


Prevalence of Angle's malocclusion in sensory-deprived and normal school children of age group of 12-16 years in India: A study conducted in 2016-2018

Tarulatha R Shyagali MDS, DCE, DNHE, PhD¹ , Manish Singh BDS², Rishi Joshi MDS³, Abhishek Gupta MDS⁴, Pratibha Kshirsagar BDS², Ruchi Jha BDS²

Original Article

Abstract

BACKGROUND AND AIM: Malocclusion has multifactorial etiology and the environmental factors play a major role in the occurrence of a malocclusion. Physical constraint faced by the disabled children may increase the chance of having malocclusion more than their normal counterparts. Thus, this study was done to evaluate the difference in the prevalence of Angle's malocclusion in sensory-deprived and normal children of the central India.

METHODS: A cross-sectional study was performed on 342 school-going children aged 12-16 years. The sample comprised of equal number of sensory-deprived and normal children (n = 171 for each group). Physical disabilities included being deaf, dumb, or visually-impaired. The children were examined for the type of Angle's malocclusion. Obtained data were subjected to chi-square test to note the difference in the prevalence of malocclusion between the two groups using the SPSS software. A P-value less than 0.05 was considered to be significant.

RESULTS: Angle's malocclusion was prevalent in 90.06% of the sensory-deprived children and 84.80% of the normal children. The most prevalent malocclusions in sensory-deprived children were class II division 1 and class I type I malocclusion with 24.60% and 21.63% prevalence, respectively. In normal children the most prevalent malocclusions were class I type II and class II division 1 with the prevalence of 23.39% and 21.05%, respectively. The results obtained were statistically significant.

CONCLUSION: High prevalence of malocclusion is seen in the sensory-deprived children compared to the normal children. The study warrants the need of orthodontic treatment in the current population group.

KEYWORDS: Angle's Classification; Malocclusion; Dental Occlusion; Disabled Children

Citation: Shyagali TR, Singh M, Joshi R, Gupta A, Kshirsagar P, Jha R. **Prevalence of Angle's malocclusion in sensory-deprived and normal school children of age group of 12-16 years in India: A study conducted in 2016-2018.** J Oral Health Oral Epidemiol 2019; 8(2): 74-80.

The World Health Organization (WHO) defines disability as an umbrella term describing the impairments, activity limitations, and participation restrictions.¹ Malocclusion can be caused either due to the underlying disease which might have caused the disability or the psychosocial issues associated with the disability or the physical constraint itself.² The studies in the past have

proven that malocclusion leads to poor quality of life and it is ranked third amongst the dental health problems next only to tooth decay and the periodontal diseases.³⁻⁵

The preconceived notion of the society makes the physically-disabled individuals less privileged in terms of receiving health care services and the educational opportunities.⁶ It is necessary to understand the existing dental problems in these children to improve their

1- Professor, Department of Orthodontics and Dentofacial Orthopedics, Hitkarini Dental College and Hospital, Jabalpur, Madhya Pradesh, India

2- MSc Student, Department of Orthodontics and Dentofacial Orthopedics, Hitkarini Dental College and Hospital, Jabalpur, Madhya Pradesh, India

3- Professor, Department of Orthodontics and Dentofacial Orthopedics, Hitkarini Dental College and Hospital, Jabalpur, Madhya Pradesh, India

4- Department of Orthodontics and Dentofacial Orthopedics, Hitkarini Dental College and Hospital, Jabalpur, Madhya Pradesh, India

Correspondence to: Tarulatha R Shyagali MDS, DCE, DNHE, PhD

Email: drtarulatha@gmail.com

quality of life. Around 15% of children worldwide are disabled. In India, one third of the total disabled population are children.⁷

The children who are affected with the partial or complete loss of hearing and partial or complete loss of vision and those who are deaf and dumb all have problems related to understanding and maintaining the oral hygiene instructions and practices in comparison to their normal counterparts. Poor oral hygiene maintenance may cause the premature loss of the teeth and subsequently lead to the development of malocclusion.⁸

There is paucity of the literature on the malocclusion prevalence in the sensory-deprived children. The comparison of the malocclusion prevalence in these children with normal children is also not given due consideration.⁹ To fill this research gap, the current study was aimed to evaluate and compare malocclusion status of the sensory-deprived children with that of the normal children of age group of 12-16 years using Angle's classification of malocclusion.

Methods

A cross-sectional study was carried out using the simple random method of sample collection. The sample survey was performed on 342 school-going children of 12-16 years old in Jabalpur City, India. Institutional Ethical Committee provided the permission to conduct the study (ethical clearance code: No.HDC&H/20). The sample was selected based on the selection criteria including individuals with no history of orthodontic treatment or the maxillofacial trauma, presence of sound permanent 1st molar, and no history of systemic illness.

A list of all the schools belonging to the sensory-disabled and the normal children

was obtained from the Social Welfare Department of the state. Three schools which trained and educated deaf and dumb, only deaf, and visually-impaired children were selected. The school authorities were approached and briefed about the study and their permission was sought for examining the children. All the participants signed the informed consent prior to the examination. A total of 171 sensory-deprived children met the selection criteria. The matching number of controlled group sample was selected by using the lottery system to select the school as well as the children.

The children were made to sit on chair or bench available at the time of examination. Natural illumination was utilized for the examination and if required a torch light was used. A single examiner examined all the children and the findings were entered into the preformed pro forma.

Mouth mirror was used to retract the cheek before examining the type of malocclusion to view the molar relationship in centric occlusion on either side of oral cavity.^{10,11} Relationship of the molar was classified as normal occlusion when the examined individual had bilateral Angle's class I molar relationship with an overjet and overbite of 2-3 mm and 1-2 mm, respectively¹² and the arches were in alignment with minimal crowding. The individuals with malocclusion were classified into three groups according to Angle's classification of malocclusion, i.e., class I, class II, and class III malocclusions. Further, class I malocclusion was classified into Dewey's types and the rest of the malocclusions were either bilaterally symmetrical or subdivisions (Table 1).

The data collected were transferred to Microsoft Office Excel sheet, and then analysed

Table 1. Dewey's modification of Angle's class I malocclusion

Dewey's types	Findings
Angle's class I type 1 malocclusion	Crowded incisors or labial canines
Angle's class I type 2 malocclusion	Protruded maxillary incisors
Angle's class I type 3 malocclusion	Anterior end to end occlusion or anterior crossbite
Angle's class I type 4 malocclusion	Unilateral or bilateral posterior crossbite
Angle's class I type 5 malocclusion	Mesial drift of molars

using SPSS software (version 22, IBM Corporation, Armonk, NY, USA). Pearson's chi-square test for the numerical value was applied to know the difference in the prevalence of different types of Angle's malocclusion between the normal and sensory-deprived children. The P-value less than 0.05 was considered to be statistically significant.

A single examiner examined all the subjects and to check the intra-examiner variability, 10 subjects were examined twice within the interval of a week and the data were subjected to Kappa statistics. The kappa statistics accounted for 0.88%, indicating good calibration of the examiner.

Results

Table 2 depicts the demographic data of the study population. The study was performed on 342 children of 12-16 years old, out of which 171 were sensory-deprived and 171 were normal children.

Table 2. Demographic data of the study sample

Sample	Gender	n (%)	Total [n (%)]
Sensory-deprived	Male	123 (35.96)	171 (50.00)
	Female	48 (14.04)	
Normal	Male	122 (35.67)	171 (50.00)
	Female	49 (14.33)	
Total	Male	245 (71.63)	342 (100)
	Female	97 (28.37)	

The distribution of the occlusion pattern in whole of the population including the sensory-deprived and normal children is shown in table 3. Malocclusion was prevalent in 87.1% of the population and the normal occlusion was prevalent in rest of the population (12.9%). The difference noted was

statistically significant.

Table 3. Prevalence of type of occlusion in study sample

Type of occlusion	n (%)
Normal occlusion	43 (12.90)
Malocclusion	299 (87.10)
Total	342 (100)

The difference between the sensory-deprived and the normal children for the distribution of the occlusion and Angle's malocclusion is depicted in table 4. Prevalence of malocclusion in sensory-deprived and normal children was by 90.06% and 84.80%, respectively. Class II division 1 was more prevalent in sensory-deprived (24.60%) than in the normal children (21.05%). Whereas, class I type 2 was more prevalent in normal children (23.39%) than the sensory-deprived (16.40%). Difference noted for the prevalence of all the kinds of Angle's malocclusion between two groups was statistically significant.

Comparison for the prevalence of different types of Angle's malocclusion in both sensory-disabled and normal children is depicted in table 5. Statistically significant difference was noted between sensory-deprived and normal children for the prevalence of class I and class III, and between class II and class III malocclusions ($P = 0.001$).

Discussion

The results of the study showed that there was an increased prevalence of Angle's malocclusion types in sensory-deprived children compared to the normal children.

Table 4. Comparison of prevalence of occlusion and malocclusion between the sensory-deprived and normal children groups

Occlusion Group	Normal	Class I				Class II			Class III		χ^2	P
		Type 1	Type 2	Type 3	Type 4	Division 1	Division 2	Subdivision	True	Pseudo		
Sensory-deprived [n (%)]	17 (9.94)	37 (21.63)	28 (16.40)	4 (2.23)	1 (0.58)	42 (24.60)	3 (1.80)	18 (10.52)	14 (8.20)	7 (4.10)	28.61	0.002*
Normal [n (%)]	26 (15.20)	32 (18.71)	40 (23.39)	6 (3.50)	4 (2.33)	36 (21.05)	3 (1.80)	21 (12.28)	2 (1.16)	1 (0.58)		

* $P < 0.050$

Table 5. Comparison of prevalence of Angle's malocclusion types in sensory-deprived and normal children groups

Type of malocclusion	Normal children	Sensory-deprived children	P
Class I	82	70	0.390
Class II	60	63	
Class I	82	70	0.001*
Class III	3	21	
Class II	60	63	0.001*
Class III	3	21	

The prevalence of malocclusions in different studies varies according to the methods of assessment, racial differences, and the chronological age of the sample. The need for baseline information regarding malocclusion in sensory-deprived children group is important as there is paucity of information regarding the same. This information will also help the policy makers in designing effective oral health education programs for the needy.

Normal occlusion was prevalent in 12.9% of the subjects and the remaining 87.1% of subjects had malocclusion for the overall population. When the data was segregated separately for the normal and disabled children, it was evident that the normal occlusion was more prevalent in the normal children by 15.20%, whereas only 9.94% of sensory-deprived children had normal occlusion. Similar results were also noted for the normal children (15.9%) of Benin City, Nigeria¹³ and were also comparable to the findings of a study conducted on the 10-12-year-old children of southern region of India, Kerala.¹⁴ However, higher prevalence of normal occlusion was reported in the Nigerian of Ibadan region (24.0%), Iranian (22.9%), and Brazilian (33.0%) normal children.¹⁵⁻¹⁷ Comparatively, higher percentage of normal occlusion was seen in the Nigerian disabled children compared to the current study group.¹⁸

Prevalence of class I malocclusion was greater in both the normal and the sensory-deprived children; however, the prevalence of class I malocclusion was greater in normal children (47.92%) than the sensory-deprived

children (40.81%). The difference noted between the two groups was statistically significant. However, variation in the prevalence of class I malocclusion in different groups of population can be traced in the previous literature. In India itself, in the southern regions like Kerala, Tamil Nadu, and Karnataka, the prevalence of class I malocclusion in normal children was 69.8%, 48.5%, and 62.0%, respectively.^{14,19,20} Similar regional variations were also reported in Saudi Arabian children, the prevalence ranged from 52.8% to 71.2%.^{21,23} Concurrent results for the prevalence of class I malocclusion were reported in Nigerian and Iranian children with the prevalence of 47.6%-50.0% and 52.0%, respectively.^{13,15,24} The huge variation in the reporting indicates the definite ethnic and racial influence in the propagation of malocclusion.^{15,24,25} Less prevalence of class I malocclusion was observed in Brazilian normal children with 37.3% prevalence.¹⁷

Reported prevalence of class I malocclusion in disabled children in the southern India population was 14.34%,⁹ which is less than the prevalence seen in current study group. Around 55.3% of the Nigerian handicapped children had class I malocclusion, which was comparable to results of the present study.¹⁸ In another study on the physically-disabled children in Cape Town, South Africa, it was reported that 29.0% of the disabled children had malocclusion. The findings were not in agreement with the current study as 90.96% of the physically-handicapped sample had malocclusion.²⁶ The high prevalence of malocclusion was also noticed in the special need children of south India.²⁷ In contrast, low prevalence of 69% malocclusion was reported for the Tanzanian physically-disabled children.²⁸ The type of malocclusion detected in physically-disabled children is influenced by the type of disability, general health, and the feeding habits.²⁹ Thus, generalising the results for the worldwide population seems illogical. A study on the

Saudi special needs children reported that the prevalence of class I malocclusion in children with autism was 41.0% and class III malocclusion was more prevalent in patients with Down syndrome.³⁰

Class I type 1 was more prevalent in sensory-deprived children (24.03%) and class I type 2 was more prevalent in normal children (27.60%). Least prevalent class I malocclusion in both groups was class I type 4 malocclusion. The results for the normal children were in contrast to the earlier study on Indian children.²⁰

In the current study, class II division 1 malocclusion was more prevalent in sensory-deprived children by 24.60%, next to it was class I type 1 malocclusion which was reportedly seen in 21.63% of the disabled children. In case of normal children, class I type 2 was the most prevalent malocclusion, which was seen in 23.39% of the sample, followed by the class II division 1 malocclusion with the prevalence of 21.05%. In comparison to other population groups, the prevalence of class II division 1 malocclusion was greater in the current group of normal children.^{13,15,20} Class II division 2 malocclusion was prevalent in 1.80% of the controlled and experimental group of the current study. High prevalence of class II malocclusion was also noted in children having cerebral palsy (CP).³⁰

Class III malocclusion was more prevalent in sensory-deprived children (12.30%) than the normal children (1.74%). True class III was prevalent in 8.20% of the sensory-deprived children and in normal children it was seen in 1.16% of the sample. The results indicate the need for early intervention by the orthodontist to tackle the problem of class III malocclusion specially the pseudo class III; so that, the further exaggeration of malocclusion to a full-fledged skeletal malocclusion is prevented.

Similar prevalence of class III malocclusion was reported in normal children of Tamil Nadu and Bangalore, India, with the prevalence of 1.5% and 0.6%, respectively.^{19,20} Higher prevalence of class III

was reported for the normal children and adolescents of different provinces of Iran (16.60%, 7.80%, 6.01%, and 3.70%).^{16,24,31,32} The variation in the prevalence of class III malocclusion was also reported in the Saudi children with 5.8%, 11.2%, and 15.4% prevalence in different provinces of the kingdom.²¹⁻²³ Same type of variation in prevalence of class III malocclusion was noted for the Brazilian children with 0.8% to 3.7% prevalence.^{17,25}

Class III malocclusion was prevalent in 9.5% of the disabled children in Nigeria.¹⁸ The literature, though, is explicit with the studies concerned with the prevalence of malocclusion in special needs children, has obvious lack of uniformity in terms of selection of sample. There are variabilities concerning the type of disability, age group, method of data collection, and the non-uniformity in the sample size.³³ The prevalence of subdivision malocclusion was 14.48% in normal children whereas in sensory-deprived ones, it was prevalent by 11.69%. The sensory-deprived children like the deaf and dumb and the visually-impaired children lack the normal dexterity and self-confidence exhibited by their healthy counterparts.³⁴ Their learning capabilities, which are very much different from the normal children, may lead to compromise in the status of the maintenance of their oral hygiene.³⁵ This finding can be an aggravating factor for the malocclusion to develop at such a young age. The results of the current study can be explained on the basis of the above statement.

As the study was limited to explore the malocclusion status in the sensory-disabled individuals, it will be beneficial to investigate the malocclusion status in other disability groups for comparing and planning the treatment strategies.

Conclusion

Overall prevalence of malocclusion (90.03%) was greater in sensory-deprived than the normal children (85.15%). Class II division 1

(27.28%) followed by class I type 1 (24.03%) were the most common malocclusions sited in sensory-deprived children. Class I type 2 (27.60%) and class II division 1 (24.82%) were the most common malocclusions sited in normal children. The least common malocclusion sited was class III in both sensory-deprived and normal children. Class III malocclusion was spotted by higher percentage in sensory-deprived (13.63%) than the normal children (2.05%).

The high prevalence of the malocclusion in the current study group warrants the need

for conducting the awareness programme for encouraging the children and their parents to visit the orthodontist for taking the appropriate treatment in time.

Conflict of Interests

Authors have no conflict of interest.

Acknowledgments

Authors acknowledge the cooperation of school authorities of different institutions during the tenure of this study.

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