

# Orthodontic Treatment Needs for a group of 11-14-year-old Isfahan Schoolboys

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## Abstract

**Aim:** The main goal of this study was to evaluate orthodontic treatment needs (IOTN) of schoolboys population of Isfahan in 2009-2010 based on Index of Orthodontic Treatment Need (IOTN).

**Materials and Methods:** In this study an examiner used the Dental Health Component (DHC) and Aesthetic components (AC) of IOTN to assess Orthodontic treatment needs for 400 Isfahan schoolboys. Multistage randomized cluster sampling method was used to choose the participants. All the participants were schoolboys aged 11 to 14 years. Using the IOTN, Malocclusion was determined. To evaluate the data a chi-square test was carried out.

**Results:** Taking into account DHC, 3.5% of Isfahan schoolboys were in 'Extreme need', 14% in 'Severe need', 25% in 'Moderate need', 38.5% in 'Little need' and 19% had 'No need' to orthodontic treatment. In evaluating AC, 77.5% had no need or little need, 16.5% had moderate need and 6% had great need to treatment group.

**Conclusion:** It was concluded that 17.5% of 11-14 year-old male students in Isfahan need orthodontic treatment (IOTN grades 4 and 5) and common deviations in this group were impaction, hypodontia and contact displacement.

**Keywords:** Aesthetic Component, Dental Health Component, Index of Orthodontic Treatment Need, population groups, oral health, epidemiology.

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To select the patients who can be treated in a certain dental care system and to establish priorities with limited resources, a large number of indices for assessing malocclusion have been developed. For estimating orthodontic treatment need in particular populations this work is of high importance.

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It is not clear enough which individual characteristics and occlusal features should be evaluated for establishing treatment need.<sup>1</sup> In this literature, the orthodontic treatment needed features are introduced. Various international associations agree on them, therefore they are used in malocclusion epidemiological research of different countries. These features are the Dental Aesthetic Index<sup>2</sup> and the Index of Orthodontic Treatment Need<sup>3</sup>. The DAI has been used in several studies to find out orthodontic treatment need in different countries<sup>5, 6, 7</sup> and is based on an acceptable social scale of occlusal conditions.<sup>4</sup> A DAI scale divided the continuous index score into four malocclusion severity levels, and

made it easier to use and encouraging its application in orthodontic care programs.<sup>8</sup>

Unlike the DAI, the IOTN classifies malocclusions based on the presence of particular occlusal features which are important for dental health and aesthetics. In this way, it is possible to determine individuals who would take the most advantage of orthodontic treatment. This index includes an Aesthetic Component (AC) and a Dental Health Component (DHC). The two components are separately analyzed and although they do not come to a single score, they can be combined to divide the patient as 'orthodontic treatment needs Yes or No.'<sup>9</sup> The IOTN has been used for this reason in many epidemiological studies in our<sup>10-13</sup> and other countries.<sup>14-17</sup> Other indices, such as the Handicapping Labio-lingual Deviations Index<sup>18</sup> used in the USA and, more recently, the Index of Complexity, Outcome, and Need<sup>19</sup> have been known as useful tools to measure intentionally orthodontic treatment need, but in the time being the DAI and IOTN are the most widely used.

IOTN tries to identify those who would benefit from orthodontic treatment. To achieve that it ranks malocclusion in terms of importance of various occlusal traits for the individual dental health component (DHC) and the perceived aesthetic impairment (AI). This index unifies an AC and DHC. Evan and Shaw developed AC<sup>20</sup> which its scale having ten color photographs shows different levels of dental attractiveness. With reference to this scale, the dental attractiveness of prospective patients can be rated. The more attractive arrangements of teeth are shown by grade 1 and the least by grade<sup>10</sup>. The score shows the aesthetic impairment.

DHC indicates an attempt at synthesis of the current evidence for the deleterious effects of malocclusion and is based on the index of the Swedish Medical Health Board.<sup>21,22</sup> The various occlusal traits of a

malocclusion are recorded by DHC, which would increase the morbidity of the dentition and surrounding tissues. There are five grades from grade 1 'no need to treatment' to grade 5 'extreme need.' Only the worst occlusal feature is recorded. Other investigators verified Validity and reliability of IOTN in different countries.<sup>23, 24</sup>

In the past decade, as a result of growing public awareness on general matters, the public interest and demand for orthodontic treatment have increased. Therefore, it is important to identify those people who have orthodontic problems to prioritize them for proper treatment due to the significant demand for orthodontic treatment. The IOTN index was the preferred measure of the degree of orthodontic treatment need, because it is a simple, repeatable, and reliable index among the available range of indices and does not require sophisticated tools and at the same time is more practical compared to the other indices. So the main purpose of this study was to evaluate the need for orthodontic treatment between 11 and 14 year old schoolboys in Isfahan.

### Materials and Methods

The sample group was 400 schoolboys 11-14 years of age from Isfahan. Multistage randomized cluster sampling method was used to choose the sample group. At the end, 10 schools from 5 educational areas were selected.

This study used the W.H.O recommendations<sup>25</sup> taking into account the aims, selection of the sample, authorization, calibration, training and assessment of the examiner, materials used, examination area and conditions.

A dental graduate performed the fieldwork in the epidemiological study. Sessions were held before the examinations, to explain the diagnostic criteria and to train the clinician for using the IOTN. The examiner used

plaster models and examination conditions in a school, to ensure the validity and reliability of the results obtained. The gold standard measurements by a specialist in orthodontics who had previously been trained in the use of IOTN were used to be compared with the results. Using daylight as the source of illumination and the child seated on a chair, the clinical examinations were performed in the schools. No more than 25 children were examined during one session to avoid the effects of tiredness. No radiographs or plaster models were taken. Latex gloves, periodontal probe, digital caliper, mirror and tongue blade were used as the examination instruments.

All the malocclusion features for determining the DHC (overjet, overbite, anterior and posterior crossbite, openbite, displacement of the teeth, impeded eruption, hypodontia, clefts of lip and/or the palate and Class II and III molar relationship), along with personal details, name and age, were included. The guidelines developed by Brook and Shaw<sup>26</sup> were used to determine the AC: the subjects observed their own teeth in the mirror, without cheek retractors, and compared them with one of the 10 photographs or levels of the AC.

Using the chi-square test ( $P < 0.05$ ) the IOTN results were analyzed.

## Results

400 schoolboys aged 11 to 14 participated in the present study. Most of them were between 11 to 12 years old. Taking into account DHC, results showed that: 76 (19%) students were in the category of no need, 154 students (38.5%) in little need, 100 students (25%) in border line need and 56 students (14%) in the severe and 14 students (3.5%) were in the category of very severe need.

According to the IOTN AC, 77.5% had no need or little need (AC 1-4), 16.5% had moderate need (AC 5-7) and 6% had great need to treatment (AC 8-10). [Table 1]

In (Table 2-5) prevalence of each occlusal variable in the grade 2 to 5 of the Dental Health Component of the Index of Orthodontic Treatment Need is shown. The most prevalent malocclusions for the group of definite need (grade 4 and 5) for orthodontic treatment was the following: hypodontia (28.6%), contact displacement (25%) and impaction (71.4%). In general, the most frequent trait was impaction, which was equal to 71.4% of all subjects.

**Table 1. Prevalence of the grades of the Aesthetic Component of the Index of Orthodontic Treatment Need as assessed in the total sample ( $n = 400$ ).**

AC	number	percent
1	68	17
2	94	23/5
3	88	22
4	60	15
5	28	7
6	28	7
7	10	2/5
8	12	3
9	10	2/5
10	2	0/5
total	370	100

**Table 2. Prevalence of eachocclusal variable in the grade 2 of the Dental Health Component of the Index of Orthodontic Treatment Need.**

<i>DHC ≠ 2</i>	number	percent
a	22	14/3
b	6	3/9
c	4	2/6
d	94	61
e	10	6/5
f	18	11/7
g	0	0

**Table 3. Prevalence of eachocclusal variable in the grade 3 of the Dental Health Component of the Index of Orthodontic Treatment Need.**

<i>DHC ≠ 3</i>	number	percent
a	30	30
b	2	2
c	16	16
d	32	32
e	12	12
f	8	8

**Table 4. Prevalence of eachocclusal variable in the grade 4 of the Dental Health Component of the Index of Orthodontic Treatment Need.**

<i>DHC ≠ 4</i>	number	percent
h	16	28/6
a	8	14/3
b	2	3/6
m	0	0
c	4	7/1
l	4	7/1
d	14	25
e	2	3/6
F	2	3/6
t	4	7/1

**Table 5. Prevalence of each occlusal variable in the grade 5 of the Dental Health Component of the Index of Orthodontic Treatment Need.**

<i>DHC</i> ≠ 5	number	percent
i	10	71/4
h	0	0
a	4	28/6
m	0	0
p	0	0
S	0	0
total	14	100

### Discussion

With the purpose of recording the prevalence of malocclusions and of evaluating orthodontic treatment need, the orthodontic features of single population have been the object of several investigations in different countries. In the present study for recording the orthodontic treatment need of Isfahan schoolboy population, the DHC and AC of the IOTN were used. According to the index 70 schoolchildren, which is equal to 17.5% of the whole sample, were classified as being in need of orthodontic treatment (grades 5 and 4).

Several researchers have studied the distribution of DHC and AC grades. In Tehran Jamilian et al.<sup>10</sup> reported that 12.6% of schoolchildren aged 14–17 years had very great to moderate need. In another study from Tehran, Hedayati et al. studied, 132000 students aged 11–14 years of age, of which 44.19% children had very great to moderate need and 55.71% who had little or no need. Manzanera<sup>16</sup> found that 23.5 per cent of the population of 12-year-olds and 18.5 per cent of 15 to 16 year-olds had a definite

treatment need.

Safavi et al.<sup>11</sup> found that, the DHC proportions in 5200 schoolchildren being 14–16 years old, 20% were in great need and 57% needed no/little treatment. Borzabadi-Farahani et al.<sup>12</sup> found out that 36.1% of the population was in the great need category, when DHC was assessed for 502 school children being 11–14 years old age. The results of the research on 9–12 years old Brazilian children by Dias and Gleiser showed<sup>15</sup> 34.2% definitely needed orthodontic treatment. While in our study, the DHC scores were found as 20.6% for great and very great need that is more close to Safavi et al.<sup>11</sup> results which examined Tehran children. But the need for treatment is more than one-third of the population (43.1%).

The highest prevalence which affected more than 44 per cent of the subjects was for displacement of contact points while taking into account the occlusal findings. About one-fifth (17 per cent) of the examined population had increased overjet. Both Anterior/Posterior crossbites and increased

overbite were present in about 10 per cent of the subjects.

At an age which is considered as the best time for treatment of many of these dento-skeletal disharmonies these findings serve as reference data for the epidemiology of malocclusions. But race, ethnicity, gender and age are among those which affect these data. In the present study, only schoolboys were examined to remove gender bias. Heterogeneity and homogeneity of populations are also important factors in obtained results.

The result of present study shows that a relatively high percentage of 11-14 schoolboys need orthodontic treatment in Isfahan.

### Conclusion

The Present study indicates that 17.5% and 6% of Isfahan schoolboys aged 11-14 years have definite orthodontic treatment needs according to DHC and AC of IOTN. In needed treatment group (DHC grades 4 and 5) common deviations were impaction, hypodontia and contact displacement.

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