



ASSESSMENT OF ORTHODONTIC TREATMENT NEEDS IN VISUALLY CHALLENGED CHILDREN - AN EPIDEMIOLOGICAL SURVEY

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ARTICLE INFO

Article History:

Received 13th October, 2018

Received in revised form 11th November, 2018

Accepted 8th December, 2018

Published online 28th January, 2019

Key words:

Visual Impairment (VI), malocclusion, orthodontic treatment needs, IOTN, Dental Health Component, and Aesthetic Component.

ABSTRACT

Background: Visual Impairment (VI) is the most common challenging condition worldwide in occurrence. Children with VI are unable to detect and recognise any early oral diseases. Malocclusions are given the third priority among all oral health problems. Dental health awareness surveys would give a holistic view on the commonly occurring oral health related problems.

Aim: To assess the orthodontic treatment needs using Index for Orthodontic Treatment Needs (IOTN) in visually challenged children.

Materials and methods: A total of 71 visually challenged children, aged 12 to 14 years, who presented complete permanent dentition and never underwent any orthodontic procedures were selected. IOTN index was used to assess the orthodontic treatment needs. In order to assess the Dental Health Component (DHC) of IOTN with accuracy, alginate impressions of maxillary & mandibular arches and the Aesthetic Component (AC), intraoral photographs were taken. Recording of dental irregularities from study models and anterior aesthetic appearance from intra oral photographs was done.

Results: Among the surveyed children, 60% had severe dental irregularities and 40.8% had severe unaesthetic dental appearance.

Conclusion: In this survey, children with VI had presented a great and very great need for the orthodontic treatment.

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INTRODUCTION

The Federal Maternal and Child Health Bureau defines Children and Youth with Special Health Care Needs (CYSHCN) as “those who have or at increased risk for a chronic physical, developmental, behavioral or emotional condition and who also require health and related services of a type or amount beyond that required by children generally.”²² Globally, it is estimated that approximately 1.3 billion people live with some form of vision impairment and 19 million belong to the age group of 15 years or younger.⁴

Oral health in children with such sensory deficits is always obscured, which could be attributed to their physical inability or limited access to proper dental care or parent’s main concern on the disabling condition of the child. The oral health of visually impaired children can be disadvantaged, since they are not in a position to detect and recognize early oral diseases and may be unable to take immediate action unless informed of the situation.¹¹

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Malocclusions are given the third priority among all the oral health problems, after dental caries and periodontal diseases.²⁴ Reported incidences of dental malocclusion in India may vary from 19.6% to 55.3%.¹ This baseline data is essential for planning dental public health programs and preventive orthodontic treatment programs.

Professional knowledge about orthodontic perceptions in different age groups is essential.²⁷ The Index of Orthodontic Treatment Need (IOTN), identifies malocclusion on the basis of various occlusal traits for dental health and aesthetic components. The IOTN classifies malocclusions which are considered important for dental health and aesthetics in order to identify individuals who would derive the most benefit from orthodontic treatment. The index incorporates a dental health component (DHC), with 5 severity levels (Table 1), based on the recommendations of the Swedish Medical Board and an aesthetic component (AC) with 10 severity levels, illustrated by a series of photographs which were rated for attractiveness by a lay panel and selected as being equidistantly spaced through the range of grades.⁵

Literature on oral health care needs in terms of malocclusion, in children with SHCN is sparse, hence this survey was aimed

to assess the orthodontic treatment needs in visually challenged children.

Table 1 DHC Grades of IOTN Index

DHC Grades	Occlusion	Orthodontic treatment need
1	Perfect or almost perfect occlusion	No need
2	Occlusion with slight irregularities	Mild/Little need
3	Occlusion with higher irregularities	Borderline need
4	Occlusion with more severe irregularities	Great or Severe need
5	Severe dental health problems	Very great need

MATERIALS AND METHODS

The present survey was done by Department of Pedodontics, Kamineni Institute of Dental Sciences, Narketpally, Nalgonda Dt. Before the commencement of survey, institutional ethical clearance; permission from the respective school authorities; and verbal consent from parents and participants were obtained. Selection criteria included children with complete permanent dentition, who never underwent or undergoing any kind of orthodontic treatment, who were willing to participate and who were not otherwise abled with medically compromised conditions or systemic illnesses or craniofacial malformations. Children who showed unwillingness for the procedures were not included in this survey.

Initially, intraoral examination (Type III) for all children of all the age groups in their respective schools was done in order to assess the oral health status. Later, a total of 71 VI children (21 girls and 50 boys) aged 12 to 14 years, who have met the selection criteria only were included in this survey, to assess the orthodontic treatment needs.

Index for orthodontic treatment needs (IOTN) records Dental Health Component (DHC) and Aesthetic Component (AC). In order to assess DHC, study models and AC, intraoral photographs are required. At first, children were explained about the purpose of the survey; importance of study models and intra oral photographs for assessing the malocclusion status with accuracy. Children were made to sit comfortably on normal chairs and intraoral photographs were taken by placing cheek retractors using digital camera under natural day light. Later, impressions of maxillary and mandibular arches were made using alginate and immediately poured with dental stone to avoid dimensional changes followed by the preparation of study models in the dental lab. After taking intraoral photographs and making impressions, basic treatment procedures such as oral prophylaxis and restorative procedures were rendered in children who had basic treatment needs.

RESULTS

Among 71 VI children, when DHC component of IOTN was analysed, greater number of children, 22.5% were under the category of Grade 4 (Great need); 21.1% children were under Grade 5 (Very Great need); and 16.9% had shown moderate dental irregularities, were under Grade 3 (Moderate need) for orthodontic treatment. Whereas, 18.3% revealed no much dental irregularities, Grade 1 (No need) and the rest 21.1% under the category of Grade 2 (Little need) (Table 2).

On analysis of Aesthetic Component (AC) of IOTN, higher percentage of children (25.3%) were under the category of Grade 1, with aesthetic dental appearance. Whereas, 18.3% of children showed severe unaesthetic dental appearance under

the category of Grade 10. Among the subjects, 40.8% children were under the categories of Grade 5 to Grade 10, revealed moderate and great treatment needs for the orthodontic treatment (Table 3).

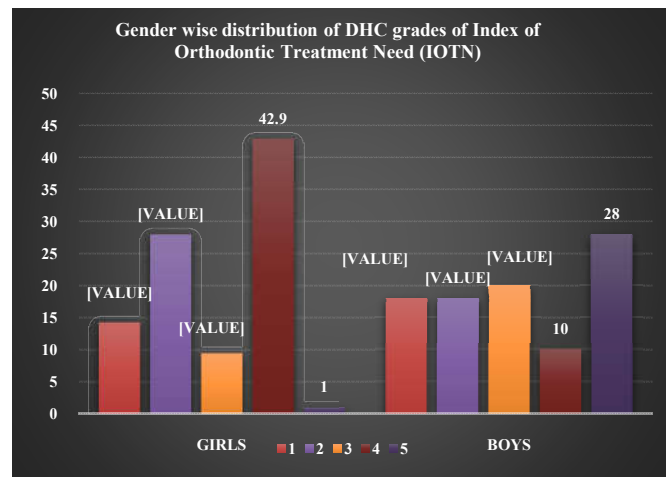
Table 2 Orthodontic treatment need according to the DHC component of IOTN

DHC(Grades)	n (Percentage)
Grade 1	13 (18.3%)
Grade 2	15 (21.1%)
Grade 3	12 (16.9%)
Grade 4	16 (22.5%)
Grade 5	15 (21.1%)
Total	71

Table 3 Orthodontic treatment need according to the Aesthetic Component of IOTN

AC Grades	n (Percentage)
1	18 (25.3%)
2	7 (9.8%)
3	3 (4.2%)
4	11 (15.5%)
5	2 (2.8%)
6	7 (9.8%)
7	1 (1.4%)
8	4 (5.6%)
9	2 (2.8%)
10	13 (18.3%)

Graph 1 shows the gender-wise comparison of 71 VI children surveyed. Among 21 girls, 42.9% had a great need for the orthodontic treatment (Grade 4), 28% showed Grade 2, and 14.3% showed no dental irregularities (Grade 1). Out of 50 boys, 28% had a very great need (Grade 5); 20%, Grade 3; 18%, Grades 1 & 2 and 10%, Grade 4. A total of 57.4% girls and 64% boys had shown dental irregularities of Grades 3,4 and 5, thereby indicating moderate to very great need for the orthodontic treatment.



Graph 1 Gender wise distribution of DHC grades of Index of Orthodontic Treatment Need

DISCUSSION

Categorization of orthodontic treatment needs based on dental irregularities as well as aesthetics play an important role for proper planning of respective public policies. Literature is replete with many dental health surveys conducted in children with special health care needs, reported an increased prevalence of dental caries and compromised periodontal health. Surveys on assessing the malocclusion / treatment needs in only visually challenged children is sparse. Hence, the

present survey has been carried out to assess the orthodontic treatment needs (IOTN) in Visually Impaired children.

Malocclusion and dental irregularities varies with gender, race, genetics etc., and there is a wide variability among different epidemiological studies.^{2, 9, 17, 20} Nevertheless, in most studies the prevalence rate of orthodontic treatment need is consistently close to the results of this study. This IOTN recording system was standardised to validated methodologies in use in European countries^{5, 15, 6} in many epidemiological studies^{6, 13, 19, 23, 8, 26} and has gained international recognition as a method of objectively assessing treatment need.²⁸ IOTN is the most reliable, concise, valid, and easy to use with acceptable reproducibility as it interprets both the perceived needs, from the Aesthetic Component and the normative need from the Dental Health Component.^{5, 7}

In the present study, a difference in the prevalence of VI children with orthodontic treatment needs on the grounds of dental irregularities and aesthetic dental appearance was observed. The Dental Health Component demanding orthodontic treatment needs was 60.1% and Aesthetic Component demanding the treatment need was 40.8%. Most of the VI children in the category of 'need to treatment' had a need on dental health grounds, although their aesthetic impairment did not fall into the most severe grades. Aesthetic component scores are based only on the aesthetic anterior tooth appearance. Various occlusal traits of contact point displacements less than 2mm, deep overbites not causing any palatal tissue trauma, horizontal overjets of more than 2mm and less than 4mm, anterior crossbites esp., have many dental health implications, but do not attract a high aesthetic score. In consistent with the present study, Lal SML *et al* (2006) have reported higher percentage of DHC, 73% for great and very great need for treatment in special needs children.¹⁶ The DHC grade demanding treatment need was 30.8%, while AC grade demanding treatment need was 16.7%. The orthodontic treatment needs for hearing and visually impaired children came out to be less demanding than the treatment needs for mentally handicapped children.²⁵

Among the malocclusions found, Angle's Class II molar relation with horizontal overjet, equal to 4mm or greater was observed in majority of children followed by crowding, crossbite and openbite in one or more segments. The need for orthodontic treatment implies both the dental irregularities of DHC and aesthetic dental appearance. Crowding (66.3%) was found to be the most prevailing followed by class II molar relation, which was relatively higher than the prevalence reported by Dias and Gleiser¹⁰ (45.5%), Sousa *et al* (28.3%) and Marques²¹ (37.8%), and similar to those reported by Freitas *et al*¹² (69%) and Lopes and Gangussu¹⁷ (65%). A possible explanation for this could be a relatively small sample size; only visually impaired children of selected age range with complete permanent dentition.

On gender wise distribution, there were 21 girls and 50 boys in this present study. As there was no equal distribution of girls and boys, a significant difference in the treatment needs between them could not be interpreted. Though there was an appreciable number of girls in the schools, girls or boys, those who were willing to participate in this survey only were included. In the present study, more number of girls revealed great needs and boys revealed very great need for the orthodontic treatment. The distribution with respect to males

and females for orthodontic treatment need has been studied by several researchers. Hedayati *et al* (2007) in Iranian children reported greater orthodontic treatment needs in males than females.¹⁴ Similarly, in our study, the difference between the IOTN values of boys and girls indicated that boys presented more need to treatment than girls.

In our study, the Dental Health Component demanding orthodontic treatment needs was 60.1% and the Aesthetic Component demanding treatment needs was 40.8% using IOTN. The orthodontic treatment needs with respect to DHC was 11.7%³ and 20.0%²⁵ in visually impaired children. While 32.5% of SHCN¹⁰ had great and very great need of orthodontic treatment and 40.0% of SHCN had great need of orthodontic treatment in terms of DHC. Utomi *et al* (2010)²⁹, 36.2% and Luppapornlarp *et al* (2010)¹⁸, 37.5% of SHCN reported severe and very severe malocclusion indicating treatment highly desirable and mandatory using Dental Aesthetic Index (DAI). So, beside the use of other treatment need index i.e. DAI by some authors, the findings for orthodontic treatment needs came out to be relatively low with the IOTN results of our study.

CONCLUSION

Oral health care is one of the greatest unmet needs in these visually impaired children. It was observed that with the use of IOTN, 60.1% children had severe dental irregularities and 40.8% had unaesthetic dental appearance. Identification and early intervention of such dental irregularities during transitional phase of mixed dentition would definitely reduce the risk from the development of complex malocclusions in future. As main focus of parents or guardians is on the disabling condition and general health, if oral health care is approached along with medical health care teams, would give a complete view on their physiological and psychological well-being and at the same time it may help to enhance their levels of motivation toward maintenance of good oral health.

Acknowledgement

I would like to express my gratitude to school teachers and parents for giving permission and all children who volunteered to participate in this study. My sincere thanks to all my interns, PG students and my fellow colleagues, who helped me in successful completion of this survey.

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How to cite this article:

Thabitha Rani. S *et al* (2019) 'Assessment of Orthodontic Treatment Needs in Visually Challenged Children - An Epidemiological Survey', *International Journal of Current Advanced Research*, 08(01), pp. 16762-16765.
DOI: <http://dx.doi.org/10.24327/ijcar.2019.16765.3111>
