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Anteroposterior, vertical and space malocclusions in adolescents with special needs in Lagos, Nigeria

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Abstract

Objective: To determine the prevalence of malocclusion in adolescents with special needs and to compare the results with those of other authors.
Methods: The study sample consisted of 230 adolescents with special needs aged 12-17 years randomly selected from 5 special school/centres in Lagos. Occlusal anteroposterior relationships were assessed based on Angle classification.
Results: Normal occlusion was seen in 11.7%, Angle's class I malocclusion in 77.4%, class II malocclusion in 8.3% and class III malocclusion in 2.6%. Over 63% had normal overbites, and 6.5% and 12.5% had increased and reduced values, respectively. Overjet relationship was normal in 50%, increased in 25.7% and reduced in 6.5%. Crowding was observed in 29% of the subjects and midline diastema in 27%. Males had a significantly higher prevalence of midline diastema than females ($p < 0.05$). The intellectually impaired had significantly higher frequency of class II division 1 malocclusion and anterior openbite when compared with the other disabled groups.
Conclusion: Class I malocclusion is the most prevalent occlusal pattern among adolescents with special needs. Statistically significant differences in occlusal pattern were observed between the disabled groups.

Keywords: Malocclusion, special need adolescents, Nigeria

Résumé

Objectif : déterminer la prévalence des malocclusions chez des adolescents ayant des besoins spécifiques et comparer les résultats avec ceux d'autres auteurs.
Méthodes : L'échantillon de l'étude était composé de 230 adolescents, ayant des besoins spécifiques âgés de 12-17 ans, sélectionnés au hasard dans 5 écoles spécialiséees du centre de Lagos. Les relations inter-arcades dans le sens antéropostérieur, ont été évaluées selon la classification Angle.
Résultats : L'occlusion normale a été observée chez 11,7%. Les malocclusions de classe I, II et III d'Angle ont été observées respectivement chez 77,4%, 8,3% et 2,6% de l'échantillon. Plus de 63% des sujets, avaient un recouvrement normal, alors que 6,5% et 12,5%, avait respectivement une supra-occlusion et une infraclusion. Le surplomb était normal chez 50% des sujets, augmenté chez 25,7% et réduit chez 6,5%. L'encombrement était observé chez 29% des sujets et le diastème médian inter-incisif chez 27%. Les hommes avaient une prévalence significativement plus élevée de diastème médian inter-incisif, que les femmes ($p < 0,05$). Les sujets déficients mentaux avaient une fréquence significativement plus élevée de classe II, division 1 et d'infraclusion antérieure, que les autres groupes de sujets handicapés.
Conclusion : La classe I est le type de malocclusion le plus répandu chez les adolescents ayant des besoins spécifiques. Des différences statistiquement significatives en ce qui concerne le type de malocclusion ont été observées entre les différents groupes de personnes handicapées composant cet échantillon.

Mots-clés : Malocclusion, adolescents spécial, Nigeria

Introduction

In recent years, there is an increasing demand for orthodontic treatment worldwide (1, 2). This is also evident in Nigeria (3), where the awareness of the dentition and its role in the overall facial beauty is growing especially in urban areas.

In past years, disabled people were mostly institutionalized and dentists were mainly required to give emergency care. The continuing deinstitutionalization process of people with special needs and their resettlement in smaller home environments means that parents and guardians are able to assist more readily in giving prompt attention to their health care needs (4). Similar trends exist in Nigeria where most of the special schools for the disabled are non-residential (5).
This suggests a possible increase in demand for dental care including orthodontic care by disabled persons.

The united nations general assembly in its declaration of the rights of the child affirmed the right of persons who are physically, mentally or socially handicapped to special treatment, education and care required by their particular condition (6). Individuals with disabilities need functional and aesthetic considerations comparable to that of normal persons (7).

Malocclusions with severe aesthetic impairment can compromise peer group acceptance and potential employment opportunities. Malocclusion can complicate the child's disability, resulting in dental trauma, periodontal disease, functional problems and even tempero-mandibular dysfunction (8, 9). In their report, SHYAMA et al. (10), noted that malocclusion and traumatic injuries are more prevalent among children and adolescents with disabilities than among the healthy population.

In Nigeria, various studies have documented malocclusion in the "normal" Nigerian population 11-18 and relatively few 19-23 have focused on the disabled population, especially in relation to orthodontics.
Lagos is the most densely populated urban city in Nigeria and the Lagos University Teaching Hospital is a major referral centre in Lagos that provides orthodontic services for patients from all socio-economic groups. In their recent report, DACOSTA and UTOMI (24), showed that adolescents constituted the modal age group for attendance at this centre.

There is need for more information on the occlusal characteristics of adolescents with special needs. A systematic and well organized dental care programme for adolescents requires adequate knowledge of the variation in occlusion within the target population. Therefore, the aim of this study was to investigate the pattern of malocclusion among disabled adolescents in Lagos, Nigeria.

Subjects and method

The study population consisted of 230 non-down syndrome disabled adolescents between 12-17 years of age from five (5), special schools/centres for people with special needs in Lagos, Nigeria. There were 132 males (57.4%) and 98 females (42.6%) with a mean age of 14 ± 1.6 years. The children were from varied socio-economic backgrounds. None of the children examined had undergone any form of orthodontic treatment. Authorization for the study was obtained from the respective school authorities and from parents or guardian through the schools.

One orthodontist (I.L.U) used pre-structured data collecting form to record the socio-demographic data and clinical findings. The criteria were limited to occlusal anteroposterior relationship, crowding, over jet, overbite and midline diastema. The disabled subjects were examined in their respective schools under natural

light. Instruments used for the examination were sterile mouth mirror, wooden spatula and a ruler. The subjects were examined clinically in two positions: open mouthed and with the teeth in centric occlusion.

Angle's classification (25) was used to determine the occlusal (anteroposterior) relationship of the dental arches. This classification divided the occlusion into class I, class II (division 1 and 2) and class III using the first permanenet molars as reference teeth. None of the subjects had previous orthodontic treatment and all had their first permanent molars.

Overjet was defined as the horizontal distance in millimeters between the labial surfaces of the maxillary and mandibular central incisors. For this purpose, the subject was positioned with the Frankfort plane horizontal, and the distance was measured with a plastic ruler with the help of a periodontal probe. Overjet values between 2 and 3 mm were considered normal, greater than 3 mm was taken as increased and less than 2 mm was taken as reduced. The term reversed overjet was used if both the left and right maxillary central incisors were in lingual occlusion.

The overbite was considered normal if the maxillary central incisors overlapped the incisal third of the crown of the mandibular central incisors. The overbite was classified as excessive if the overlap exceeded the middle third of the crown of the mandibular central incisors and reduced if was less than incisal third of the crown. Reversed overbite was diagnosed when there was reversed over jet. Anterior open bite was diagnosed when there was a vertical gap between the maxillary and mandibular incisor edges with the teeth in centric occlusion. An edge-to-edge incisor relationship was noted if the maxillary and mandibular incisors occluded on their incisal edges.
Crowding was considered to be present in a segment when the teeth overlapped or if there was insufficient space for interrupted teeth to erupt without overlapping. This shows the relationship between tooth size and arch size. Midline diastema was diagnosed when there was a space of at least 1 mm between the central incisors in either arch.

Occlusions with minor deviations from the hypothetical concept of ideal in the permanent dentition that did not cause aesthetic or functional problems were classified as normal. Such were subjects with the mesiobuccal cusp of the maxillary first molar occluding with the anterior buccal groove of the corresponding mandibular tooth, or the maxillary canine occluding in the embrasure between the mandibular canine and the first premolar. In such subjects, no apparent crowding or spacing was noted, and overbite and overjet were normal, this is in contrast to class I malocclusion in which at least one occlusal variable was not normal, despite a normal anteroposterior molar relationship.

To assess the reproducibility of the measurement by the author, 30 subjects were re-examined three weeks after their initial examination. The intra-examiner agreement was tested using Spearman rank correlation coefficient. The rank order ($r = 0.98$, $p = < 0.001$) showed very good agreement.

Statistical Analysis

The data was analysed using the Epi-Info version 6 software statistical package. The chi-square test (X^2) was used to assess statistical significance between different proportions. The critical level of significance was set at $p < 0.05$.

Results

The occlusal classification of the subjects according to their disability is shown in table 1.

Table 1: Occlusal pattern according to disability group

Occlusal classification	Hearing impairment		Intellectual impairment		Physically handicapped		Total		X^2	P. Value
	N	%	N	%	N	%	N	%		
Normal	12	11.8	7	8.2	8	18.6	27	11.7	2.96	0.227
Class I	86	84.3	62	72.9	30	69.8	178	77.4	5.18	0.075
Class II div I	4	3.9	12	14.1	3	7.0	19	8.3	6.48	0.039
Class II div 2	0	0.0	0	0.0	0	0.0	0	0.0	/	/
Class III	0	0.0	4	4.7	2	4.7	6	2.6	4.91	0.086
Total	**102**	**44.3**	**85**	**37.0**	**43**	**18.7**	**230**	**100**		

Table 2: The occlusal classification of the subjects by gender

Occlusal classification	Males		Females		X^2	P. Value
	N	%	N	%		
Normal	17	12.9	10	10.2	0.39	0.533
Class I	101	76.5	77	78.6	0.05	0.821
Class II div I	10	7.6	9	9.2	0.19	0.661
Class II div 2	0	0.0	0	0.0	/	/
Class III	4	3.0	2	2.0	/	1.00*
Total	**132**	**57.4**	**98**	**42.6**		

Table 3: Overbite values among the disabled adolescents

Overbite	Males (N = 132)		Females (N = 98)		X^2	P. Value
	N	%	N	%		
Normal	82	62.1	64	65.3	0.25	0.619
Increased	9	6.8	6	6.1	0.04	0.823
Reduced	20	15.2	8	8.2	2.57	0.109
Edge to edge	7	5.3	5	5.1	0.05	0.816
Reversed	3	2.3	0	0.0	-	0.263*
Anterior open bite	11	11.2	15	15.3	2.73	0.098

Table 4: Overjet values among the disabled adolescents

Overjet	Males (N = 132)		Females (N = 98)		X^2	P. Value
	N	**%**	**N**	**%**		
Normal	63	47.7	52	53.1	0.64	0.423
Increased	35	26.5	24	24.5	0.12	0.728
Reduced	13	9.8	2	2.0	5.62	0.018
Edge to edge	7	5.3	5	5.1	0.05	0.816
Reversed	3	2.3	0	0.0	-	0.263*
Anterior open bite	11	11.2	15	15.3	2.73	0.098

** Fisher's exact test*

Normal occlusion was found in 11.7% the subjects and 77.4% had class I malocclusion. About 8% and 2.6% had class II and III malocclusions, respectively. Only the mentally disabled subjects (4.7%) and the physically disabled (4.7%) had Angle's class III malocclusion. The prevalence of class II division 1 malocclusion was significantly higher in the intellectually disabled group when compared to the other groups (X^2 = 14.5, df 6, $p < 0.05$).

Table 2 shows the occlusal classification of the subjects in relation to gender. This was not statistically significant between the sexes. Overbite and overjet values are shown in tables 3 and 4, respectively. Normal overbite and over-jet values were the most common. Increased overjet was observed in 25.7% of the subjects. No statistically significant differences in overbite and overjet values were noted between males and females except the prevalence of reduced overjet which was statistically higher in males ($p < 0.05$). Anterior open bite was found in 11.3% of the subjects. The prevalence of anterior open bite was significantly higher in the intellectually disabled group when compared with the hearing impaired and the physically disabled group (X^2 = 20.3, df 2; $p < 0.001$).

Anterior crowding was found in about 29% of the subjects (table 5). No significant gender differences were observed. Midline diastema

Table 5: Distribution of anterior crowding

Crowding	Male		Female		X^2	P. Value
	N	%	N	%		
No crowding	92	69.7	72	73.5	0.39	0.531
Lower arch	15	11.4	11	11.2	0.00	0.974
Upper arch	10	8.3	8	8.2	0.03	0.870
Both arches	14	10.6	7	7.1	0.81	0.367
Total	**132**	**100**	**98**	**100**		

Table 6: Distribution of midline diastema

Midline diastema	Males		Females		X^2	P. Value
	N	%	N	%		
Absent	103	78.0	65	66.3	3.91	0.047
Present	29	22.0	33	33.7		
Total	**132**	**100**	**98**	**100**		

was found in 27% (table 6). Midline diastema occurred more frequently in females than males. This was statistically significant ($P < 0.05$).

Discussion

The rate of normal occlusion observed in the present study (11.7%) compares well with that previously reported for handicapped children in Ibadan, Nigeria (13.8%) (21) and that of normal children in Ibadan (16) and the Northern part of Nigeria (15). Class I malocclusion was found in 77.4% of the present sample and this is higher than that (50%) report-ed for normal adolescents in Ibadan (16), although it is also higher than that (68.7%) reported by ONYEASO (5), for handicapped children in Ibadan, Nigeria, the findings of this study are consistent with that of ONYEASO (5) which showed that majority of the handicapped children had class I molar relationship. This study confirms that the predominant anteroposterior relationship of the arches in disabled Nigerian adolescents is class I. This concurs with a previous report on normal adolescents in Ibadan, Nigeria (16). This figure of 77.4% for class I in the present study is comparable to the combined total of 76.8% reported in Lagos (12) but that study did not separate normal and class I malocclusion.

The present study seems to support the findings reported by ONYEASO (16), regarding Angle's class II and III for non-handicapped adolescents in Ibadan, Nigeria although there are some differences as ONYEASO reported a higher prevalence of class II and III. The proportion of 8.3% for Angle's class II div. I in this study is close to 10% reported by RICHARDSON and ANA (8). However, higher proportions have been reported in previous Nigerian studies (12, 23).

The results of this study indicated that those with intellectual impairment had a significantly higher prevalence of class II division 1 malocclusion than other disabled groups. This agrees with the report of VITTEK et al. (26), which noted a high incidence of Angle class II malocclusion in individuals with intellectual impairment.

This study also has shown that Angle's class II div. 2 is rare in this population as no case was seen. This is consistent with previous reports on Nigerian children (11, 21). Similar low values of class II div. 2 have been reported in East Africans (27, 28).

The value obtained for Angle's class III in the present study is comparable to that of normal children (21), but a higher prevalence was reported for children with special needs in Ibadan, Nigeria (16). This difference could be because the later report (16) included Down syndrome children. The present study excluded Down syndrome cases. In their literature review, BROWN and SCHODEL (29), showed that except for individuals with Down's syndrome and severe cerebral palsy, there was no conclusive evidence that malocclusion was

common in people with special needs. Individuals with Down syndrome often have altered cranial base relationship which predisposes them to class III malocclusion (30).

The high prevalence (63.5%) of normal overbite values is in agreement with previous reports, RICHARDSON and ANA (60%) (11) and ISIEKWE (71.2%) (12). The prevalence of anterior open bite in this study (11.3%) is greater than that (7.1%) reported by ONYEASO (16), for non-handicapped adolescents in Ibadan, Nigeria. It is also higher than that (9.8%) reported by ONYEASO (5) for children with special needs in Ibadan, Nigeria. However, UTOMI and ONYEASO (22), reported a higher prevalence (14%) but that study sample included children with Down syndrome. Deficient maxillary growth and abnormal tongue size have been reported as contributing factors in the production of anterior open bite in individuals with down syndrome (31).

The increased overjet noted in 25.7% the subjects is higher than that 15.7% reported for adolescents in Ibadan, Nigeria (16) and the 14% and 13% for non-handicapped and children with special needs, respectively (14, 22). This is an oral health concern as previous Nigerian studies (32, 33), have shown a relationship between trauma to anterior teeth and increased overjet. In one Nigeria study (34), the prevalence of fractured teeth among young people with intellectual impairment was 20%.
Crowding was noted in this study more in the mandibular anterior segment (11.3%) than in the maxillary anterior segment (8.3%), which supports previous Nigerian studies (12, 23). Although the prevalence of mandibular anterior crowding noted in this study is lower than that (17.7%) previously reported for handicapped children in Ibadan, Nigeria, (21) it is, however, greater than that (7.7%) reported for normal adolescents in Ibadan, Nigeria (16). The findings of this study indicate a higher prevalence of spacing than crowding in the sample. The low prevalence of crowding could be due to the favorable dento-alveolar ratio. Spacing in the primary dentition of Nigerian preschool children coupled with the very broad maxilla in the adults (9) results in the relatively high prevalence of midline diastema in the Nigerian population.
This study recorded the prevalence of midline diastema as 27% which compares with that (25%) reported for normal Nigerian children (14). The results of this study showed that a significantly higher prevalence of midline diastema in females than males. DACOSTA (15), reported the prevalence of midline diastema in Northern Nigerian children as 30.3% in females and 25% in males. Although the prevalence in this study is different from the latter study essentially the same pattern is maintained in the 2 studies. However midline diastema is not regarded as a malocclusion but as a sign of personal and natural beauty (16).

Conclusion

Class I malocclusion is the most prevalent occlusal pattern among adolescents with special needs in Nigeria. Adolescents with intellectual impairment had a significantly higher prevalence of Angle's class II division I malocclusion and anterior open bite when compared with the other disabled groups. The prevalence of midline diastema was significantly higher in females than males.

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