The prevalence of malocclusion and orthodontic treatment needs in school going children of Nalagarh, Himachal Pradesh, India

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ABSTRACT

Objective: The aim of this study was to determine the prevalence of malocclusion and orthodontic treatment need in 13–18-year-old schoolchildren of Nalagarh, Himachal Pradesh, India using the Index of Orthodontic Treatment need (IOTN) and to analyze the treatment needs between males and females and correlation between the esthetic component (AC) and dental health component (DHC) of IOTN.

Subjects and Methods: The sample comprised 2000 school children (1125 females and 875 males) who had not undergone orthodontic treatment. No radiographs, study casts, were used; IOTN was calculated from clinical examination.

Results: DHC results showed that little need for orthodontic treatment was found in 31.6% and moderate need in 30.85%. A great need was estimated at 37.55%. Severe contact point displacement of more than 4 mm was the most common occlusal feature in the definite treatment need group, followed by increased overjet, impeded eruption of teeth, and anterior or posterior cross bite. AC results showed that little need for orthodontic treatment was in 86.15%, moderate need in 4.95%, and great need in 4.95%.

Limitations: Index does not consider midline discrepancy, soft tissue abnormalities, and AC does not include Class III and Class II div 2 malocclusion photographs.

Conclusions: There seems a discrepancy in the proportion of children needing orthodontic treatment on esthetic and dental health grounds. This study provides baseline data on the need and demand for orthodontic treatment among the sample which is important for planning public orthodontic and dental services.

Key words: Index of Orthodontic Treatment need, Malocclusion, Prevalence

The prevalence of malocclusion varies from country to country and among different ages and sex group. There are large variations in the prevalence of orthodontic treatment need in different countries exists, ranging from 11% in Sweden (Myrberg and Thilander) to 75.5% in Saudi Arabia (Al-Emran et al.). The demand for orthodontic treatment is increasing in most of the countries including India. Therefore, rational planning of orthodontic preventive measures on population basis is essential. This stresses the importance of epidemiological studies to obtain knowledge about the prevalence of different types of malocclusion and the need for the orthodontic treatment and in accessing the resources required for such services.

In this era of evidence-based dentistry, quantitative measures are essential, so as to quantitate the treatment and compare orthodontic results with some standard of care. For this, several valid and reliable indices have been developed.

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to assess the treatment need and the treatment outcome for both health care providers and health care consumers. However, a universally accepted index does not exist. The Index of Orthodontic Treatment Need (IOTN) developed by Brook and Shaw (1989) is gaining wide acceptance in the UK and other parts of Europe. The index incorporates a dental health component (DHC) based on the recommendation of the Swedish Medical Board (Linder-Aronson, 1974) and an esthetic component (AC) developed by Evans and Shaw (1987).

In such a diverse and vast country like India, a large variation in prevalence of malocclusion exists in varying regions of our country. This can be due to variations in ethnicity, nutritional status, religious beliefs, and dietary habits. The prevalence of malocclusion in India varies from 20% to 43%. The data on orthodontic awareness and treatment need is very scanty; malocclusion is undoubtedly a public health concern in young populations. There are few studies to estimate the proportion of the population that requires orthodontic treatment in India. There are no records of the earlier reports related to the prevalence of malocclusion and orthodontic treatment needs in school going children aged 13–17 years in this area.

The aim of this study was to estimate and evaluate the prevalence of malocclusion, and their orthodontic treatment needs in a sample of school children from Nalagarh, Himachal Pradesh, India [Figures 1 and 2].

SUBJECTS AND METHODS

Ethical approval

Ethical clearance from the Ethical Committee was taken for conducting the study. The examinations were conducted with permission from the education authorities and head teachers.

Study group

Two thousand school children of government and private schools of age group 13–18-year-old were examined. Of the total 2000 population, 1125 were females and 875 were males [Figure 3 and Table 1]. The study was conducted for 1.5 years, i.e., from January 2012 to June 2013. There were twenty schools which were included in this study and from each school a sample of 100 subjects were taken. All the schools included were randomly selected.

Inclusion criteria

• Subjects with permanent dentition
• Subjects within the age group of 13–18 years.

Exclusion criteria

• Subjects with missing permanent first molar
• Any facial trauma
• Previous history of ongoing orthodontic treatment.

Clinical examination

The clinical examination was performed in the schools, with the child seated on chair, using natural sunlight as the source.
of illumination. Basic infection control procedures in Hand Hygiene and personal protective equipment were adopted. Frontal intra-oral photograph in centric occlusion was taken after applying cheek retractor with high-resolution digital camera. No more than 25 children were examined during one session to avoid the effects of tiredness. No radiographs or plaster models were taken. The examination instruments were WHO-type periodontal probe, number 5 plain mouth mirror, and custom made calibrated scale. To record the findings per individual, a pro forma was prepared which contain personal details such as name, gender, and age and grading of DHC.

The DHC of IOTN has five grades: Grades 1 and 2 represent no/little need for treatment, Grade 3 represents borderline need for treatment, and Grades 4 and 5 represents high priority for treatment. In use, ten features or traits of malocclusion are considered: Overjet, anterior crossbite, overbite, open bite, lateral crossbite, displacement of teeth, impeded eruption of teeth, clefts of lip and/or palate, Class II and Class III buccal occlusion, and hypodontia. The acronym “MOCDO” (missing, overjet, crossbite, displacement, and overbite) means that missing teeth and overjet, including reverse overjet, have the highest priority in the assessment of treatment need. The hierarchical scale was designed for the purpose of providing guide for systematic examination, with the examiner recording and focusing the treatment activity to the higher evaluated anomaly in the case of two or more occlusal anomalies. The AC is designed to complement the DHC by recording the severity of anterior esthetic tooth arrangement, with Grade 1 being no esthetic need through Grade 10, great esthetic need for treatment. The AC scores were recorded by the patient self-assessment (Grzywacz I, 2003) unlike other studies whereby the orthodontic examiner or both by the patients and orthodontists.

**Statistical analyses**

The data collected were analyzed using the Statistical Package for Social Sciences for Windows (SPSS Inc., Chicago, Illinois, USA). The Intra-examiner reliability was checked by using “kappa” analysis. To check the intra-examiner reliability of DHC of IOTN. A sample of 20 students was selected from the college and two readings for each student were recorded at 3 weeks interval. The gender difference between the DHC and the AC of the IOTN was assessed using “Chi-Square” test.

**RESULTS**

The DHC revealed that Grades 1 and 2 have combined to score as population showing no/slight need (31.6%), Grade 3 having a moderate/borderline need (30.85%), Grades 4 and 5 together showing a definite need (37.55%) for orthodontic treatment [Table 2] [Figure 4]. According to the gender difference, there was no statistically significant difference in the DHC of IOTN between males and females (P = 0.1229) as assessed by Chi-square test.

Results of the AC revealed that Grade 1–4 have been combined to score as population showing no/slight need (86.15%), Grade 5–7 have been combined to score as population showing moderate/borderline need (8.90%), Grade 8–10 have been combined to score as population showing definite need (4.95%) [Table 3 and Figure 5]. There was statistically significant difference in the AC of the IOTN between males and females (P = 0.0105) as assessed by Chi-square test.

In this study, the DHC of IOTN 37.55% of the population required the definite need of treatment while according to the AC of IOTN 4.95% of the population required definite need of treatment.

Among the entire population, the various dental anomalies were shown in [Table 4 and Figure 6].

**DISCUSSION**

In total, 2000 school children 875 were males and 1125 were females. In this study, care was taken to keep the percentage of the gender difference equal. The percentage of gender difference was kept equal to evaluate the treatment needs between males and females. Gender difference was also kept to assess the self-perception among the males or females toward the malocclusion.

In this study, the normative need in Grades 4 and 5 was 37.55%. The results of DHC were near to the findings of, who reported the prevalence of malocclusion in 49.30% of population, who reported the prevalence of malocclusion...
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in 50% of population\textsuperscript{[19]} who reported the prevalence of malocclusion in 28.8% of population\textsuperscript{[20,21]} in 530 12-year-old Maltese and Gozitan School children reported 42% in Grade 4 and Grade 5, 29% in Grade 3 and remaining 29% in Grade 1 and Grade 2. Findings of this study was in disagreement with\textsuperscript{[22]} who reported the prevalence of malocclusion in 90% of population,\textsuperscript{[23,24]} who reported treatment needs in 28% of population in Canada,\textsuperscript{[25]} who reported treatment need in 63.4% in Victoria, Australia,\textsuperscript{[26]} who reported treatment need of 65% in Norway,\textsuperscript{[27]} who reported 23.5% treatment need in 12-year-old Spanish children and 18.5% treatment need in Spanish children between age 15–16-year-old,\textsuperscript{[28]} who reported 22% treatment need in Japan,\textsuperscript{[29]} who reported 29% objective need in Kenya, (Bhardwaj et al., 2010) who reported prevalence of malocclusion in 71% of population,\textsuperscript{[30]} who reported 20.42% of malocclusion in Shimla city,\textsuperscript{[31]} who reported 12.5% of malocclusion in Himachal Pradesh,\textsuperscript{[32]} who reported 9.0% treatment need in Tehran population,\textsuperscript{[33]} who reported 6.0% treatment need in school children of Yemen.
Results of the AC revealed that among 2000 school going children, 86.15% exhibited no or slight need for treatment while 8.90% reported moderate to borderline need and 4.95% reported definite need for orthodontic treatment. These findings were similar to the findings reported by (Souames et al.,)[27] who found that 4.4% were considered to have a definite need for treatment. Findings of AC in this study was in disagreement with[34] who reported 16.1% expressed great need for orthodontic treatment,[35] who reported 21.5% require definite treatment,[36] who reported 36% treatment need in Islamabad,[37] who reported 32.8% treatment need in Pune, India.

The treatment needs of males and females were evaluated in this study. The DHC of IOTN showed no statistically significant difference between males and females ($P = 0.1229$) assessed by Chi-square test. These findings are similar to the findings reported by.[29, 36,38‑40] The AC of IOTN showed statistically significant difference between males and females ($P = 0.0105$) assessed by Chi-square test. The females show more perception toward the malocclusion on esthetic grounds as compared to the males. This was in agreement reported by[41] in his study that men tend to be less concerned with the appearance of their teeth, even when observable esthetic defects are present.

In this study, there seems to be a discrepancy in the proportion of children needing orthodontic treatment on esthetic and dental health grounds, i.e., according to DHC of IOTN 37.55% of subjects required definite treatment while according to AC of IOTN 4.95% of subjects required definite treatment. It indicated a general lack of awareness among the school children about the severity of their existing malocclusion. This can be attributed to their weak oral health knowledge as well as parents’ neglect toward malocclusion. Moreover, the perception of occlusal traits in the buccal segments was generally underestimated by people when compared to those present in the anterior segment. Furthermore, the DHC score was based on a grade assigned to the single most severe occlusal trait which makes it an easy and reliable index to use, but ignores the cumulative effect of a number of less severe occlusal deviations. As a result, it may under-estimate the severity of a malocclusion in some individuals. Assessment of an esthetic need for orthodontic treatment was complex, and that was clearly seen by the difference in opinion between a professional person and the child. Usually, subjects tended to rate their dental appearance lower on the esthetic scales compared with the orthodontist’s rating. It was generally understood that evaluation of malocclusion must consider esthetic and psychosocial factors, as well as physical and functional ones.

CONCLUSIONS

The following conclusions were arrived at:

- The DHC revealed that 31.6% had no need for treatment, 30.85% had moderate/borderline need for treatment and remaining 37.55% had a definite need for treatment
- The AC revealed that 86.15% had no need for treatment, 8.90% had moderate/borderline need for treatment, and 4.95% had a definite need for treatment
- There seems to be a discrepancy in the proportion of children needing orthodontic treatment on esthetic and dental health grounds. It indicates a general lack of awareness among the school children about the severity of their existing malocclusion. This can be attributed to their weak oral health knowledge as well as parents’ neglect toward malocclusion
- The females showed more perception toward the malocclusion on esthetic grounds as compared to the males. It indicated that the girls show more concern about their esthetics or appearance of their teeth as compared to the boys.

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Conflicts of interest
There are no conflicts of interest.

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