite, contact point shift and hypodontia.[9] DHC is used to record the worst features of malocclusion that affect long-term dental function and health.[1,15] The results of this study are in line with those of the research conducted at Theodorus Kotamobagu Catholic Junior High School which showed

that 112 students (85.3%) required minor orthodontic treatment, 19 students (13.3%) needed moderate care and two students (1.4%) were in urgent need of treatment.[6] Research conducted on 15-17 year old adolescents showed that 33 students (51.56%) required no or only minor treatment, 23 students (35.94%) needed moderate care and 8 students (12.5%) were in desperate need of attention.[5] Adolescents possess a higher level of awareness of their physical appearance and are, consequently, more self-conscious about dental malocclusions.[5,16] Contrasting results were produced by a study conducted on 61 students in State 1 Tareran Junior High School. Among 13-14 year-old students, there were 10 students (16.39%) who required no or only minor treatment, 11 students (18.04%) were slightly in need of care, while 40 students (65.57%) were in dire need of it.[12] This proves that the use of different indices or indicators may yield contrasting results. Moreover, there were differences in the characteristics of each population and race.[3]

The level of education is determined by the duration of formal schooling which, according to Indonesian Law No.20 of 2003, consists of basic education, secondary education and higher education. Basic education is delivered at pre-school and middle schools, whereas secondary education is provided by junior and senior high schools. Higher or tertiary education consists of diploma, bachelor, masters, specialist and doctoral-level qualifications obtainable through a university.[17] The results of this study failed to definitively prove that the higher the level of formal education, the superior the knowledge and attitude towards a healthy lifestyle that might be gained.[8,18,19] It is also possible that the occurrence of malocclusion is strongly influenced by genetic and environmental factors.[3]

According to Barker's job classification, there are five job classes: class 1 consists of professions such as doctor, prosecutor, architect, notary amongst others requiring a higher education; class 2 are careers accessed by possession of a medium-level education including: civil servant, private employee and teacher ; class 3 included those occupations necessitating only a basic education, for example drivers, security guards, tailors and craftsmen, class 4 were those requiring no basic education such as labor
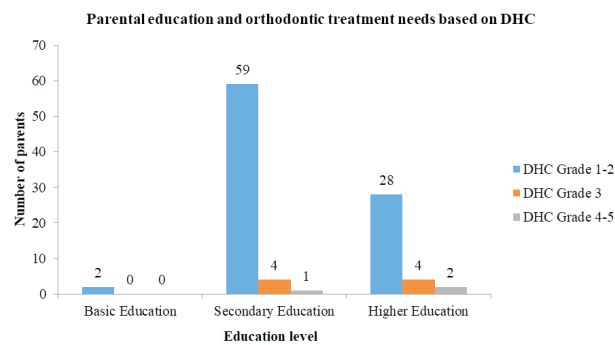

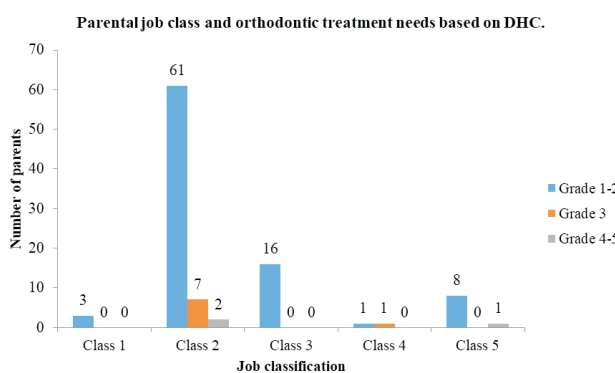**Figure 3.** Distribution of parental education and orthodontic treatment needs based on DHC.

Figure 4. Distribution of parental job class and orthodontic treatment needs based on DHC.
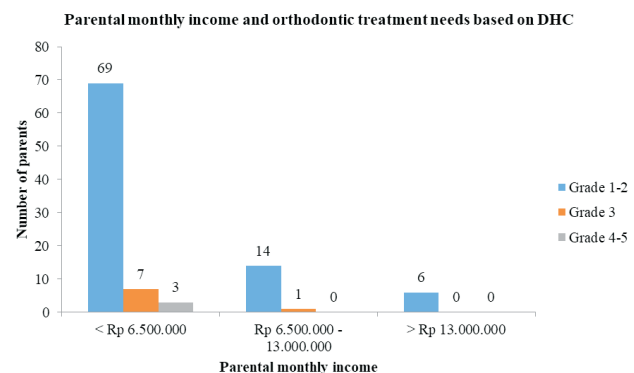

Figure 5. Distribution of parental income per month and orthodontic treatment needs based on DHC.

workers and domestic workers, while class 5 consisting of the unemployed.[14] The highest percentage of students requiring either no or only minor orthodontic treatment (68.5%) had parents with class 2 jobs. These results were due to children from higher socioeconomic groups possibly expressing higher demands for orthodontic treatment and their parents possessing greater oral and dental hygiene awareness and concern for their health.[14,18] However, the majority of subjects with a moderate or desperate need for orthodontic treatment had parents occupying class 2 jobs. This was probably due to some parents being unable to monitor the dietary habits of their children because of hectic work schedules culminating in nutritional deficiency.[19] This would, in turn, result in underdeveloped dentofacial structures, leading to either dental or skeletal malocclusion.[20]

For the purposes of this study, income levels were determined according to the monthly family income. Susi *et al.*[21] define family income as the money earned by parents (either individually or combined) from various daily economic activities. In this study, based on feedback from subjects, the range of parental income was divided into three categories: less than 6.5 million rupiah, between 6.5 and 13 million rupiah and in excess of 13 million rupiah. Although the majority of students with low income parents had a minor need for orthodontic treatment, all subjects with high income parents shared this level of need. As with the results of previous studies,[22] no significant associations were found between parental wage levels and malocclusion as genetic and environmental factors can affect children regardless of social class. It is also important to note that all subjects in desperate need of orthodontic treatment had low income parents. This was probably due to the higher caries rate among students with such parents resulting in premature loss, molar tooth drifting and crowding. Conversely, high income parents were able to afford dental treatment and prevent further tooth decay in their children by having them visit the dentist at an younger age.[23] The prevalence of malocclusions requiring minor treatment or none was the largest group, but it did not include the presence of dental anomalies such as crowding, crossbite or supernumerary teeth.[24]

It was concluded that the largest distribution of orthodontic treatment need based on DHC among students of State 15 Junior High School was at levels 1-2. These individuals either required minor or no orthodontic treatment. The majority of the students with DHC levels 1-2 have parents with a secondary education level, a class 2 occupation and a low monthly income.

REFERENCES

1. Rahardjo P. Ortodonti dasar. 2nd ed. Surabaya: Airlangga University Press; 2012. p. 64-204.
2. Rorong GFJ, Pangemanan DHC, Juliatri J. Gambaran maloklulsi pada siswa kelas 10 di SMA Negeri 9 Manado. J e-GiGi. 2016; 4: 2–7.
3. Wijayanti P, Krisnawati K, Ismah N. Gambaran maloklusi dan kebutuhan perawatan ortodonti pada anak usia 9-11 tahun (Studi pendahuluan di SD At-Taufiq, Cempaka Putih, Jakarta). J PDGI. 2014; 63: 25–9.
4. Laguhi VA, Anindita P., Gunawan PN. Gambaran maloklusi dengan menggunakan Hmar pada pasien di Rumah Sakit Gigi dan Mulut Universitas Sam Ratulangi Manado. J e-GiGi. 2014; 2(2): 1–7.
5. Oley AB, Anindita PS, Leman MA. Kebutuhan perawatan orthodonti berdasarkan index of orthodontic treatment need pada usia remaja 15-17 tahun. J e-GiGi. 2015; 3(2): 292–7.
6. Hansu C, Anindita PS, Mariati ni wayan. Kebutuhan perawatan ortodonsi berdasarkan index of orthodontic treatment need di Smp Katolik Theodorus Kotamobagu. J e-GiGi. 2013; 1(2): 99–104.
7. Dewi O. Analisis hubungan maloklusi dengan kualitas hidup pada remaja SMU Kota Medan tahun 2007. Thesis. Medan: Universitas Sumatera Utara; 2008. p. 17-36.
8. Indraswari R, Agusni T, Sylvia M. Besarnya tingkat kebutuhan perawatan ortodonti pada populasi jawa (orthodontic treatment need in Javanese). Orthod Dent J. 2010; 1(1): 26–9.
9. Rahayu WP. Analisis intensitas pendidikan oleh orang tua dalam kegiatan belajar anak, status sosial ekonomi orang tua terhadap motivasi belajar dan prestasi belajar siswa. J Pendidikan dan Pembelajaran. 2011; 18: 72–80.
10. Kaolinni W, Hamid T, Winoto ER. Dental student's perception to Aesthetic Component of IOTN and demand for orthodontic treatment. Dent J (Maj Ked Gigi). 2013; 46(2): 97–100.
11. Hamid T. Treatment results evaluation using the Index of Orthodontic Treatment Need. Dent J (Maj Ked Gigi). 2009; 42(4): 204–9.
12. Wilar LA, Rattu AJM, Mariati NW. Kebutuhan perawatan orthodonsi berdasarkan index of orthodontic treatment need pada siswa SMP Negeri 1 Tareran. J e-GiGi. 2014; 2(2): 1–8.
13. Cobourne MT, DiBiase AT. Handbook of orthodontics. Philadelphia: Mosby; 2010. p. 22-6.
14. Badran SA, Sabrah AH, Hadidi SA, Al-Khateeb S. Effect of socio-economic status on normative and perceived orthodontic treatment need. Angle Orthod. 2014; 84(4): 588–93.
15. Gill DS. Ortodonsia at a Glance. Suta T, editor. Jakarta: EGC; 2014. p. 28-30, 135-6.
16. Rumampuk MA V., Anindita PS, Mintjelungan C. Kebutuhan perawatan ortodonsia berdasarkan index of orthodontic treatment need pada siswa kelas II di SMP Negeri 2 Bitung. J e-GiGi. 2014; 2(2): 1–6.
17. Setyaningsih R, Prakoso I. Hubungan tingkat pendidikan, tingkat sosial ekonomi dan tingkat pengetahuan orangtua tentang perawatan gigi dengan kejadian karies gigi pada anak usia balita di desa Mancasan Baki Sukoharjo. J Ilmu Kesehatan Kosala. 2016; 4: 13–24.
18. Ngantung RA, Pangemanan DH., Gunawan P. Pengaruh tingkat sosial ekonomi orang tua terhadap karies anak di TK Hang Tuah Bitung. J e-GiGi. 2015; 3(2): 542–8.
19. Abuaisha AA, Huda BZ. Dental caries and its associated factors among children aged 8-12 years in Libyan schools, Klang Valley, Malaysia. Asian J Agric Biol. 2018; : 55–61.
20. Singh N, Tripathi T, Rai P, Gupta P. Nutrition and orthodontics-interdependence and interrelationship. Res Rev J Dent Sci. 2017; 5(3): 18–22.
21. Susi S, Bachtiar H, Azmi U. Hubungan status sosial ekonomi orang tua gengan karies pada gigi sulung anak umur 4 dan 5 tahun. Majalah Kedokteran Andalas. 2012; 36: 96–105.
22. de Sousa RV, Pinto-Monteiro AK de A, Martins CC, Granville-Garcia AF, Paiva SM. Malocclusion and socioeconomic indicators in primary dentition. Braz Oral Res. 2014; 28: 1–7.
23. Prabu D, Naseem B, Manish J, Mathur A, Dhanni C, Saify M, Goutham B, Kulkarni S. A relationship between socio-economic status and orthodontic treatment need. Virtual J Orthod. 2008; 8(2): 9–16.
24. Kolonio FE, Anindita PS, Mintjelungan CN. Kebutuhan perawatan ortodonsi berdasarkan index of orthodontic treatment need pada siswa usia 12-13 tahun di SMP Negeri 1 Wori. J e-GiGi. 2016; 4(2): 259–64.