

Sudanese Individuals with Special Need

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Abstract

Background: Malocclusion plays an important role on the overall health of individuals, careful attention to malocclusion in individuals with special needs leads to a considerable improvement in the quality of their life.

Aim: To determine the prevalence of malocclusion and the orthodontic treatment need among Down's syndrome, deafness and cerebral palsy individuals in Khartoum state, and compare the results with normal individuals of the same age group.

Methods: All individuals with special needs were examined for determination of malocclusion and need for treatment, and compared with matching number and age of normal individuals.

Results: Crowding and Class III Angle's were found to be the highest malocclusion in Down's syndrome individuals, whereas Class II over jet and over bite were found to be the most prevalent malocclusions in individuals with cerebral palsy. Deaf individuals were at most need for orthodontic treatment (47.8%).

Conclusion: Sudanese with special needs have high prevalence of malocclusion and are of more need for orthodontic treatment than normal individuals.

Keywords: Malocclusion, Orthodontic treatment need, Down's syndrome, Deafness, Cerebral palsy

Introduction

The term disability has been defined as any impairment that restricts or limits daily activity; the limitation could be physical, mental, or sensory and can be developmental or acquired [1].

"Special needs" refers to individuals suffering from developmental disability identified in early childhood, persisting throughout life. This category includes cerebral palsy, Down's syndrome, mental retardation, autism, epilepsy, hearing and visual impairments and congenital defects [1,2].

The inappropriate stereotyped images of the children with special needs influence their daily lives and may affect the implementation of needed health services, including orthodontic care [3]. As the number of people living with disabilities grow so does the need to explore the oral health status of such individuals' increases [4].

Malocclusion is the inaccurate relationship between the upper maxillary arch and the lower mandibular arch or misalignment of the teeth in the same arch which can be represented as distal occlusion mesial occlusion, increased or decreased over jet and overbite, open bite, cross bite and scissor bite.

Cerebral palsy is a term used to describe a group of disorders of movement, muscle tone reflecting abnormal control over motor function [5]. The prevalence of cerebral palsy across the united states in 2002 was 3.6 cases per 1000 [6].

The occlusal status of cerebral palsy individuals is abnormal due to abnormality in the muscles of the oral cavity which leads to malocclusions including maxillary over jet, Class II Angle's crowding and cross bite [7,8].

Down's syndrome (DS) was described in 1866 by John Langdon Down's, it affects 1 in every 600-1000 live births; and it's the most common genetic cause is trisomy of chromosome 21, accounting for approximately 95% of all DS cases [9]. DS is characterized by generalized hypotonia, neurological changes, respiratory problems and infections, dental anomalies and orofacial dysmorphism. Children with DS are known to have anterior open bite, posterior cross bite and reductions in the maxillary arch [10-12].

Deafness is a major health problem that limits communication and learning. In 2001 WHO had estimated that 250 million people worldwide had hearing impairment [13,14]. The etiology is due to hearing loss before the age of 2-3 years, mostly resulting from acute infectious [15]. Deafened subjects develop open bite with high jaw displacement and minimal tongue movement [16,17].

The present study is designed to assess malocclusion and orthodontic treatment need for special need individuals to help them improve their oral health in hopes that it will be a base line for the future dental services.

Materials and Methods

This's a descriptive cross sectional study carried out in special needs institutes and government teaching schools. Ethical approval was

obtained from the Ethical Committee University Of Medical Science and Technology, Khartoum, Sudan.

Permission as well was obtained from the Ministry of special education and ministry of education, Khartoum/ Bahri state, in addition to special needs centers and government schools.

All individual with special needs in the institutions who parents agreed to participate in the study were included.

The current study was carried out in Khartoum/Bahri state. The target population included all the Sudanese individuals suffering from Down's syndrome, cerebral palsy and deafness, and compared with normal controls children matching in gender and age from governmental schools.

Before the dental examination, demographic information was registered including: type of disability, age, school, gender and nationality.

Randomly selected 6 government schools in Bahri state to match the population of special needs individuals were included.

Informed consent of parents/guardians and school authorities was obtained before including the subjects in the study. They informed that the data will be kept confidential and it's only used for the purpose of the study.

For individuals with special needs the clinical examinations took place at the institutes classrooms. The desk was placed in front of a

well-lighted window with the subject facing the window and no artificial dental illumination was used. Those who were confined to a wheelchair were examined in their wheelchair. For normal individuals, the clinical examination took place at the teacher office, using normal day light. Malocclusion was identified in accordance with Brzroukov et al. [18].

Dependent: malocclusion trait including: diastema, spacing, crowding, overjet, overbite, anterior open bite, anterior cross bite, midline shift, posterior cross bite, open bite. Class I, Class II, And Class III Angle's malocclusion Orthodontic treatment need: necessary, doubtful and not necessary.

Statistical Analysis

Data was cleaned summarized, entered into master sheet and analysed using statistical package of social science SPSS version 19.0. Results were presented in a form of tables and figures.

Results

The total number of individuals with special needs participating was 105 matching with 107 normal individuals by age and gender. Cerebral palsy were found to be 18% of the total study sample, Down's syndrome 38%, and deaf individuals were 44% (Figure 1), (Tables 1 and 2).

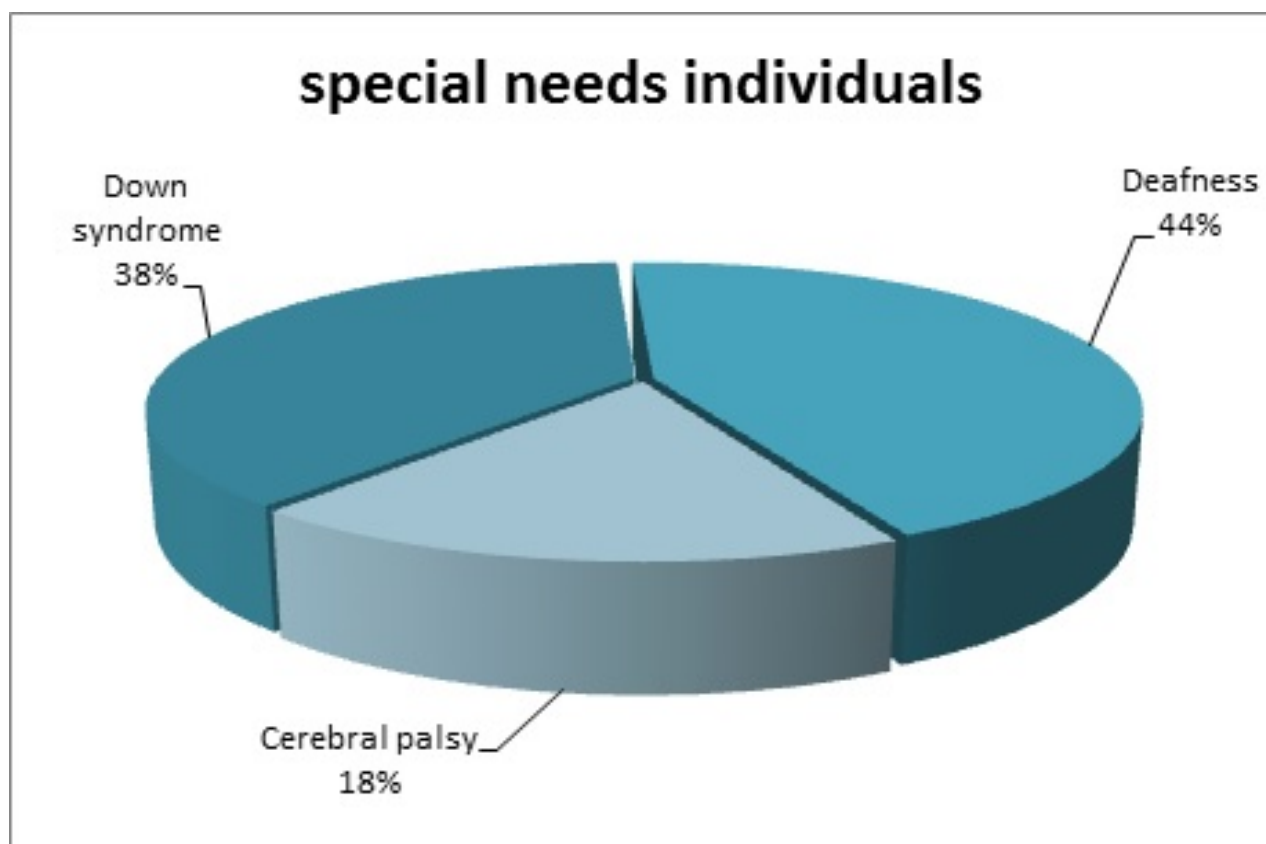


Figure 1: Distribution of the individual with special needs.

Gender	Special needs	Normal individual	Total
Male	66 (62.9%)	67 (62.6%)	133 (62.7%)
Female	39(37.1%)	40(37.4%)	79(37.3%)
Total	105(100%)	107(100%)	212(100%)

Table 1: Gender distribution of special needs and normal individuals.

Age Group	Special need	Normal	Total
6 to 11 years	48(45.7%)	50(46.7)	98(46.2%)
12 to 17 years	51(48.6%)	52(48.6%)	103(48.6%)
18 to 21 years	6(5.7%)	5(4.7%)	11(5.2%)
Total	105(100.0%)	107(100.0%)	212(100%)

Table 2: Distribution of the sample according to the age groups.

In Table 3 it is clear that crowding and Class III were found to be the most prevalent traits (35%) in Down's syndrome individuals whereas, over jet, over bite and Class II were the most prevalent traits in individuals with cerebral palsy. Deaf individuals were recorded to have the most need for orthodontic treatment (47.8%), (Table 4).

Occlusal traits	Down's syndrome NO (40)	Deafness NO (46)	Cerebral palsy NO (19)	Normal NO (107)
Diastema	2(5.0)	6(13.0)	1(5.3)	4(3.7)
Spacing	5(12.5)	14(30.4)	3(15.8)	7(6.5)
Crowding	14(35.0)	2(3.4)	6(31.6)	3(2.8)
Increased overjet	1(2.5)	2(3.4)	8(42.1)	7(6.5)
Anterior Cross bite	6(15.0)	5(10.9)	1(5.3)	5(4.7)
Increased over bite	1(2.5)	8(17.4)	8(42.1)	8(7.5)
Open bite	10(25.0)	3(6.5)	1(5.3)	1(0.9)
Upper midline shift	8(20.0)	1(1.7)	3(15.8)	2(1.9)
Lateral open bite	3(7.5)	6(13.0)	2(10.5)	4(3.7)
Posterior cross bite	7(17.5)	4(8.7)	3(15.8)	8(5.6)
Class I	21(52.5)	28(61.0)	7(36.8)	77(72.0)
Class II	5(12.5)	11(23.9)	10(52.6)	26(24.3)
Class III	14(35.0)	7(15.1)	2(10.5)	4(3.7)
Orthodontic treatment need				
Necessary	15(37.5)	22(47.8)	7(36.8)	17(15.9)
Doubtful	8(20)	8(17.4)	4(21.1)	23(21.5)
Not necessary	17(42.5)	16(34.8)	8(42.1)	67(62.6)

Total	40(100.0)	46(100.0)	19(100.0)	107(100.0)
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Table 3: Distribution of occlusal traits and orthodontic treatment need among the age groups of special needs and normal individuals.

Malocclusion traits	6-11years		12-17 years		>18 years	
	Male	Female	Male	Female	Male	Female
Diastema	0(0)	2(6.5)	2(5.6)	0(0)	0(0)	0(0)
Spacing	1(5.3)	6(19.4)	0(0)	0(0)	0(0)	0(0)
Crowding	2(10.5)	1(3.2)	0(0)	0(0)	0(0)	0(0)
Overjet	1(5.3)	3(9.7)	1(2.8)	1(6.3)	1(25.0)	0(0)
Cross bite	0(0)	1(3.2)	3(8.3)	1(6.3)	0(0)	0(0)
Overbite	0(0)	1(3.2)	4(11.1)	1(6.3)	2(50.0)	0(0)
Open bite	0(0)	0(0)	0(0)	0(0)	1(25.0)	0(0)
Midline shift	1(5.3)	0(0)	0(0)	1(6.3)	0(0)	0(0)
Lateral open bite	0(0)	2(6.5)	0(0)	1(6.3)	0(0)	1(100)
Posterior crossbite	1(5.3)	0(0)	3(8.3)	1(6.3)	1(25.0)	0(0)
Class I	17(89.5)	24(77.4)	25(69.4)	8(50)	3(75.0)	0(0)
Class II	2(10.5)	4(13)	10(27.8)	7(43.8)	2(25.0)	1(100)
Class III	0(0)	1(3.25)	1(2.8)	1(6.3)	0(0)	0(0)

Table 4: Distribution of malocclusion trait according to the age groups among normal individuals.

Down's syndrome

Malocclusion trait	6-11 year		12-17 years		>18 years	
	Male	Female	Male	Female	Male	Female
Diastema	0(0)	1(12.5)	1(5.6)	0(0)	0(0)	0(0)
Spacing	0(0)	1(12.5)	2(11.1)	0(0)	2(66.7)	0(0)
Crowding	1(20.0)	1(12.5)	10(55.5)	2(50.0)	0(0)	0(0)
Increased overjet	0(0)	0(0)	0(0)	0(0)	1(33.3)	0(0)
Cross bite	1(20.0)	1(12.5)	3(16.7)	0(0)	1(33.3)	0(0)
Overbite	0(0)	0(0)	0(0)	0(0)	0(0)	1(50.0)
Open bite	1(20.0)	4(50.0)	3(16.7)	1(25.0)	0(0)	0(50.0)
Midline shift	3(60.0)	0(0)	4(22.2)	0(0)	0(0)	1(50.0)
Lateral open bite	0(0)	1(12.5)	2(11.1)	0(0)	0(0)	0(0)
Posterior cross bite	1(20.0)	1(12.5)	3(16.7)	2(50.0)	0(0)	0(0)
Class I	3(60)	6(75)	9(50)	0(0)	1(33.3)	2(100.0)
Class II	0(0)	0(0)	3(16.7)	1(25.0)	1(33.3)	0(0)

Class III	2(40.0)	2(25.0)	6(33.3)	3(75.0)	1(33.3)	0(0)
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Table 5: Distribution of malocclusion trait according to the age groups among Down’s syndrome individuals.

Table 5 revealed that the most prevalent malocclusions were Class III and crowding (35%), which were more dominant in the age group 12-17 years. Crowding was also found to be more predominant in the age group 12-17 years.

Orthodontic treatment need

The age group 12-17 years showed the highest prevalence of orthodontic treatment need for individuals with Down’s syndrome (Figure 2).

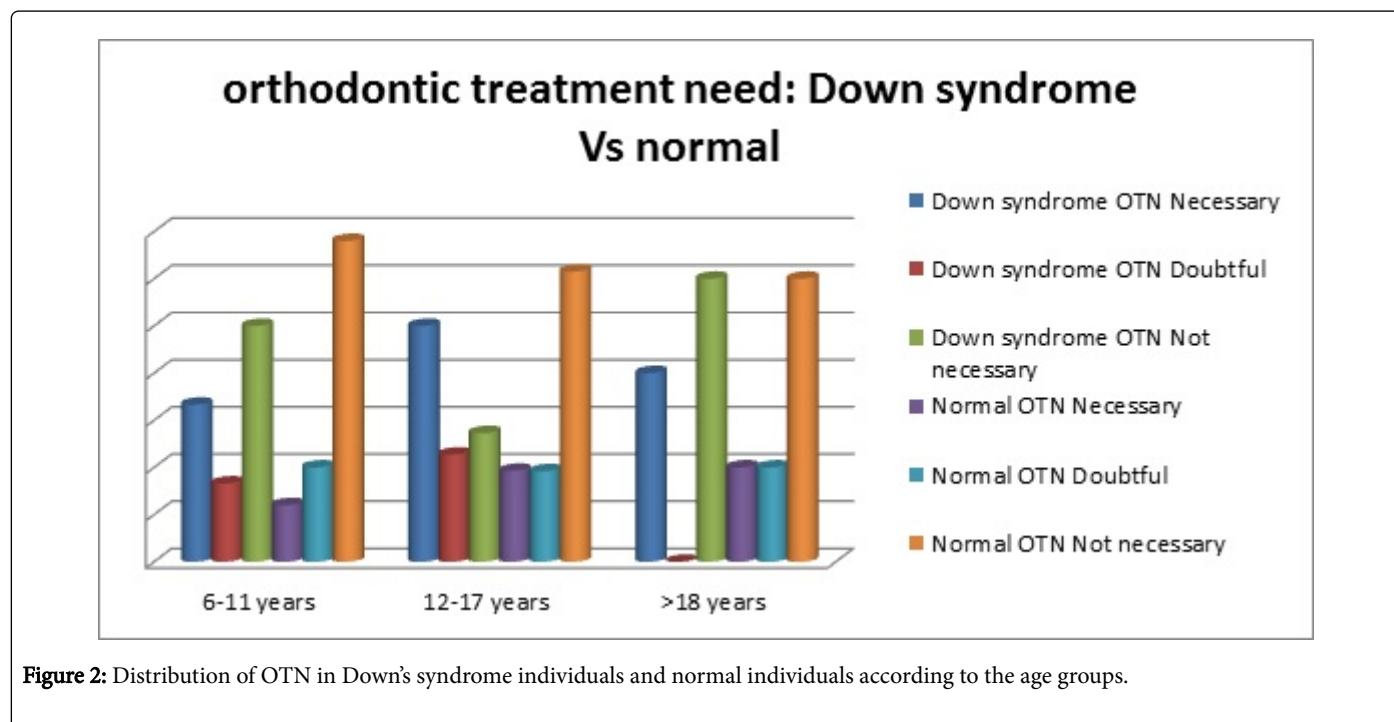


Figure 2: Distribution of OTN in Down’s syndrome individuals and normal individuals according to the age groups.

Deafness

Spacing was found to be predominating with high prevalence in the age group 6-11. This was also seen when compared to normal

individuals of the same age group. Class II 23.9% was predominating in the age group 6-11. Deep bite 17.4% was prevalent in the age group from 12-17 shown in Table 6.

Malocclusion trait	6-11 years		12-17 years		>18 years	
	Male	Female	Male	Female	Male	Female
Diastema	1(5.6)	1(12.5)	0(0)	1(12.5)	0(0.0)	0(0.0)
Spacing	6(33.3)	4(50)	3(25)	1(12.5)	0(0.0)	0(0.0)
Crowding	3(16.7)	4(50)	1(8.3)	0(0.0)	0(0.0)	0(0.0)
Overjet	1(5.6)	1(12.5)	0(0)	0(0.0)	0(0.0)	0(0.0)
Cross bite	3(16.7)	1(12.5)	1(8.3)	0(0.0)	0(0.0)	0(0.0)
Overbite	1(5.6)	1(12.5)	5(41.7)	1(12.5)	0(0.0)	0(0.0)
Open bite	3(16.7)	1(12.5)	0(0.0)	2(25)	0(0.0)	0(0.0)
Midline shift	1(5.6)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Lateral open bite	3(16.7)	0(0.0)	1(8.3)	2(25)	0(0.0)	0(0.0)
Posterior cross bite	1(5.6)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)

Class I	9(50)	6(75)	6(50)	5(62.5)	0(0.0)	0(0.0)
Class II	5(27.8)	1(12.5)	3(25)	0(0)	0(0.0)	0(0.0)
Class III	5(27.7)	2(25)	3(25)	1(37.5)	0(0.0)	0(0.0)

Table 6: Distribution of malocclusion trait according to the age group among deaf individuals.

Orthodontic treatment need

Need of treatment was greater in deaf individuals than normal individuals' also Deaf individuals in the age group 6-11years showed

higher prevalence of OTN when compared with the other groups shown in Figure 3.

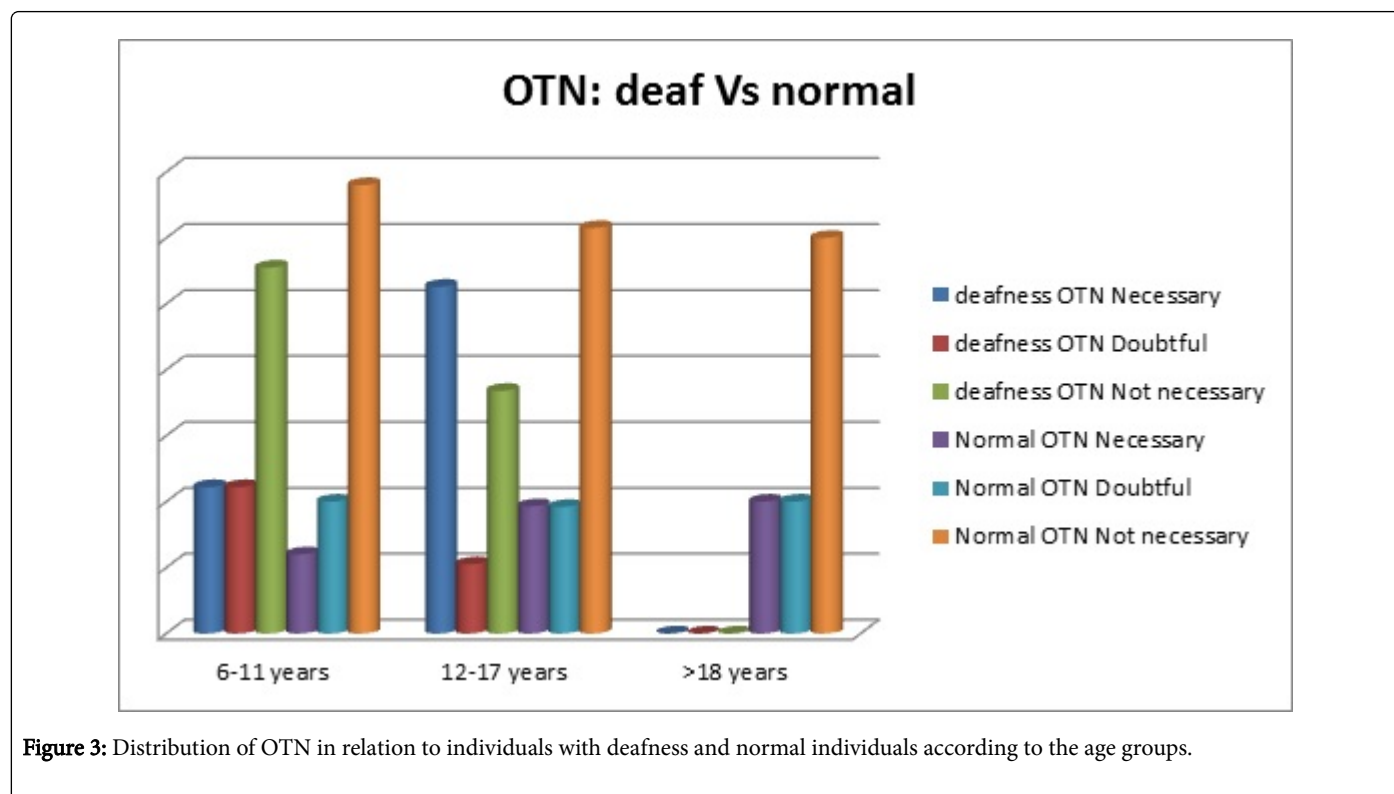


Figure 3: Distribution of OTN in relation to individuals with deafness and normal individuals according to the age groups.

Cerebral palsy

Class II (52.6%) was the most prevalent trait with in the age group 12-17 years. overjet and overbite were followed with a prevalence of

42.1% with higher prevalence of overbite in the age group 12-17 years and higher prevalence of overjet in the age group 6-11 years old as shown in Table 7.

Malocclusion Trait	6-11 years		12-17 years		>18 years	
	Male	Female	Male	Female	Male	Female
Diastema	0(0)	1(16.7)	0(0)	0(0)	0(0)	0(0)
Spacing	0(0)	3(50)	0(0)	0(0)	0(0)	0(0)
Crowding	0(0)	0(0)	1(16.7)	0(0)	0(0)	0(0)
Overjet	2(66.7)	1(16.7)	3(50)	2(66.7)	0(0)	0(0)
Cross bite	0(0)	0(0)	1(16.7)	0(0)	0(0)	0(0)
Overbite	2(66.7)	1(16.7)	3(50)	2(66.7)	0(0)	0(0)
Open bite	1(66.7)	3(50)	2(33.3)	1(33.3)	1(100)	0(0)

Midline shift	0(0)	2(33.3)	1(16.7)	0(0)	0(0)	0(0)
Lateral open bite	0(0)	1(16.7)	1(16.7)	0(0)	0(0)	0(0)
Posterior cross bite	0(0)	1(16.7)	1(16.7)	1(33.3)	0(0)	0(0)
Class I	2(66.7)	2(33.3)	2(33.3)	1(33.3)	0(0)	0(0)
Class II	1(33.3)	3(50)	5(83.3)	2(33.3)	0(0)	0(0)
Class III	0(0)	1(16.7)	0(0)	0(0)	0(0)	0(0)

Table 7: Distribution of malocclusion traits according to the age groups among cerebral palsy individuals.

Orthodontic treatment need

Individuals with cerebral palsy in the age group 11-17 years showed the highest prevalence of treatment need when compared with the

other age groups also the need for orthodontic treatment for cerebral palsied individuals was more than the normal group shown in Figure 4.

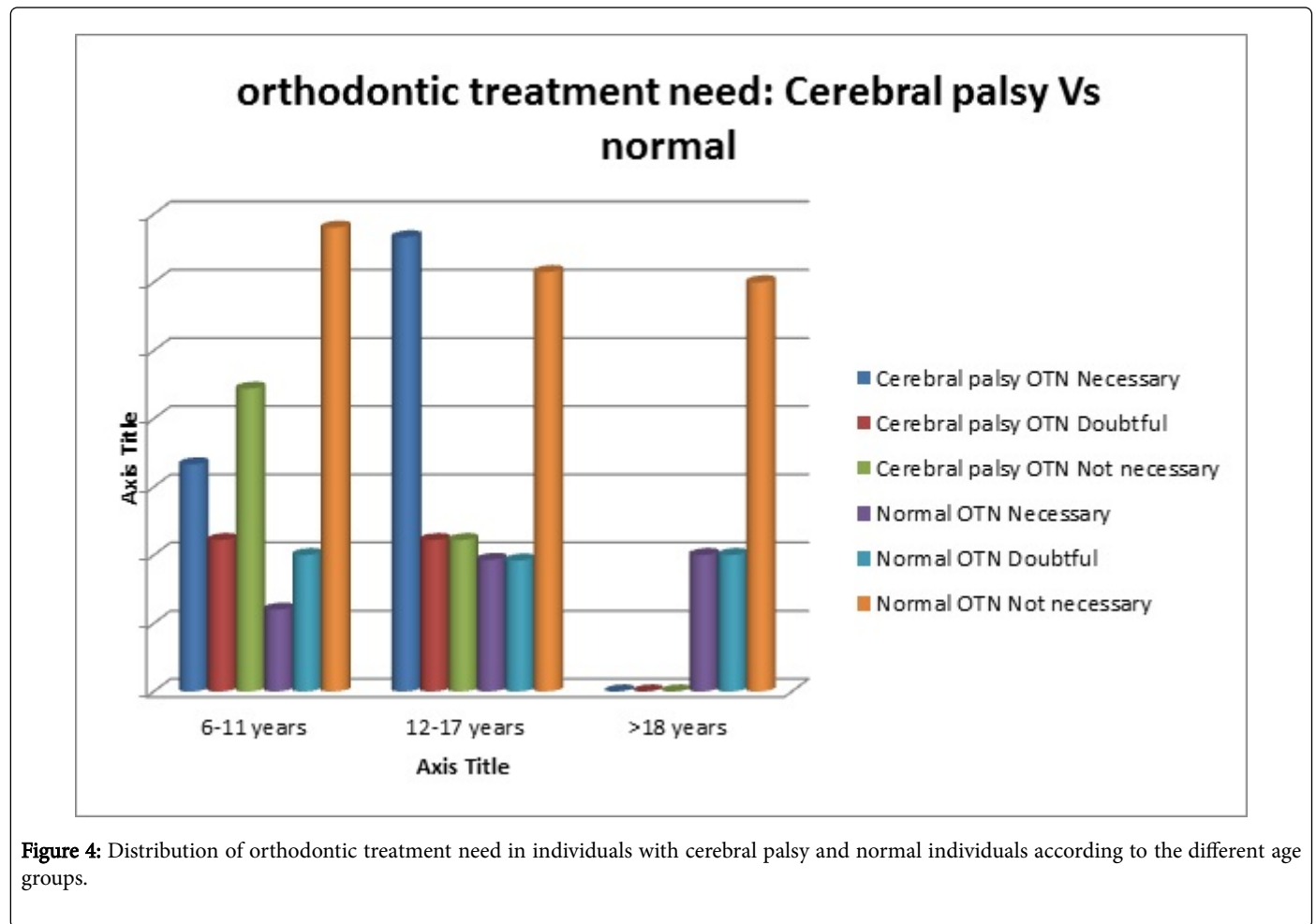


Figure 4: Distribution of orthodontic treatment need in individuals with cerebral palsy and normal individuals according to the different age groups.

Discussion

Down's syndrome

Class III was found to be in 35% of Down's syndrome individuals while it was only 3.7% in the control group which was more or less similar to the results obtained by Oredugba [19] who found 47% of Class III among Portages individuals with Down's Syndrome and only 5% of Class III in the control group in addition similar results were

obtained by Soares et al. and Viviana et al. [20,21]. Regarding Class II, differences were found between special needs group and normal individual group, with a higher prevalence in the normal individuals group. This pattern of malocclusion is a consequence of the midface hypoplasia [17]. Anatomically, the facial mid-third is underdeveloped but the mandible follows normal development also it contributes to the narrow maxilla [22].

The prevalence of crowding was 35% which was more or less similar to previous studies with a prevalence of 33% [10-17]. This feature has been commonly reported in literature as a result of hypoplasia of the mid face which contributes to a narrow maxilla thus crowding, this was also reported to become accentuated with age [23,24].

A prevalence of 20% anterior open bite was seen in individuals with Down's syndrome which is in accordance to results of previous studies [10,25-27] which is suggested to be due to hypo-tonicity of the tongue and lips also it could be due to Tongue thrust and posture that slow eruption leading to anterior open bite [26].

Deafness

No difference in current results between normal deaf individuals in regards to the antero-posterior relation, which in accordance to studies by Helm and Lew et al. [28,29] whereas, high prevalence of deep-bite in accordance with Semra et al. results among Turkish population [30]. Tye-Murray suggested that high prevalence of deep bite can be attributed to the inflexible tongue of deaf individuals [17].

Spacing prevalence in this study was found to be comparable to the results obtained by De Costa et al. and Onyeano et al. [31,32] among a Nigerian population this may be related to missing teeth although it was not included in this study

Cerebral palsy

The majority of the children with cerebral palsy (52.6%) in the present study had Class II malocclusion which was in accordance to Rosenstein et al., Chandna et al. and Strodel results [33-35]. According to Victoria et al. hyper extended resting position of the head could influence the lower facial third causing malocclusion [36].

Prevalence of overjet was found to be 42.1% in this study with predominance in the age group 12-17, similar results were obtained by Wessels [37], according to Victoria et al. [36] this was attributed to the incompetent hypotonic lip of the cerebral palsy individuals which prevents the teeth from being retruded.

Overbite was obtained in the present study was 42.1% of cerebral palsied individuals, this was in accordance to Franklen et al. [7] which was higher than the control group, however, these result were in contrast with work done by [33,38] who found a reduced overbite which can be partially attributed to differences in age groups and the difficulty of the assessment of the occlusion itself.

Orthodontic treatment need

WHO/FDI malocclusion index (1979) [18] was used to assess OTN, whereas previous studies used the Dental Esthetic Index (DIA), Index of Orthodontic Treatment Need (IOTN), index of complexity, outcome, and need for treatment (ICON) or Treatment Priority Index (TPI)[10,30,32,36], thus it was difficult to compare the results.

Down's syndrome individuals in the present study at age group 12-17 years old showed the highest prevalence of OTN when compared with the other age groups as well as the orthodontic treatment need which was higher in all age groups than normal individuals; this was suggested to be as a consequence of the midface hypoplasia.

Deaf individuals in the age group 6-11 years showed the highest prevalence of OTN when compared with the other age groups and the

need for orthodontic treatment was higher in all age groups than the normal group except for age group >18 as there were no participants included. Tongue inflexibility which leads to abnormal habits and narrowing of the maxillary arch, is suggested to be the main reason for demanding orthodontic treatment [17].

Cerebral palsy individuals in the age group 11-17 showed the highest prevalence of OTN this is seen in older age group because overtime the hyper extended resting position of the head leads to Class II malocclusions, overjet and open bite, thus orthodontic treatment is needed [19].

Conclusion

Based on WHO/FDI malocclusion index individuals with special needs revealed to have several malocclusions

Individuals with Down's syndrome appeared to have Class III and crowding.

Cerebral palsied individuals had more incidence of Class II, increased overjet and overbite.

Deaf individuals appeared to have more prevalence of Class II, spacing and over bite.

The three groups of individuals with special needs revealed more need for orthodontic treatment than normal individuals and the deaf individuals showed the more need of treatment.

Recommendations

To improve the occlusion status of individuals with special needs with early preventive measures in order to help them to improve their quality of life.

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