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Assessment of Malocclusion and Orthodontic Treatment Need Among Hearing and Speech Impaired Children

Javed Sodawala*, Nidhi Agrawal, Sumit Gandhi, Shaheen Hamdani, Swalpa Agrawal and Harsha Malhotra

Department of Orthodontics and Dentofacial Orthopedics, Rungta College of Dental Sciences & Research, Pt. Deendayal Upadhyay Memorial Health Sciences and Ayush University of Chhattisgarh, Bhilai - 490024, Chhattisgarh, India; drjavedazher@gmail.com

Abstract

Aim: Children with special needs are prone to poor oral health due to their potential sensory, motor and intellectual disturbances. The purpose of this study was to evaluate type and severity of malocclusion and assess orthodontic treatment need in hearing and speech impaired children. **Materials and Methods:** Sixty-seven hearing and speech impaired children aged 7-14 years studying in special schools in Bhilai and Durg were included in this study. The Dental Health Component (DHC) and Aesthetic Component (AC) of Index of Orthodontic Treatment Need (IOTN) were recorded by one examiner. Data were analysed using student's t-test and chi-square test at a level of significance of .05. **Results:** According to AC, 61.2% children had no/little need, 35.8% had moderate need and 3% had great need of orthodontic treatment. According to DHC, 35.8% children had no/little treatment need, 43.3% had moderate need and 20.9% had great treatment need. Chi-square test showed a highly significant gender difference (P<.001), according to gender based DHC grade. Also, a highly significant difference between patient's perception and orthodontist's opinion for both AC and DHC (P<.001). **Conclusion:** The patient's perception and orthodontist's opinion differed for assessment of malocclusion of hearing and speech impaired children. There was a moderate need of orthodontic treatment in these children of Bhilai and Durg.

Keywords: Hearing and Speech Impaired, Orthodontic Treatment Need, IOTN

1. Introduction

Hearing and speech impairment is a major health problem and limits appropriate communication and learning that is necessary for the normal development and maturation of a child. Its etiology is generally due to loss of hearing before the age of 2 – 3 years, which hinders the child being able to learn how to speak; congenital impairment is also a possible etiology. Most cases of hearing and speech impairment result from acute infectious diseases such as measles, epidemic meningitis, encephalitis, typhoid, otitis media, or toxic effects of drugs[1].

An unesthetic dental appearance may have a significant emotional impact on an individual's well-being which may adversely affect their self-esteem and evoke an unfavourable social response in many facets of his or her social interaction. The face and oral region in particular, appear to be of primary importance in determining attractiveness and the teeth are a frequent target for teasing and ridicule amongst children[2].

Individuals with special needs have greater limitations in oral hygiene performance due to their potential motor, sensory and intellectual disabilities and are prone to poor oral health[3]. Oral and dental anomalies are a frequent

*Author for correspondence

problem for special needs patients, including those who have hearing impairment and/or are blind. The oral cavity plays an important role in the satisfaction to be achieved from life through functions such as mastication, aesthetics, phonetics, communication, and expression[4].

Evidence in research orthodontics indicates that unacceptable dental appearance, including a visible dental appearance that deviates greatly from the norm, are phenomena that may stigmatise, impede career advancement and compromise peer group acceptance. Severe unesthetic occlusion can compromise already difficult social relationship and potential employment opportunities. Individuals with disabilities need functional and aesthetic considerations comparable to that of normal persons[5]. According to Waldman[6], the need for orthodontic care for disabled people is further highlighted by the increasing trend towards deinstitutionalisation of this group of people with special needs and subsequent resettlement of these people in smaller home environments.

There is a paucity of information regarding malocclusion and orthodontic treatment need in this group of population especially in Chhattisgarh. Durg and Bhilai are upcoming twin cities of Chhattisgarh and the special schools of these cities have been selected for the purpose to assess the malocclusion and orthodontic treatment need among hearing and speech impaired children.

2. Materials and Methods

There are 8 schools catering to the need of special children in Durg and Bhilai. Each school has approximately 15-20 students. Out of these 8 schools, four schools were selected for the study. Sixty-seven children aged 7-14 years with hearing and speech impairment were included in this study. Children were selected from special schools and training centres of Bhilai and Durg. Children, who were not willing to participate, had previous history of orthodontic treatment or craniofacial abnormalities were excluded from the study.

An approval for conducting this study was taken from the ethical committee of the concerned institution. Also, verbal and written informed consents were obtained from the parents. Demographic data of children - name, age, sex and name of the school was recorded. The Aesthetic component (AC) of Index of Orthodontic Treatment Need (IOTN) was recorded by showing children the set of illustrated photographs, used originally by Brook and Shaw[7] and comparing their dental appearance to these standard photographs and grading their aesthetics to the nearest resembling photograph from 0 to 10. The Dental Health Component (DHC) was recorded by one examiner and grading was done from 0 to 5.

After the clinical examination, dental health instructions were given with the help of visual aids to students, teachers and care givers to increase awareness of these children regarding malocclusion and orthodontic treatment.

Statistical analysis

Data was compiled and analysed using the Statistical Package for Social Sciences (Version 18.0). Student t-test was used to compare age of male and female subjects. Chi-square test was used to assess the gender differences for both AC and DHC of IOTN. Pearson's correlation coefficient was used to assess the inter-relationship of AC and DHC of IOTN. The significance level was set at $P<.05$.

3. Results

The mean age of the sample was 10.60 ± 2.3 years. There was no significant difference ($P>.05$) between male and female regarding age. (Table 1).

Table 1: Descriptive statistics of study population for age in years

Gender	N	%	Mean	SD	P value
Male	31	46.3	10.71	2.2	.788
Female	36	53.7	10.56	2.4	
Total	67	100	10.60	2.3	

P>.05: Not Significant

According to AC grades of IOTN, 3% had great or definite need of treatment, 35.8% had moderate need of treatment and 61.2% had little or no need of treatment. (Table 2).

Table 2: Distribution of study population according to AC grades of IOTN

AC of IOTN	Treatment need	N	%
Grade 1	No/ Little need	3	4.5
Grade 2		11	17.9
Grade 3		12	17.9
Grade 4		15	20.9
Total		41	61.2
Grade 5	Borderline/Moderate need	10	14.9
Grade 6		9	13.4
Grade 7		5	7.5
Total		24	35.8
Grade 8	Great /Definite need	2	3
Grand Total		67	100

According to DHC grades of IOTN, 21% had great or definite need of treatment, 43.3% had moderate need of treatment and 35.8% had little or no need of treatment. (Table 3).

Table 3: Distribution of study population according to DHC grades of IOTN

DHC of IOTN	Treatment need	N	%
Grade 1	No/ Little need	3	4.5
Grade 2		21	31.3
Total		24	35.8
Grade 3	Borderline/Moderate need	29	43.3
Grade 4	Great /Definite need	14	20.9
Grand Total		67	100

According to gender based AC grade, no significant gender difference (P>.05) was found. (Table 4).

Table 4: Distribution of study population according to gender based AC grade

AC of IOTN	Treatment need	Male N (%)	Female N (%)	Total N (%)	χ^2 value	P value
Grade 1	No/ Little need	2(6.5)	1(2.8)	3(4.4)	123.6	.539
Grade 2		4(12.9)	8(22.2)	12(17.9)		
Grade 3		4(12.9)	8(22.2)	12(17.9)		
Grade 4		7(22.6)	7(19.4)	14(20.9)		
Total		17(54.9)	24(66.6)	41(61.1)		
Grade 5	Borderline/Moderate need	4(12.9)	6(16.7)	10(14.9)		
Grade 6		6(19.4)	3(8.3)	9(13.5)		
Grade 7		2(6.5)	3(8.3)	5(7.5)		
Total		12(38.8)	12(33.3)	24(35.9)		
Grade 8	Great /Definite need	2(6.5)	0	2(3)		
Grand Total		31 (100)	36 (100)	67 (100)		

P>.05: Not Significant

According to gender based DHC grade, a highly significant gender difference (P<.001) was found. (Table 5).

Table 5: Distribution of study population according to gender based DHC grade

DHC of IOTN	Treatment need	Male N (%)	Female N (%)	Total N (%)	χ^2 value	P value
Grade 1	No/ Little need	2 (6.5)	1 (2.8)	3(4.4)	20.722	.000
Grade 2		8(25.8)	13(36.1)	21(31.6)		
Total		10(32.3)	14(38.9)	24(36)		
Grade 3	Borderline/Moderate need	11(35.5)	18(50)	29(43.2)		
Grade 4	Great /Definite need	10(32.3)	4(11)	14(20.8)		
Grand Total		31(100)	36 (100)	67 (100)		

P<.001: Highly significant

Pearson's correlation coefficient showed slight positive correlation (r=0.02) between patient's perception and orthodontist's opinion for both DHC and AC which was not statistically significant (P<0.05). (Table 6).

Table 6: Inter-relationship between DHC and AC grade of IOTN

		DHC				Total	r value	P value
		1.00	2.00	3.00	4.00			
AC	1.00	2	1	0	0	3	0.02	.495
	2.00	1	8	3	0	12		
	3.00	0	7	4	1	12		
	4.00	0	2	10	2	14		
	5.00	0	1	6	3	10		
	6.00	0	2	3	4	9		
	7.00	0	0	3	2	5		
	8.00	0	0	0	2	2		
Total		3	21	29	14	67		

P>.05: Not significant

4. Discussion

Oral and dental anomalies are a frequent problem for special needs patients; including those who have hearing impairment[8]. Oral health of disabled people may be neglected because of a focus on their disabling condition, other major disease(s) or limited access to oral health care. It has been reported that dental treatment is the greatest unattended health need of the disabled[9]. IOTN developed by Book and Shaw[7] was used to assess the malocclusion and orthodontic treatment need in hearing and speech impaired children.

The current study represents the epidemiological survey carried out on hearing and speech impaired school children of Bhilai aged 7 to 14 years with the purpose to highlight the orthodontic conditions of the study population. In the present study, according to AC, 38.8% study population had moderate to great need of orthodontic treatment and according to DHC, 64.2% study population had moderate to great need of orthodontic treatment.

Sarheed et al.[10] assessed the need for orthodontic treatment in hearing impaired children attending special schools in Riyadh, Saudi Arabia and reported that according to AC, 64.8% of study population and according to DHC, 30% of study population had orthodontic treatment need. Desai et al.[11] conducted a study of the dental treatment needs of children with disabilities using IOTN in Melbourne, Australia and found that most children (64%) had moderate to severe malocclusion requiring orthodontic treatment.

Soni et al.[12] assessed children with special need of Chandigarh aged 12-15 years and found out that according to AC, 39.7% of study population and according to DHC, 41.1% of study population had orthodontic treatment need. Maurya et al.[13] conducted a study in five different Indian cities and found that speech disabled children have moderate need of orthodontic treatment with average IOTN score of 4 and hearing disabled children has borderline need for orthodontic treatment with IOTN average score of 3.

Vellappally et al.[14] conducted a study to assess the prevalence of malocclusion among 12-18-year-old disabled adolescents in Chennai, Tamil Nadu, India, by using the Dental Aesthetic Index (DAI) and found that 50.6% participants had DAI scores of 36 and above, which indicated a handicapping malocclusion requiring mandatory orthodontic treatment and 28.4% participants had DAI scores between 31 and 35, which indicated severe malocclusion, for which orthodontic intervention was desirable.

In the present study, the orthodontic treatment need of school going children of Bhilai, according to AC component, was in accordance to the study conducted by Soni et al.[12] while it was lesser than the study reported by Sarheed et al.[10] According to DHC component, the orthodontic treatment need was greater in Bhilai population when compared to the other studies.[10,12] Desai et al.[11], Maurya et al.[13] and Vellappally et al.[14] were in accordance with that of present study.

Nguyen et al.[15] conducted similar study to assess orthodontic treatment need among Vietnamese school

children and found that 22.8% of study population, according to AC and 47.5% of study population, according to DHC, were in need of orthodontic treatment. Thakur[16] on school children of Bhilai aged 8-14 years reported that, according to AC, 43.7% of study population and according to DHC, 72.3% of study population had orthodontic treatment need. Sarheed et al.[10] reported that according to AC, 58.1% of study population and according to DHC, 22.4% of study population had orthodontic treatment need.

In the present study, it was found that orthodontic treatment need was lesser when compared to Thakur[16] and Sarheed et al.[10] whereas orthodontic treatment need was greater when compared to Nguyen et al.[15] according to AC component. According to DHC component, orthodontic treatment need was greater when compared with study conducted by Nguyen et al.[15] and Sarheed et al.[10] and lesser when compared with study conducted by Thakur[16]. These might be due to the racial and ethnic differences among population, literacy rate, lifestyle, awareness regarding malocclusion, availability of orthodontic clinics, etc.

A slight positive correlation (r = 0.02) was found between the patient's perception (AC) and orthodontist's opinion (DHC) for the assessment of malocclusion in hearing and speech impaired children. The results were similar to another study conducted by Sharma et al.[17] on school going children which reports that orthodontists graded children to less attractive side of scale in comparison to children themselves.

Further studies should be carried out with a larger sample, especially in rural areas where the provision of specialized oral care is lacking. Also, visually impaired children should be included in the future studies as lack of vision restrains them from maintaining good oral hygiene.

5. Conclusion

It can be concluded that the patient's perception and orthodontist's opinion differed for assessment of malocclusion of hearing and speech impaired children. According to AC, 35.8% of hearing and speech impaired children had moderate need and 3% had definite need of orthodontic treatment. According to DHC, 43.3% hearing and speech impaired children had moderate need and 21% had definite need of orthodontic treatment.

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7. References

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