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Orthodontic treatment need in 14-16 year-old Tehran high school students

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Aim: To assess orthodontic treatment need in a Tehran high school population.

Methods: The Dental Health Component (DHC) of the Index of Orthodontic Treatment Need (IOTN) was used by 21 trained examiners to estimate the orthodontic treatment need in 5200 Tehran high school students. The children, between 14 and 16 years of age, attended 84 high schools in 21 educational areas in Tehran and the neighbouring city of Rey. Children who had had orthodontic treatment and those who had not been treated were assessed. Children under treatment were excluded. Major components of the DHC were recorded.

Results: When the DHC is considered, 2 per cent of Tehran school children showed 'Extreme need', 18 per cent 'Severe need', 23 per cent 'Moderate need', 37 per cent 'Little need' and 20 per cent had 'No need' of orthodontic treatment. In those needing treatment (Grades 4 and 5) common deviations were hypodontia, contact point displacements, crossbites and increased overjet. A small number of the subjects (N = 36) who had received orthodontic treatment required further treatment. Of these, 18 subjects (50 per cent) had hypodontia, 10 subjects (28 per cent) had contact point displacements and 4 subjects (11 per cent) had increased overjet.

Conclusion: Twenty per cent of Tehran high school students needed orthodontic treatment (IOTN Grades 4 and 5).

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Introduction

Malocclusion may be associated with psychosocial distress, poor periodontal health and impaired masticatory function. For orthodontic treatment to become an integral part of an oral health care programme, basic information on the percentage of individuals needing orthodontic treatment is required. The Index of Orthodontic Treatment Need (IOTN) has been the most widely accepted means of achieving this objective in the past three decades.[1–3]

There are wide variations in reported levels of orthodontic treatment need.[4–14] In Shiraz, Iran, orthodontic treatment needs between 12 and 18 per cent (IOTN Grades 4 and 5) have been reported,[15,16] and in an unpublished study of 12 to 13 year-olds in Gorgan city found that approximately 16 per cent of the children needed orthodontic treatment (IOTN Grades 4 and 5).

The validity and reliability of the dental health (DHC) and aesthetic components (AC) of the IOTN are well-established.[16,17] The DHC may be assessed by a dentist or trained dental ancillary and the AC by either the dentist or the subjects themselves. The AC consists of a scale of 10 photographs considered to represent malocclusions of different attractiveness. The DHC, which is more widely used than the AC, consists of a hierarchical scale of conditions ranging in severity from Grade 1 (minor/no malocclusion with no need of treatment) to Grade 5 (severe malocclusions considered to need treatment). Most studies use Grade 4 as the cut-off point between those who need or do not need treatment.

The purpose of the present study was to determine the orthodontic treatment need in 14 to 16 year-old high school students attending schools in Tehran and the neighboring city of Rey. The population of both cities is in excess of 8 million, and there have been no previous studies of orthodontic treatment need in the children attending high schools in this area.

Materials and methods

Subjects

The study group consisted of 5200 Tehran and Rey high school children between 14 and 16 years of age. At the time of the examinations the total number of children attending high schools in both cities was 520 482. The sample included 2553 boys (49.1 per cent) and 2647 girls (50.9 per cent). As a list of all students attending the high schools was not available for random sampling we used multi-stage cluster sampling. In the first stage, 84 high schools were randomly selected from 21 educational areas in Tehran and Rey. In this way, we had four high schools in each area with all possible socioeconomic classes represented. In second stage, three classes were randomly selected from each high school, and in third stage subjects were selected randomly from each class according to the proportion of students in each area. Of the 5200 students, 203 children had had orthodontic treatment and 109 were under treatment at the time of the examinations. Children who had had orthodontic treatment and those who had not been treated were assessed. Children under treatment were excluded.

Method

The first step was to train 21 senior dental school students as the examiners. Fifty one sets of study casts were selected from the records held in the Orthodontic Department, Shaheed Beheshti Dental School. These casts were first assessed by a panel of three orthodontists using the IOTN and a rating for each set of casts obtained. A 4-day workshop was then held for the senior dental school students, who were to act as the examiners. All aspects of the IOTN, including the clinical features, were reviewed thoroughly. At the end of the workshop, the 51 sets of study casts were analysed by the student examiners. One week later all students re-examined 30 study casts to assess inter- and intra-examiner agreements. Kappa statistics indicated sufficient reliability (k > 0.6).

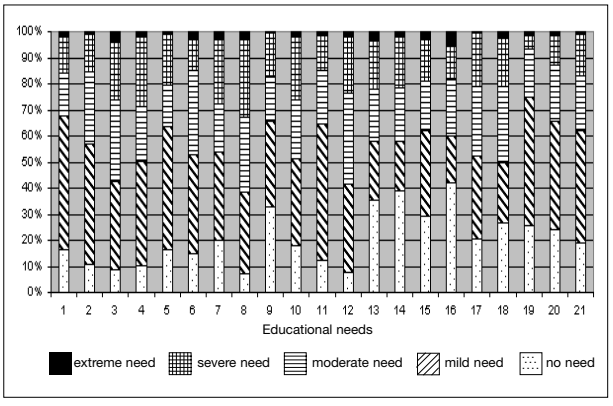

Figure 1. Orthodontic treatment need in 21 educational areas in Tehran and Rey in 2004.

The children were examined at their schools by the examiners during daylight hours. Only the DHC was used. A mylar IOTN ruler was used by the examiners. We grouped the five grades in the DHC into the following three groups: Grades 1 and 2 representing 'slight or no need for treatment'; Grade 3 representing 'borderline' cases; Grades 4 and 5 representing those in 'definite need of orthodontic treatment'. The chi-squared test was used to compare orthodontic treatment need in different educational areas.

Results

There was no significant difference in orthodontic treatment need among the various educational areas ($p > 0.05$).

One hundred and nine students receiving treatment at the time of the examinations were excluded and 203 students who had been treated were included. Of the 5091 students included, 1012 subjects (20 per cent) had 'no need' for orthodontic treatment (Grade 1), 1878 (37 per cent) had 'little need' (Grade 2), 1166 (23 per cent) had 'moderate need' (Grade 3), 926 (18 per cent) had 'severe need' (Grade 4) and 109 (2 per cent) had an 'extreme need' (Grade 5) for orthodontic treatment (Table I, Figure 1).

The most common occlusal deviation was contact point displacement (N = 2511, 49 per cent). Among those with a 'definite need' of orthodontic treatment (N = 1035, Grades 4 and 5), hypodontia (N = 346, 33 per cent), contact point displacements (N = 334, 32 per cent), crossbite (N = 86, 8 per cent) and increased overjet (N = 80, 8 per cent) were the most severely deviated occlusal traits (Table II).

Table I. DHC assessments of orthodontic treatment need in previously treated and untreated Tehran and Rey high school students.

Grade	1 No need	2 Little need	3 Moderate need	4 Severe need	5 Extreme need	Total
Previously treated	24 (11.8)	94 (46.3)	49 (24.1)	35 (17.2)	1 (0.5)	203 (100)
No previous treatment	988 (20.2)	1784 (36.5)	1117 (22.8)	891 (18.2)	108 (2.2)	4888 (100)
Total	1012 (19.9)	1878 (36.9)	1166 (22.9)	926 (18.2)	109 (2.1)	5091 (100)

Excludes 109 students receiving treatment at the time of examinations
Per cent in brackets

Table II. Occlusal traits in treated and untreated Tehran and Rey high school students.

Occlusal trait (IOTN)	No need N (%)	Little need N (%)	Moderate need N (%)	Severe need N (%)	Extreme need N (%)
Overjet	-	179 (9.5)	96 (8.2)	70 (7.6)	10 (9.2)
Reverse overjet	-	21 (1.1)	24 (2.1)	5 (0.5)	3 (2.7)
Crossbite	-	146 (7.8)	118 (10.1)	86 (9.3)	-
Contact point displacement	-	1354 (72.1)	823 (70.6)	334 (36.1)	-
Open bite	-	39 (2.1)	67 (5.7)	38 (4.1)	-
Overbite	-	104 (5.5)	38 (3.3)	9 (1.0)	-
Prenormal/post-normal	-	35 (1.9)	-	-	-
Hypodontia	-	-	-	335 (36.2)	11 (10.1)
Impeded eruption	-	-	-	-	67 (61.5)
Cleft lip and palate	-	-	-	-	4 (3.7)
Submerged teeth	-	-	-	-	14 (12.8)
Partial eruption	-	-	-	44 (4.7)	-
Supernumerary teeth	-	-	-	5 (0.5)	-
Total	1012 (100)	1878 (100)	1166 (100)	926 (100)	109 (100)

A small number of the subjects (N = 36) who had received orthodontic treatment required further treatment. Of these, 18 subjects (50 per cent) had hypodontia, 10 subjects (28 per cent) had contact point displacements and 4 subjects (11 per cent) had increased overjets.[4]

Discussion

We used a multi-stage cluster sampling method to obtain a representative sample of 14 to 16 year-olds attending high schools in Tehran and Rey in 2004. The subjects were examined by 21 senior dental students after a 4-day training workshop and the student examiners used the standard DHC rule to assist them in their assessments. We checked the reliability of their assessments at the end of the workshop and found the kappa score (> 0.6) was satisfactory. Twenty per cent of the 14–16 year-old high school students were assessed as Grades 4 and 5 and, therefore, were considered to have a 'definite need' of orthodontic treatment. Of the 203 students who had had some form of orthodontic treatment approximately 18 per cent were considered to need further treatment.

The prevalence of orthodontic treatment need in the present study was higher than the orthodontic treatment needs of children in Shiraz,[15,16] Nigeria,[8] Saudi Arabia[13] and for white American subjects,[11] but less than the rates reported for other groups.[4,5,7,12] Different ages, racial characteristics and even the sampling methods used may have contributed to these differences. We selected high school students because the permanent dentition was established and we avoided assessing mixed dentitions. Furthermore, age changes in the occlusal pattern may influence assessments of treatment need. During adolescence, features such as an increased overjet, may improve enough to reduce the recommendation for treatment, although the DHC is relatively stable over time.[17]

One of the disappointing findings of this study was that only 6 per cent of the high school students had received or were receiving orthodontic treatment. A small number of subjects (N = 36) who had received orthodontic treatment required further treatment due to relapse or partial treatment. Possible explanations for the small number of children treated is that orthodontic treatment is given low priority in the oral health care system in Iran and treatment in private and university clinics is not readily available to the general population. While the DHC has been widely used and was acceptable for our purpose, our panel of three orthodontists considered the AC was less reliable due to cultural and social considerations in Iran.

Impeded eruption of teeth, contact point displacements, crossbites and increased overjets were the most common deviations in children who had not been treated. Hypodontia, contact point displacements and increased overjets were the most common deviations in the group that had been treated. Hypodontia was a prominent feature of this group, presumably because teeth had been extracted for relief of crowding and extraction spaces had not been closed. In their study Burden and Holmes reported that the most frequent deviations were impeded eruption of teeth, contact point displacements, increased overjets and crossbites.

Conclusions

Twenty per cent of the 14 to 16 year-old students attending high schools in Tehran and Rey were assessed with the DHC as needing orthodontic treatment. The most common deviations were: hypodontia, contact point displacements, crossbites and increased overjets. Only 6 per cent of the subjects had received or were receiving some form of orthodontic treatment at the time of the examinations.

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