Occlusal/Dental Anomalies found in a Random Sample of Nigerian Schoolchildren

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Objective: The aim of this study was to assess the occlusal/dental anomalies needing early treatment for maximal occlusal development among 11–12-year-olds in Ibadan, Nigeria.

Materials and Methods: An epidemiological survey of 361 school students, 171 (47.4%) males and 190 (52.6%) females, was carried out in Ibadan, Nigeria. Subjects were randomly selected from different schools in the city. One examiner, under natural illumination in the school premises, examined all the children.

Results: Prolonged retention of primary teeth with displacement of the permanent series was observed in 4.2% while dental anterior cross bite accounted for 5.5%. Oral habits with their deleterious effects on the occlusion were noted in 5.0%. Other findings were: clinically missing permanent teeth, 3.6%; supernumerary teeth, 1.4%; double teeth, 1.9%; carious lesions, 6.9%; conically shaped lateral incisors, 1.4%; and transposition, 0.6%. Proclination of the upper incisors with increased overjets of more than 5mm, as well as some fractures of the incisors, accounted for 22.4%. In all, 51.8% had one form of occlusal/dental need or another. No statistically significant gender differences were observed for all the various needs ($p > 0.05$) except the prevalence of supernumerary teeth, which was statistically higher in males ($p < 0.05$).

Conclusion: Over half of the children could benefit from one interceptive need or the other for proper occlusal development. Routine dental check ups are very much encouraged in developing countries like Nigeria, as in other developed parts of the world.

Key words: interception, occlusal/dental anomalies, prevalence, Nigerian children

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In a developing country like Nigeria, where the teaching and practice of dentistry is still relatively young and many are not able to afford the cost of extensive dental treatments, it is necessary to assess the prevalence of dental or occlusal needs for possible early treatments (Onyeaso et al, 2002b). The art or science of interceptive orthodontics can be defined as fostering developmental changes that are favourable, and halting or minimising those that are not (Richardson, 1995).

In order to identify developing malocclusion readily, or other dental needs, three special vigilance age groups are recognised (Richardson, 1995). The recognition of these special vigilance times for effective practice of interceptive orthodontics led to the proposal that the child population should be screened at these age groups and interceptive measures applied where appropriate (Richardson, 1995). Even in the primary dentition, West (1969) gave objectives of early screening and treatment. Popovich et al (1975) had evaluated the preventive and interceptive orthodontic care from age 3 to 18 while Sadowsky (1998) emphasised the timing of treatment and craniofacial growth.

According to Richardson (1995), the first vigilance time is shortly after the completion of deciduous dentition at 3 years, the second period is at about 7–9 years, when the first permanent molars will normally have erupted and the permanent incisors should be erupting, and the third period is at about 11–12 years, when the premolars, second molars and canines

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should be coming into the oral cavity. Some of the major setbacks to the general implementation of this noble proposal on community basis are a shortage of manpower and finance (Richardson, 1995). Early screening and intervention reduces the cost of subsequent orthodontic treatment because it is likely to become less extensive later. This is much more necessary in a developing country like Nigeria, where the cost of comprehensive orthodontic treatment is high. The advantages of such early interventions are highlighted in the report by Bishara et al (1998).

Previous reports in the Nigerian population have assessed the prevalence of occlusal and dental anomalies for interceptive orthodontic care in the early vigilance age group (Onyeaso and Sote, 2002; Onyeaso et al, 2002b; Otuyemi et al, 1997a, 1997b). Most other studies on occlusal needs in the older age groups of the Nigerian population were not targeted specifically at the special vigilance age groups (Aggarwal and Odusanya, 1985; daCosta, 1998; Isiekwe, 1983, 1986, 1987; Onyeaso et al, 2002a; Richardson and Ana, 1973). However, a systemic and well-organised dental programme for children requires enough knowledge of the variation in the dentition within the target population.

Therefore, the aim of this study was to investigate the prevalence of dental or occlusal anomalies needing treatment for maximal occlusal development among the 11–12-year-old children in Ibadan, Nigeria.

MATERIALS AND METHODS

Three hundred and sixty-one schoolchildren were randomly recruited into the study from five schools in different local government areas across the city of Ibadan, Nigeria. The schools were selected from the list of 167 public and 109 private schools in Ibadan city obtained from the Ministry of Education, Oyo state. Informed consent was obtained from the relevant school authority as well as from the subjects and parents. Only the children who were 11 or 12 years old at their last birthdays during this survey were included in the study.

The schools attended by the elites (relatively high-fee paying schools) in the city and the ones attended by the common members of the society (public and no-fee paying schools) were involved. Three of such elite schools were surveyed, while two public schools were included. All the children aged 11–12 in each school were invited to participate. There was no record of any parent refusing his or her children from participating in the survey. The support from their teachers contributed in making this level of cooperation possible.

The subjects comprised 171 (47.4%) males and 190 (52.6%) females. The author examined each child clinically in two positions: open-mouthed and with the teeth in centric occlusion. All the findings were entered in predesigned orthodontic forms by the examiner. The occlusal or dental anomalies in this study were based on the criteria by Richardson (1995), which are in agreement with the report by Bishara et al (1998). These conditions are local etiological factors of malocclusion as previously classified by Richardson (1995). They include missing teeth (congenitally missing or due to disease or trauma), teeth of abnormal form (including fused or geminated teeth, commonly referred to as 'double teeth') and conically shaped laterals, structural dental anomalies (hypo calcifications), oral habits (including thumb or finger sucking, tongue sucking/thrusting, lip sucking and others), crowding, supernumerary teeth, premature loss of deciduous teeth, prolonged retention of deciduous teeth (diagnosed when the deciduous teeth remains firmly in place one year after its normal exfoliation time or remains firmly in place while the permanent set are erupting in displaced positions), premature loss of permanent teeth, transpositions and others. The examinations were undertaken in the school premises under natural illumination with the child seated on a bench or ordinary chair. No dental chair was used during the study.

The social classification was on an individual basis according to the occupation of the parent(s) of the child in line with the Registrar General's social class (Beal, 1996). The Registrar General's social class was deemed suitable for this survey because it allows general statements to be made on social groups (working and middle classes). Being based on the occupation of the head of the family makes it relatively reliable. Also, the social system in Nigeria is similar to that of her colonial masters, Britain. This study classified the subjects into two social classes: working class and middle class. Middle class comprised classes I, II, III non- manual, and working class consisted of classes III manual, IV and V of the Registrar General's social class.

Statistical analysis

Data analysis was performed with statistical package for social sciences (SPSS 10.0 for windows). Because the prevalence of some of the occlusal traits could vary among sexes and social groups, differences in proportions were compared using chi-square (χ^2) statistic or, when appropriate, Fisher's exact test. Corresponding p-values were considered significant at $p < 0.05$.

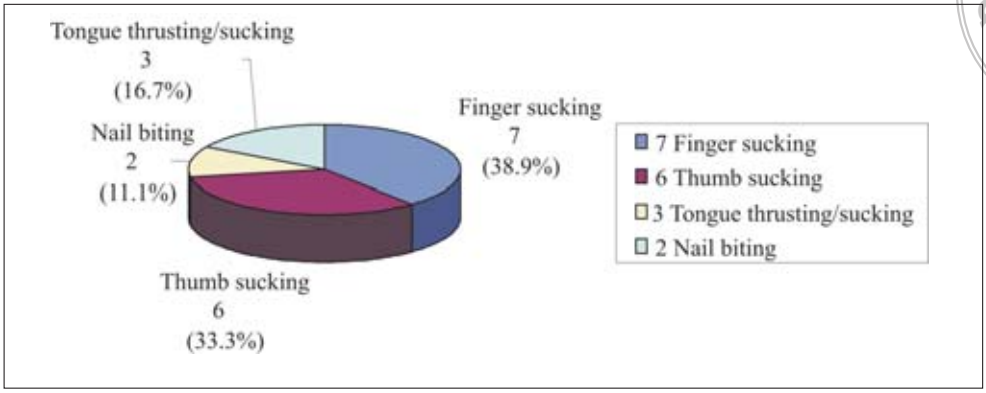

Fig 1 Types of oral habits practiced by the 18 subjects.

Table 1 Angle's classification of the study sample

	Angle's class gender					
	Male		Female		Total	
	n	%	n	%	n	%
Class I	141	49.0	147	51.0	288	79.8
Class II	23	41.1	33	58.9	56	15.5
Class III	7	41.2	10	58.8	17	4.7
Total	171	47.4	190	52.6	361	100.0

$\chi^2 = 1.44$; df = 2; p = 0.49

Reproducibility test

To ascertain the intra-examiner reliability in assessing the occlusal conditions, 25 subjects were re-examined 4 weeks after the initial examinations and statistically tested using Pearson correlation coefficients. This was found to be good ($r = 0.97$, $p < 0.001$).

RESULTS

The distribution of Angle's classification of the molar relationships of the subjects is shown in Table 1.

Table 2 shows the distribution of the occlusal or dental conditions surveyed in the study sample needing interception. In all, 187 (51.8%) had one form of interceptive need or another. No statistically significant gender differences were observed with regard to any of the conditions ($p > 0.05$) except the prevalence of supernumerary teeth, which was statistically significantly higher in males ($p < 0.05$). In all, five supernumerary teeth were recorded in this study.

The distribution of the fractured incisors, excessive overjets and anterior open bite observed in the subjects is shown in Table 3, with excessive overjets of more than 5 mm accounting for 13.9%. Fifteen upper incisors were fractured with 13 cases involving the central incisors and 2 cases involving the laterals. In all, 53 (14.7%) had dental anomalies, 139 (38.5%) had occlusal anomalies while 59 (16.3%) had space discrepancies (crowding). Sixty- four (17.7%) had more than one form of anomaly.

No significant gender difference ($p > 0.05$) was found in relation to crowding. Lower labial segment (LLS) crowding only accounted for 7.2% and crowding in the upper labial segments (ULS) only accounted for 0.6%. Those who had both ULS and LLS crowding gave 5.0%.

On the relationship between the age groups and the prevalence of the conditions needing interception, the 12-year-old children had significantly more missing teeth than the 11-year-olds ($p < 0.001$), while teeth of abnormal form were significantly higher among the 11-year-old group ($p < 0.05$).

Only 8% of the subjects examined had visited a dentist previously for dental treatment following toothaches, while none of them had been to a dentist for routine dental check-ups. Significantly more of the subjects who sought dental care were males ($p < 0.05$).

Table 2 Occlusal/dental anomalies needing treatments in the study sample according to gender

Occlusal/dental anomaly	Gender								
	Male		Female		Total		χ^2	df	p-value
	n	%	n	%	n	%			
1. Missing teeth	6	46.2	7	53.8	13	3.6	0.00798	1	0.929
2. Supernumerary	5	100.0	-	-	5	1.4	5.63358	1	0.018*
3. Prolonged retention of primary teeth	8	53.3	7	46.7	15	4.2	0.22335	1	0.637
4. Anterior cross bite	13	65.0	7	35.0	20	5.5	2.64016	1	0.104
5. Carious lesions	9	36.0	16	64.0	25	6.9	1.39243	1	0.238
6. Teeth of abnormal form and structure:									
a. Double teeth	4	57.1	3	42.9	7	1.9	0.27356	1	0.601
b. Conical upper lateral incisors	1	20.0	4	80.0	5	1.4	1.52332	1	0.217
c. Structural dental anomaly (hypocalcification)	1	100.0	-	-	1	0.3	-	-	-
7. Oral habits	9	50.0	9	50.0	18	5.0	2.47619	1	0.480
8. Transposition	1	50.0	1	50.0	2	0.6	0.00559	1	0.940
9. Others: Fractured incisors, proclination of the upper incisors with overjets >5mm and anterior open bite.	37	45.7	44	54.3	81	22.4	0.11956	1	0.730

* Statistically significant (Fisher's exact test was used for item 2)

Table 3 The breakdown of the frequency distribution of the fractured upper incisors, increased overjets and anterior open bite in the subjects

Occlusal anomaly	Gender					
	Male		Female		Total	
	n	%	n	%	n	%
Fractured upper incisors	8	53.3	7	46.7	15	4.2
Overjets > 5 mm	23	46.0	27	54.0	50	13.9
Anterior open bite	6	37.5	10	62.5	16	4.4

The types of oral habits still practiced by 5% (18) of the subjects in this study include tongue thrusting/sucking, thumb sucking, finger sucking and nail biting (Figure 1).

DISCUSSION

Although reports of the number of children whose dentitions would benefit from interception had been difficult to evaluate and compare because of differing interpretations of where interceptive orthodontics begins and ends (Richardson, 1995), this aspect of orthodontics is growing in its worldwide acceptance and relevance. In the present Nigerian study, the conditions where early treatment could foster better occlusal development are considered as described by Richardson (1995). Any of the conditions could be managed by an orthodontist or a general dental practitioner, but the interception led towards enhancement of better occlusal development in particular, and the craniofacial complex in general.

The present Nigerian study has shown that 51.8% of children in this age group in Ibadan would benefit from one form of interception or another, involving both 'middle class' and 'working class' families. Popovich

and Thompson (1975) estimated that 73% of their sample should respond to interceptive treatment alone, while Freeman (1997) reported that 14.3% of his sample would benefit from interception. Chung and Kerr (1987) showed that young patients in Glasgow found interception an acceptable form of therapy.

In the present study, the recording of five supernumerary teeth might not be exact because radiographs are needed to make accurate diagnosis of supernumerary teeth. This is one of the limitations of the present study.

Anterior cross-bite has been reported widely as needing early interceptive treatment to enhance favourable growth and development of not only the occlusion but also the entire craniofacial complex (Bishara et al, 1998; Clifford, 1997; Ngan and Fields, 1995; Ngan et al, 1988; Richardson, 1995; Sadowsky, 1998; West, 1969).

The present study recorded oral habits in 5% as against 13.14% reported in a previous study in the early special vigilance age group (pre-school children) in Nigeria (Onyeaso and Sote, 2001). This drop in prevalence is consistent with the normal changes in maturation, growth and development. However, the 5% reported in the present study should be considered high enough to deserve orthodontic attention due to the deleterious effects these habits have on the dentofacial development and the difficulty in management posed by them, especially anterior open bite. The major habit found in the study sample was digit sucking (thumb and finger sucking). Anterior open bites were recorded in the subjects with digit sucking and/or tongue thrusting habits with proclination of the upper incisors (Bishara et al, 1998; Fletchen, 1975; Larsson, 1972, 1987; Larsson et al, 1992; Nnachetta, 1996; Richardson, 1995).

The roles of the other local irregularities in the etiology of malocclusion and the need for their early treatments/treatment options have been well elucidated by Richardson (1995). Missing teeth were recorded in 3.6% in the present study, which is low compared with the 16% reported by Davies (1968) in Sydney schoolchildren. This occlusal anomaly was found in 4.6% of the handicapped Nigerian children (Onyeaso, 2000).

The conical or peg-shaped upper lateral incisors were the most prevalent teeth of abnormal form observed in the present study (1.4%) and this finding agrees with Richardson (1995). In the present study, 60% of the peg-shaped upper lateral incisors occurred bilaterally.

Double teeth (fused or geminated teeth) accounted for 1.9% in the present study. Previously, peg-shaped upper lateral incisors and double teeth were reported among the handicapped Nigerian children as 1.9% and 0.2% respectively (Onyeaso, 2000). Fused or geminated teeth could only be differentiated with the help of radiographs. In both studies no radiographs were taken, which remains one of the limitations of such epidemiological surveys (Richardson, 1995). Double teeth is the term frequently used to describe the anomaly of conjoined teeth which includes both dental fusion and gemination (Brook, 1970; Nik-Hussein, 1992; Yeun et al, 1987). It is difficult to decide whether fusion or gemination has occurred (Brook, 1970; Yeun et al, 1987). Therefore, in this study the term double teeth is used.

The need for restorative caries therapy accounted for 6.9% in the present study. Untreated carious lesions have the risk of the shortening of the dental arch due to the loss of the teeth, as well as to the extension of the carious attack to the approximal surfaces of the teeth.

In the present survey, fractured upper anterior teeth, proclination of the upper anteriors with overjets of over 5mm and anterior open bite accounted for 22.4%. Dental injury is a traumatic event with many causative factors. Certain dentofacial features, such as dental proclination and excessive incisor exposure, are considered indicators for early orthodontic treatment to prevent injury to teeth (Ben-Bassat et al, 2001; Brin et al, 2000; Burden, 1995; Nguyen et al, 1999; Tulloch et al, 1997). In the present Nigerian study, one-third of the subjects who sustained fracture to the upper incisors had proclination of the teeth with increased overjets of more than 5mm. In fact, two previous studies (Akpata, 1969; Henshaw and Adenubi, 1980) on traumatic anterior dental injuries in Nigerian children reported the prevalence as 14.5% and 2.6–13.2%. The differences could be due to the wider age groups of the earlier studies involving younger children where falls accounted for the etiological factor.

CONCLUSION AND RECOMMENDATIONS

Within the limitations of the present Nigerian study, more than half of the children in this study could benefit from one form of interception or another.

Considering the variety of needs, some of which could be prevented, such as prolonged retention of deciduous teeth with the resultant displacement of the permanent set, and carious lesions and anterior open bite resulting from prolonged oral habits, intensification of dental health education in primary and secondary schools so as to encourage routine dental check-ups among the Nigerian schoolchildren would

be helpful. Secondly, subsidised dental care by Government would encourage uptake of such services in the community due to the general low standard of living of many Nigerian families. Thirdly, financial assistance from Non-Governmental Organizations (NGOs) will surely help both in increasing dental awareness as well as provision of services to the needy population.

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