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Normative and Perceived Need for Treatment of Malocclusion among Malaysian Adolescents

(Keperluan Normatif dan Keperluan yang Dirasai untuk Rawatan Ortodontik dalam Kalangan Remaja Malaysia)

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ABSTRACT

In practice, the need for orthodontic care is often determined by normative need. However, in reality, a person's decision to seek orthodontic treatment is dependent on multiple factors. The aim of this study was to determine the association between normative and perceived need for orthodontic treatment among Malaysian adolescents. This is a cross-sectional study involving 700 schoolchildren aged 13-14 years in Jempol District, Negeri Sembilan, Malaysia. The Dental Health Component (DHC) and Aesthetic Component (AC) of the Index of Orthodontic Treatment Need (IOTN) were used to assess the normative need. The children's perceived need was obtained by matching the appearance of their anterior teeth with the photographs on the AC scale. The normative need according to the DHC was 27.1% while the AC indicated 21.9%. Only 3.2% of the schoolchildren perceived that they needed treatment. There was a significantly high correlation between the DHC and AC scores of the dentist (Spearman $r_s = 0.89$, $p<0.01$*). However, the correlation between the AC of dentist and AC score of the children was weak (Spearman* $r_s = 0.39$, $p<0.01$*). No significant differences were observed for need of orthodontic treatment among gender and ethnicity according to the DHC and AC of dentists as well as AC of children (*$p>0.05$*). The findings from this study support the importance of considering the use of perceived need in prioritizing orthodontic treatment especially because of the shortage of orthodontic services in the country.*

Keywords: IOTN; normative need; perceived need

ABSTRAK

Secara amalan, keperluan rawatan ortodontik seringkali ditentukan oleh keperluan normatif. Namun demikian, secara realiti, keputusan seseorang untuk mendapatkan rawatan ortodontik adalah bergantung kepada pelbagai faktor. Tujuan kajian ini adalah untuk menentukan kaitan antara keperluan normatif dan keperluan yang dirasai untuk rawatan ortodontik dalam kalangan remaja di Malaysia. Ini merupakan kajian rentas yang melibatkan 700 kanak-kanak sekolah berusia 13-14 tahun di Daerah Jempol, Negeri Sembilan. Keperluan normatif kanak-kanak ditentukan oleh Komponen Kesihatan Pergigian (DHC) dan Komponen Estetik (AC) Indeks Keperluan Rawatan Ortodontik (IOTN). Keperluan yang dirasai kanak-kanak diperoleh melalui perbandingan dengan gambar-gambar daripada skala AC. Keperluan normatif mengikut DHC adalah 27.1% manakala AC menunjukkan 21.9%. Hanya 3.2% kanak-kanak sekolah merasai yang mereka perlukan rawatan. Terdapat korelasi signifikan yang tinggi antara skor DHC dan AC oleh doktor pergigian (Spearman $r_s = 0.89$, $p<0.01$*). Namun korelasi diantara AC doktor pergigian dan AC kanak-kanak adalah rendah (Spearman* $r_s = 0.38$, $p<0.01$*). Tidak terdapat perbezaan yang signifikan bagi keperluan rawatan ortodontik mengikut jantina dan kumpulan etnik berdasarkan DHC dan AC doktor pergigian serta AC kanak-kanak (*$p>0.05$*). Penemuan kajian ini menyokong kepentingan menimbangkan penggunaan keperluan yang dirasai dalam rawatan ortodontik untuk menentukan prioriti bagi rawatan ortodontik terutamanya kerana kekurangan perkhidmatan ortodontik di negara ini.*

Kata kunci: IOTN; keperluan normative; keperluan yang dirasai

INTRODUCTION

Normal occlusion in the biological sense implies a range of variation in tooth alignment and jaw relationships, which is compatible with normal function and the absence of disease (Lombardi 1982). Hence malocclusion is an appreciable deviation from the ideal that may be considered aesthetically or functionally unsatisfactory (Houston & Tulley 1986). Malocclusion is not a disease but rather a set of dental deviations, which in some cases can influence quality of life.

The majority of measures of orthodontic treatment need are normatively assessed based on clinical examinations alone. Few have attempted to measure or even record the patient's subjective perceptions in relation to their disability or handicap (Baldwin & Barnes 1966; Grover & Singh 2007). Yet these subjective elements are the most important determinants of the demand for orthodontic treatment. Previous studies on the need for dental care have shown that perceived or self-assessed need is reported to be associated with certain signs and

symptoms (Gilbert et al. 1994), socio-demographic factors and satisfaction with previous dental treatment (Atchison et al. 1993; Matthias et al. 1995). It seems that normative need as assessed by dental professionals may not be linked to patients' perceptions unless the condition has progressed sufficiently to be symptomatic (Heft et al. 2003).

There are considerable differences between objective and subjective need for orthodontic treatment (Tsakos 2008). Previous studies have demonstrated the discrepancy between objective and subjective need for orthodontic treatment (Bellot-Arcis et al. 2012; Ghijseling et al. 2013; Oshagh et al. 2011). The children have in some studies estimated their treatment need as being relatively close to the opinions of dentists (Christopher et al. 2009; Kerusou et al. 2004; Livas & Delli 2013; Trivedi et al. 2013), although their criteria and preferences can be very different (Cala et al. 2010; Soh et al. 2005). In other studies, the estimates of subjective treatment need among adolescents and adults have been significantly lower than the estimates of objective need (Bernabe and Flores-Mir 2006; Burgersdijk et al. 1991). It is important to take into consideration the patient's point of view of his/her dental attractiveness before treatment is decided (Johansson & Follin 2005). This is all the more important as the main benefit of orthodontic treatment is considered to be an improved socio psychological well-being which is within the realm of the patient's well-being.

Limited studies had been carried out locally to assess orthodontic need. Earlier epidemiological studies had utilized normative clinical indices (Dental Health Division, Ministry of Health Malaysia 1988, 1985, 1981, 1970/71; Oral Health Division, Ministry of Health Malaysia 2007, 1997). An earlier local study found the proportion of children needing orthodontic treatment was 25% according to grades 4 and 5 of the Dental Health Component (DHC) and 70% according to grades 8 to 10 of the Aesthetic Component (AC) of Index of Orthodontic Treatment Need (IOTN) (Sarah & Sundralingham 1995). However, a more recent study using similar index found that the proportion of children needing orthodontic treatment was 47.9% according DHC and 22.8% according to AC of IOTN (Abdullah & Rock 2002). The judgements of dental attractiveness are complex and may vary between professional and lay assessment. It may even vary between individuals within a community and even between communities with differing cultural values. Hence, the aim of the present study was to assess the association between normative and perceived need for orthodontic treatment among Malaysian adolescents. This study would provide further evidence of the discrepancy between the normative need of the dentist and the perceived need of the children in another population.

Materials and Methods

Study Population

This cross-sectional study involved a clinical examination using the IOTN and individual interview of all the participants. This interview sought to enable the respondents to provide a graded response to some questions, therefore enabling assessment of the depth of intensity of a subject's opinion. It was conducted in the district of Jempol which is the largest administrative district in the state of Negeri Sembilan, Malaysia. There were 15 secondary schools in this district and 8 day schools were randomly selected with a probability proportionate to the size of their student enrolment. The three ethnic groups according to gender were selected based on proportionate sampling of school lists. Equal number of age-eligible boys and girls were selected from the lists obtained from the various schools. The minimum sample size estimated was 375 based on previous prevalence of malocclusion (Esa et al. 2001), 80% power, 0.05 significance level and 10% attrition rate. This was further inflated to 700 to enable a sizable number of adolescents in the various ethnic groups to be included in the sample and for meaningful comparison among ethnic groups. Participants aged between 13 and 14 years at the time of the study with parental consent were included. Those who had received or were currently undergoing orthodontic treatment and had mixed dentition were excluded.

This study was approved by the Ethics Committee of the Faculty of Dentistry, University of Malaya (DFCO 0810/0031). The research support was obtained from the University of Malaya (Vote F: P0077/2008C).

Data Collection

Each participant was examined in a sitting position on portable dental chair with the aid of a spot light. Each student's teeth were assessed using the Dental Health Component (DHC) and Aesthetic Component (AC) of the Index of Orthodontic Treatment Need (IOTN) by a single examiner (SZMZ) who had been previously trained and calibrated in the use of IOTN. The aim of the IOTN was to identify those individuals who would be most likely to benefit from treatment (Shaw et al. 1995). The IOTN was chosen because it was used as a screening tool by orthodontists in Malaysia in decision making for treatment priority.

The DHC of the IOTN records the various occlusal traits into five grades according to severity and the needs for orthodontic treatment. Grades 1 and 2 represent 'no need for treatment'; grade 3 as 'borderline need' and grades 4 and 5 are considered to be a 'definite need' for orthodontic treatment. The AC has a scale of 10 coloured photographs of anterior teeth showing different levels of

dental attractiveness, with grade 1 representing the most attractive and grade 10 the least attractive (Brook & Shaw 1989; Evans & Shaw 1987). Photographs 1-4 represent 'no need for treatment'; 5-7 'borderline need'; and 8-10 'definite aesthetic need for orthodontic treatment'. The examiner rated the students' aesthetic impairment of the malocclusion using the AC scale.

The self-perception of malocclusion was evaluated by asking each student to identify which photograph of the AC scale most closely resembled the appearance of their anterior teeth. The following question was asked: 'Here is a series of 10 photographs showing a range of dental attractiveness, number 1 is the most attractive and number 10 the least attractive arrangement of teeth. Where would you put your teeth on this scale?' (Lunn et al. 1993). At each examination, it was emphasized that a general aesthetic impression was being sought, not an exact match with the one shown in the photographs. The students were told to ignore other variables such as tooth morphology, oral hygiene or the colour of the photograph.

DATA MANAGEMENT AND ANALYSIS

The data were analysed using the statistical package for social sciences (SPSS-PC+ version 13.1). The Pearson's chi-square test was used to establish the associations between gender and ethnicity with the DHC and AC of the IOTN. The Spearman's correlation coefficient, r_s statistic was used to assess the correlation between the DHC and AC of the dentist and the AC of the dentist and the children. The significance level for all analysis was set at $\alpha = 5\%$. Kappa coefficient was used to assess the intra-examiner reproducibility.

RESULTS

A total of 700 students (out of 3628 students) of 13-14 years participated in the study. By ethnic groups, Malays make up the majority (61.7%) followed by the Chinese (24.3%) and Indians (14.0%). There were equal proportions of male and female students.

Inter-examiner calibration was conducted prior to data collection with an orthodontic specialist using 10 study models of varying severity of malocclusion. The Kappa agreement for the DHC was 0.62. During the pre-test, the intra-examiner agreement for the study models was 0.64. The intra-examiner agreement conducted on 28 students for DHC and AC components were 0.74 and 0.75, respectively. During the data collection period, 15% of the students were re-examined for intra-examiner reproducibility at the end of the sessions. Kappa values for the DHC and AC was 0.84 and 0.94, respectively.

About 27 and 22% of the subjects were in definite need of treatment according to the DHC and AC scores of dentists, respectively. However, only 3.2% of children rated themselves to be in definite need of treatment (Figure 1). Table 1 shows the relationship between the DHC and AC scores of dentist to see whether there was any concordance between them. There was a significantly high correlation between them (r_s=0.89, p<0.01). Among subjects who were categorized according to the AC as not in need for treatment by the dentist, 85.6% of the subjects were similarly categorized according to the DHC. Among subjects who were categorized as in need of treatment according to the AC, 98.6% subjects were similarly categorized according to the DHC.

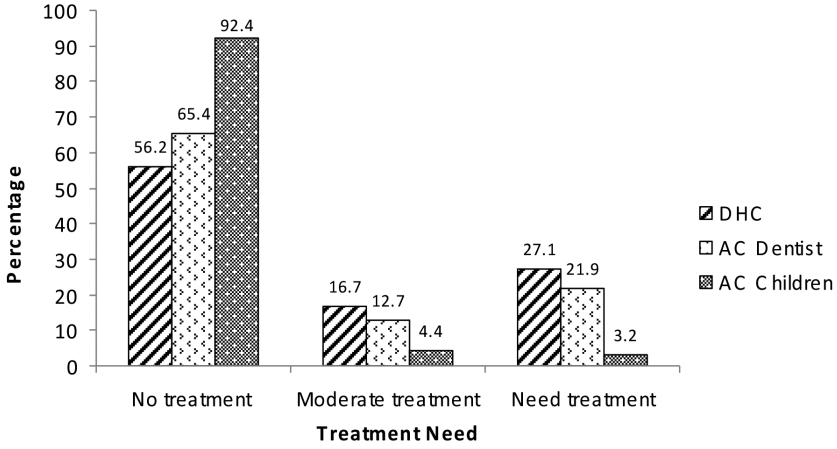

FIGURE 1. Prevalence and treatment need according to the DHC, AC of dentist and AC of children

TABLE 1. Relationship between DHC and AC of dentist

AC	DHC						DF	p
	No need treatment		Moderate		Need treatment			
	n	%	n	%	n	%		value
No need treatment	392	85.6	65	14.2	1	0.2		
Moderate/borderline	0	0	51	57.3	38	42.7	4	0.000*
Need treatment	1	0.7	1	0.7	151	98.6		

*Statistical significant at the level of significance 0.05

Table 2 shows the relationship between the AC of dentist and AC scores of children. Even though 97.6% of the subject agreed with the dentist that they did not require treatment, only 12.4% of the subjects agreed with the dentist that they were in need of treatment. Among 153 (21.9%) subjects that needed treatment according to the AC of dentist, 134 subjects perceived 'no need treatment' or 'moderate need' according to the AC of children and therefore had underrated their dental attractiveness. However, among 458 (65.4%) of the subjects that had 'no need treatment' according to the AC of dentist, eleven of them overrated their dental attractiveness and perceived 'moderate need' and 'need treatment' according to the AC of children. Figure 2 shows the correlation between the AC scores of dentist and AC scores of children were weak.

No significant differences were observed for need of orthodontic treatment among gender and ethnicity according to the DHC and AC of dentists (p>0.05). A similar observation was noted for AC of children.

DISCUSSION

A good method of recording or measuring malocclusion is important for documentation of the prevalence and severity of malocclusion in population groups (So & Tang 1993). The majority of measures of orthodontic treatment need are based on clinical examinations alone. Few have attempted to measure or even record the perceptions of the child and parent in relation to their disability or handicap. Yet these subjective elements are the most important determinants

TABLE 2. Relationship between AC dentist and AC children

AC	AC children							
	All subjects		No need treatment		Moderate		Need treatment	
dentist %	n	%	n	%	n	%	n	%
No need treatment	458	65.4	447	97.6	10	2.2	1	0.2
Moderate/borderline	89	12.7	80	89.9	7	7.9	2	2.2
Need treatment	153	21.9	120	78.4	14	9.2	19	12.4
TOTAL	700	100.0	647	92.4	31	4.4	22	3.2

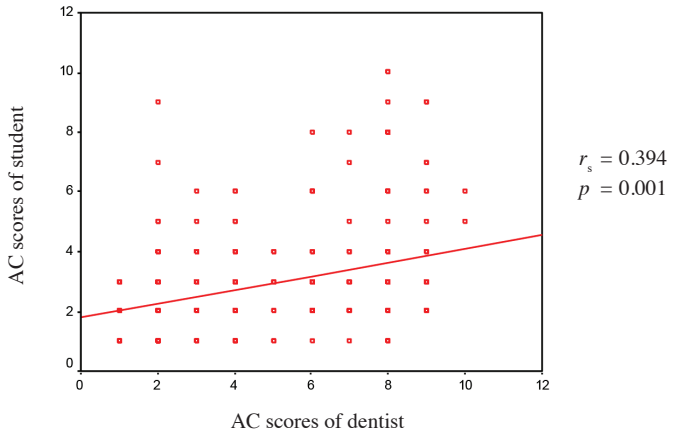

FIGURE 2. Scatterplot between AC scores (1 to 10) of students and AC scores of dentist (1 to 10)

of the demand for orthodontic treatment (Sheiham et al. 1999). Fitzpatrick (1991) also suggested that assessments made in experimental situations may not reflect the decisions made in the real-life situation and highlighted the importance of seeking patients' views.

A large number of indices to measure malocclusion have been developed since the 1950s. One such index is the IOTN. The validity of the use of IOTN index has also been verified by several researchers (Burden & Holmes 1994; Burden et al. 1994; Richmond et al. 1994; Shaw et al. 1995) and it has been increasingly used in several countries (Bellot-Arcis et al. 2012).

The prevalence of malocclusion in this study of 27% based on the DHC scores is similar to a local study which reported a prevalence of 25% among subjects aged 8 to 15 years-old in Kuala Lumpur (Sarah & Sundralingam 1995). This prevalence is low compared with another local study (Abdullah & Rock 2002) whereby about 48% of children in Malaysia were found to be in need of orthodontic treatment according to the DHC of IOTN. This is not surprising since the dentist might over score the normative need. However, according to the AC, the result was almost similar (22.8%). This suggests that the AC may be a good predictor of perceived need by dentist.

No significant difference in orthodontic treatment need was found between gender in the present study according to the DHC and AC of dentist. This is similar to a study done in Turkey which found that the difference between the IOTN values of schoolchildren aged 11-14 years were not statistically significant (Ucuncu & Ertugay 2001). Other study also found that no gender difference was noted among schoolchildren aged 11 years in Norway (Heft et al. 2003). The finding in this study suggests that the perception of aesthetics is not gender related but lies more to an individual aesthetic value. Thus the assumption that females have an increased awareness of their malocclusion is not substantiated in this age group.

Different ethnic groups usually have different features of facial appearance. Chinese had the highest need for treatment followed by the Malays and Indians in this study. The results from this study were in accordance with a local study which found that the Chinese had a higher need for orthodontic treatment although that study utilized a different index of measurement i.e. the Dental Aesthetic Index (Baharon 1999). A survey regarding the proportion of the various features of occlusion in the permanent dentition of the three major ethnicities in Malaysia found that the Chinese and Malay had almost similar distribution of the different types of occlusion (Woon et al. 1989).

The disagreement between dentist and children's grading of the AC in this study is not unexpected. The children do not perceive a need for treatment to the same extent as the dentist or orthodontist (Bernabe & Flores-Mir 2006; Kok et al. 2004). Factors that may contribute to these differences are social class, economic considerations, individual perceptions of psychosocial benefits and attitudes to appliances (Birkeland et al. 1996).

According to the present findings, almost a quarter of the young adults should receive orthodontic treatment to avoid the associated health risks generated by malocclusions. The prevalence of orthodontic treatment according to the DHC and AC is almost similar. Therefore, both the DHC and AC can be used to determine treatment need and priority. The findings from this study however, showed a lower treatment need according to the AC compared to the DHC. Thus, emphasis should be given to the use of AC in the assessment of the malocclusion treatment need.

The evidence from this study has shown that dental professionals' assessment of aesthetic acceptability differs from the schoolchildren. There was a tendency for children to overrate or underrate their level of attractiveness compared with professional assessment. It could also be argued that dental professionals are not in the best place to make judgments on the aesthetic values of the patients. Obviously the AC does not reflect the society's aesthetic expectations. Therefore, it is important to emphasize the perception of malocclusion and the need to establish exactly what the patients dislike most about their teeth should be highlighted when they attend for assessment.

CONCLUSION

There was a significantly weak correlation between the normative and perceived need for treatment of malocclusion between the dentists and adolescents. As the ultimate goal of a health service is to meet the public needs, normative need can be related to individual's self-perception of need for treatment. Therefore, assessment of perceived need in prioritizing orthodontic treatment should be utilized in the government dental services in this country.

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