

Orthodontic Treatment Needs Among 9 Year Old Indian School Children: A Cross Sectional Study

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ABSTRACT

Background: The present study aimed to evaluate the need for orthodontic treatment in 9 year-old Indian school children. 150 school children were randomly selected from four schools of Vijayawada city. All the children were evaluated using both DHC and AC components of Index of Orthodontic Treatment Needs (IOTN). 46% and 24% of the children were in definite need for orthodontic treatment according to DHC and AC respectively. The most prevalent malocclusal trait was increased overjet followed by crowding and crossbite. It was concluded that there was a high level of orthodontic treatment need among 9 year-old Indian school children of Vijayawada city.

Keywords: Orthodontic treatment need; children; IOTN.

INTRODUCTION

The assessment of orthodontic treatment needs in children has been crucial for planning orthodontic care services from a public health perspective. Early orthodontic intervention in children promotes better oral health care and decreases the risk of dental caries occurring as a result of malocclusion.¹ Further it reduces the psychological influence that malocclusion could have on the patient at an earlier stage.^{1,2}

Whilst several indices have been developed to assess the orthodontic treatment needs, the most widely used index in children included the Index for Orthodontic Treatment Needs (IOTN).³ It consists of two separate components: Dental Health Component (DHC) and Aesthetic Component (AC). The DHC incorporates various occlusal traits and has five grades and a grade is allocated according to the severity of the worst single trait and describes

the priority for treatment. The AC consists of a 10-point scale illustrated by a series of color photographs showing the different levels of dental attractiveness.³ No data is available on the orthodontic treatment needs of children from Vijayawada city. The aim of this study was to assess the orthodontic treatment needs among a group of school children aged 9 years, using the IOTN index.

MATERIALS AND METHODS

This cross-sectional study was carried out on 150 Indian school children aged 9 years randomly selected, using stratified sample, from 4 schools located in different geographical locations of Vijayawada city. Subjects with craniofacial anomalies and with current or previous orthodontic treatment history were excluded from the study. Written informed consent was obtained from the parents and participation in the study was entirely voluntary. The study design was approved by the

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Table 1: Age and gender distribution of the study sample.

Gender	n (%)	Mean age (SD) in years
Male	83 (55.3)	9.96 (0.86)
Female	67(44.7)	9.52 (0.72)
Total	150 (100)	9.74 (0.79)

SD: standard deviation.

Table 2: Distribution of subjects according to DHC and AC components.

Index of Orthodontic Treatment Needs (IOTN)			
DHC	n (%)	AC	n (%)
(1-2)	74 (49.3)	(1-4)	88 (58.6)
(3)	51 (34)	(5-7)	34 (22.7)
(4-5)	25 (16.7)	(8-10)	28 (18.7)

DHC: Dental Health Component; AC: Aesthetic Component.

Table 3: Orthodontic treatment needs according to DHC and AC grades.

Category	DHC grade	n (%)	AC grade	n (%)
No / little	(1-2)	56 (37.3)	(1-4)	80 (53.3)
Borderline	(3)	25 (16.7)	(5-7)	34 (22.7)
Great need	(4-5)	69 (46)	(8-10)	36 (24)
Total		150 (100)		150 (100)

Table 4: Prevalence of individual malocclusal traits among study subjects.

Traits	n (%)
Increased overjet	38 (25.3)
Crowding	34 (22.7)
Crossbite	29 (19.3)
Openbite	16 (10.7)
Overbite	12 (8)
Reverse overjet	8 (5.3)
Hypodontia	7 (4.7)
Impeded eruption	6 (4)
Submerged teeth	-
Impacted teeth	-

research ethical committee. The study was conducted over a period of 3 months from November 2015 to January 2016.

Oral examination was conducted by an experienced calibrated examiner using gloves, a wooden tongue depressor and a disposable transparent ruler in a sterile environment. Data pertaining to the IOTN was collected along with demographic details. At the end of examination, all the parents and/or school teachers were notified as to the nature of the treatment their child needed.

The DHC of the IOTN are grouped into five grades, where Grades 1 and 2 represent no or slight need for treatment; Grade 3 borderline or moderate need for treatment; and Grades 4 and 5 require high priority for treatment.⁴ The AC of the IOTN was determined in a three-grade scale, using a scale of 10 colour photographs showing different levels with Grade 1 no esthetic need, through Grade 10, the great esthetic need for treatment.³ The subjects observed their teeth in the mirror and compared them with one of the 10 levels of AC. Statistical analysis was undertaken using the Statistical Package for Social Sciences version 15.0 (SPSS Inc., Chicago, IL, USA). A Chi-square test was used to analyze the IOTN results by gender. Statistical significance was set at 5%.

RESULTS

A total of 150 school children aged 9 years with a mean age of 9.74 ± 0.79 years (Mean $\pm$ SD) participated in this study. Of the 150 subjects, 83 were males (55.3%) with a mean age of 9.96 ± 0.86 (Mean $\pm$ SD) and 67 were females (44.7%) with a mean age of 9.52 ± 0.72 (Mean $\pm$ SD). [Table 1] All the subjects were between the ages of 9 years and 9 years 11 months. The distribution of subjects according to DHC and AC of IOTN is shown in Table 2. Orthodontic treatment needs according to DHC and AC is shown in Table 3. There was no statistically significant ($P > 0.05$) gender difference in the DHC and AC grades. The prevalence of individual malocclusal traits in all subjects is shown in Table 4. Increased overjet was the most frequent trait (25.3%) followed by crowding (22.7%) and crossbite (19.3%) respectively. Malocclusal traits such as submerged teeth and impacted teeth were not found in the present study.

DISCUSSION

Children in the age group of 9 years are in mixed dentition stage during which early

intervention is possible through preventive and/or interceptive orthodontics which could reduce the complexity and cost of the orthodontic treatment done at later stages. Index for preventive and Interceptive Orthodontic Needs (IPION) has been developed and tested to determine the treatment needs specifically in mixed dentition. However, studies found that it lacks sensitivity necessary to choose cases specific for preventive or interceptive orthodontics.⁵ IOTN was used in the present study as the validity and reliability of this index has been verified in previous studies.⁶⁻⁸ In our study, with regards to IOTN DHC, 46% of children have been found to be requiring definite orthodontic treatment which was higher than that reported in previous studies on Indian children.^{8,9} However studies conducted in Malaysia¹⁰ (47.9%) and China¹¹ (52%) showed higher DHC scores that that seen in our study.

The IOTN AC score of 24% in this study was very close to the 22.8% reported in Malaysia.¹⁰ However, other studies reported lower scores as in France¹² (7%), India⁹ (9.5%), Iran¹³ (17.9%) and UAE¹⁴ (20.3%). In our study, 53.3% of children did not think they required orthodontic treatment as they rated themselves being in AC categories 1-4. This correlated with the findings of DHC as 46% needed treatment rather badly. On the contrary, Camilleri and Mulligan (2007)¹⁵ found that 87% of children did not express any desire for orthodontic treatment, despite a substantial score (42%) in the DHC grade 3 and 4 categories.

The differences in the results might be attributed to the fact that the AC component is based on self-perception of subjects, whereas the DHC is an objective analysis of occlusal characteristics of the dentition. Furthermore the use of a variety of sample selection methods, age groups and indices in different studies might contribute to varying results.¹⁴

There was no significant difference in orthodontic treatment needs between males and females which corroborates with most studies. In our study, the most common malocclusal trait was increased overjet followed by crowding which is similar to that seen in a previous study on Indian children.⁹ Contrary to this, other studies have recorded crowding as most common trait followed

by increased overjet.^{12,14,16} One limitation in the present study could be the sample selection which included school children residing in Vijayawada city, owing to varying results between different geographical areas.

CONCLUSIONS

There is a high level of orthodontic treatment need among 9 year-old school children of coastal Andhra Pradesh as assessed by both components of the IOTN. 46% of the children in our study were in definite need for orthodontic treatment. The results of the present study are useful for public health planning and as reference for future studies.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Kerosuo H. The role of prevention and simple interceptive measures in reducing the need for orthodontic treatment. *Med Princ Pract* 2002;11 Suppl.1:16-21.
2. King GJ, Brudvik P. Effectiveness of interceptive orthodontic treatment in reducing malocclusions. *Am J Orthod Dentofacial Orthop* 2010;137:18-25.
3. Brook PH, Shaw WC. The development of an index of orthodontic treatment priority. *Eur J Orthod* 1989;11:309-20.
4. Burden DJ, Pine CM, Burnside G. Modified IOTN: an orthodontic treatment need index for use in oral health surveys. *Community Dent Oral Epidemiol* 2001;29:220-25.
5. Sandoval VP, Ceballos CM, Acevedo AC, Jans MA. Orofacial characteristics in relation to the need of orthodontic treatments in children. *Int. J. Odontostomat* 2010;4:59-64.
6. Burden DJ, Holmes A. The need for orthodontic treatment in the child population of the United Kingdom. *Eur J Orthod* 1994;16:395-99.
7. Albarakati SF. Self-Perception of malocclusion of Saudi patients using the aesthetic

- component of the IOTN index. *Pak Oral Dent J* 2007;27:45-51.
8. Athira S, Jayakumar HL, Chandra M, Gupta T, Swathy Anand PJ, Dithi C. Dental esthetic perceptions and orthodontic treatment needs among school children aged 9-18 years of South Bengaluru: A cross-sectional study. *J Indian Assoc Public Health Dent* 2016;14:50-56.
 9. Kumar P, Londhe SM, Kotwal A, Mitra R. Prevalence of malocclusion and orthodontic treatment need in schoolchildren. An epidemiological study. *Med J Armed Forces India* 2013;69:369-74.
 10. Abdullah MS, Rock WP. Assessment of orthodontic treatment need in 5,112 Malaysian children using the IOTN and DAI indices. *Community Dent Health* 2001;18:242-48.
 11. So LLY, Tang ELK. A comparative study using the Occlusal Index and Index of Orthodontic Treatment Need. *Angle Orthodontist* 1993;63:57-64.
 12. Souames M, Bassigny F, Zenati N, Riordan PJ, Boy-Lefevre ML. Orthodontic treatment need in French schoolchildren: an epidemiological study using the index of orthodontic treatment need. *Eur J Orthod* 2006;28:605-9.
 13. Borzabadi-Farahani A, Borzabadi-Farahani A, Eslamipour F. Orthodontic treatment needs in an urban Iranian children, an epidemiological study of 11-14 year old children. *Eur J Paediatr Dent* 2009;10:69-74.
 14. Abu-Fanas A, Hashim R, Al-Ali S. Orthodontic treatment needs among 9-12 years old children in the Emirate of Ajman, United Arab Emirates. *J Adv Oral Res* 2015;6:39-42.
 15. Camilleri S, Mulligan K. The prevalence of malocclusion in Maltese Schoolchildren as measured by the Index of Orthodontic treatment Need. *Malta Medical Journal* 2007;19:19-24.
 16. Miguel JA, Feu D, Brêtas RM, Canavarro C, Almeida MA. Orthodontic treatment needs of Brazilian 12-year-old school children. *World J Orthod* 2009;10:305-10.