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A STUDY OF MALOCCLUSION IN THE PRIMARY DENTITION IN A POPULATION OF NIGERIAN CHILDREN

C. O. Onyeaso, E. O. Sote*
Department of Preventive Dentistry, College of Medicine, University of Ibadan, Ibadan and
**Department of Child Dental Health, College of Medicine, University of Lagos, Lagos, Nigeria.*

ABSTRACT

Objective: The understanding and prediction of the permanent dentition depends much on the primary set, but there is still paucity of information concerning malocclusion in the primary dentition of Nigerian children. This study aimed at assessing the malocclusion in Nigerian pre-school children.

Materials & Method: Five hundred and sixty-three (563) children aged 3-5 years in Lagos and Ibadan, Nigeria drawn from eight randomly selected pre-primary schools were examined.

Results: Overall, 40.5% of the children were found to have some form of malocclusions. Increased overjet was found in 12% of the children while 1.17% had increased overbite.

Anterior open bite accounted for 6.22%. Crossbite was recorded in 12.79%, (11.90% anteriorly and 0.89% posteriorly). Scissors bite was 8.88% and dental midline deviation 2.67%.

Anthropoid spaces (Precanine – 100%, Postcanine – 85.44%) were observed in the children. While about 74.60% had all teeth spaced in the incisor regions, 1.24% had no spacing at all in both arches. Straight terminal plane of the primary second molars was diagnosed in 63.7% of the children, mesial step in 31.7% and distal step occlusion in 4.6% of the children. No significant differences in occlusal patterns were found between boys and girls ($P > 0.05$).

KEY WORDS: ***Malocclusion; Primary dentition; Nigerian children***

INTRODUCTION

Most reports on occlusal pattern or characteristics of dentition in Nigerian population hitherto have been on permanent teeth[1-7]. Albeit, the status of the primary dentition affects the development of the permanent occlusion to the extent that certain traits and anomalies of the primary occlusion are often reflected in the permanent occlusion[8-10].

The primary dentition provides the basis for studying occlusion and for predicting the occlusion of the permanent dentition[10,11]. It would appear that the most stable occlusion is distal occlusion of the molars in primary dentition which is invariably maintained and is always transferred unchanged to the permanent dentition[12, 13, 14].

The literature contains adequate information concerning malocclusion in primary dentition among Caucasians and in the developed countries but there is a paucity of information regarding the prevalence of malocclusion in the preschool child in Africa. Only recently were there reports on the primary dentition of Tanzanian, Kenyan and Nigerian children[7,10,15]. The character of the dentition varies among populations and ethnic groups and comparisons of occlusion among ethnic groups are rare, especially for the primary dentition[10]. Considering the importance of the primary dentition to the permanent set and in a developing country like Nigeria where the teaching and practice of orthodontics are relatively new, it became very essential to carry out a study on the occlusal pattern of the primary dentition. The idea that a child should begin visits to the paediatric dentist only from the age of 3 has been disputed. Instead, this should start earlier for preventive procedures[16].

In Nigerian children, eruption starts at about 5 months and is completed between 20-30 months with the most active period of tooth eruption being between 9 to 18 months[17].

The purpose of this study, therefore, was to investigate the prevalence of malocclusion in the primary dentition of preschool (pre – primary) children in an indigenous Nigerian population.

MATERIALS AND METHODS

Five hundred and sixty-three (563) 3 – 5 – year – old children (289 boys and 274 girls) from eight (8) randomly selected pre-primary schools in Ibadan and Lagos cities in Nigeria were studied. With the help of their teachers, the ages of the children were obtained from school registers. None of the children had received any form of orthodontic treatment before the

*Correspondence: Dr.C. O. Onyeaso

investigation. All the children were examined under natural light in the school premises using sterile mouth mirror, probe, graduated periodontal probe and overjet gauge by the same examiner (C.O.O.). Before carrying out the main study, a pilot study was done for calibration and determination of intra examiner reproducibility.

The criteria of Foster and Hamilton [18] were used for assessment of the occlusion.

Molar Occlusion

Class I: This was classified when the distal surfaces of upper and lower second primary molars were in the same vertical plane in centric occlusion.

Class II: It was recorded when the distal surface of the lower second primary molar was in posterior relationship to upper second primary molar.

Class III: Was recorded when the distal surface of the lower second primary molar was in anterior relationship to upper second primary molar.

Canine Relationship

Class I: It was assessed when the tip of the upper primary canine was in the same vertical plane as the distal surface of the lower primary canine in centric occlusion.

Classes II: Was recorded when the tips of the upper primary canines were in anterior relationships to the distal surface of the lower primary canines in centric occlusion

Class III: Was recorded when the tips of the upper primary canines were in posterior relationships to the distal surface of the lower primary canines in centric occlusion.

For molar and canine relationships, children were classified as Class II or Class III on the basis of bilateral occurrence only. If, for example, a child was class II on one side and class I on the opposite side of the arch, for the purposes of prevalence calculations he was considered class I. Very few children, however, had such rotation.

Overjet: It was measured in centric occlusion on the greatest distance between the incisal edges of the maxillary and mandibular primary incisors in the horizontal plane using a graduated periodontal probe.

Ideal: This was recorded if a positive overjet was less or equal to 2mm.

Increased: It was noted when the overjet was greater than 2mm.

Reversed: This occurred when there was anterior crossbite.

Edge-to-edge: It obtained when the incisal edges of the upper and lower primary central incisors met in an Edge – to – edge: position in centric occlusion.

Vertical Occlusal relationships were registered in incisor region while in the lateral segments attention was given to submerged molars. (However, no molar was found submerged).

Ideal Overbite was recorded when the incisal tips of the primary lower central incisors contacted the palatal surfaces of the upper primary central incisors.

Reduced overbite when the incisal tips of the primary lower central incisors do not contact the upper incisors or the palate in centric occlusion, there being a positive overbite.

Increased overbite when the incisal tips of the lower primary central incisors touch the palate in centric occlusion.

Anterior open bite when the incisal tips of the lower primary central incisors stay below the level of the incisal tips of the upper primary central incisors in centric occlusion.

Crossbite: This was noted when the upper primary molars occlude(s) in lingual relationship to the lower primary molars in centric occlusion.

Scissors bite (lower lingual occlusion): It was diagnosed when the tips of the buccal cusps of the lower primary molars were in the same vertical plane, as, or in lingual relationship to, the tips of the palatal cusps of the upper primary molars in centric occlusion.

Spacing: This was noted when there was a lack of contact between adjacent teeth. **Imbrication:** It occurred when there was overlapping of adjacent teeth.

Incisal Centre: The midpoints between the central incisors in each arch.

Data were analysed on a coded master sheet before transfer to a computer where it was also statistically analysed using EP 6 Info software programme. The statistical analysis of the material was performed using the Chi-square test.

RESULTS

The overall prevalence of malocclusion in this study population was 40.5%. Straight terminal plane of the primary second molar was found in 359 (63.7%) of the children while 179 (31.27%) had mesial step molar occlusion. Only 26 subjects (4.6%) had distal step molar occlusion. There were no significant differences found in molar relationship (P = 0.088) and canine relationship (P = 0.123) between sexes.

Table 1 shows the age and sex distribution of the sample. The sagittal relationships of the molars and canines of the study sample is shown in Table 2. Three hundred and fifty-eight of the study samples (63.59%) had Class I molar relationship and the canine relationship followed the same pattern – 364 (64.7%). Generally, the same pattern of sagittal relationships is observed for both the molars and the canines.

Table 1: **Age and Sex distribution in the study population**

Age (years)	3	4	5	Total	(%)
Sex:					
Male (n)	61	119	109	289	(51.3)
Female (n)	64	102	108	274	(48.7)
Total	125	221	217	563	(100)

Table 2: **Distribution of Sagittal relationship of Primary Molars and Canines in 563 3 – 5-year-old Nigerian Children.**

Relationships	No (%) of children
Class 1 (Flush terminal plane)	358 (63.59)
Class II (Distal step)	26 (4.62)
Class III (Mesial step)	179 (31.79)
Cannine	
Class I	364 (64.7)
Class II	29 (5.1)
Class III	170 (20.2)

Table 3 shows the sagittal incisal relationship. Ideal overjet was found in 349 (62.0%) while edge-to-edge was in 50 (8.9%). The distribution of vertical relationships is shown in Table 4. Reduced overbite was noted in 16 (2.84%) of the study sample while 80 (14.2%) had increased overbite.

Table 3: **istribution of Sagittal incisal relationship in 563 Nigerian Children aged 3 – 5-years.**

Overjet	No (%) of Children
Ideal	349 (62.0)
Increased	61 (10.8)
Edge – to – edge	50 (8.9)
Reversed	65 (11.5)
(Anterior open bite) accounted for	36 (6.4)
Unmeasured (due to trauma to incisors)	2 (0.4)

Table 4: **istribution of Vertical relationship in 563 Nigerian Children aged 3 – 5-years.**

Relationship	No (%) of Children
Incisor	
Ideal	379 (67.32)
Reduced	16 (2.84)
Anterior open bite	36 (6.4)
Increased	80 (14.2)
Edge – to – edge	50 (8.88)
Unmeasured (due to trauma to incisors)	2 (0.4)

The lingual and buccal crossbites are shown in Table 5 with 72 (12.8%) having lingual crossbite while 50 (8.88%) had buccal crossbite. Thirteen (2.31%) of the children had upper midline deviation while 2 (0.36) had lower midline deviation.

Arch spacing and crowding are shown in Table 6. One of the striking features was the generous spacing in the dentition of this study sample. Four hundred and fourteen (414) subject had upper incisor spacing which accounted for 73.53%, 421 (74.79%) had lower incisor spacing. Anthropoid spaces were noted as follows: precanine spaces in the upper arch (100%) and postcanine spaces in the lower arch (85.44%). Forty-one children had attrition of teeth (7.28%).

Table 5: **Distribution of Lingual and buccal crossbites in 563 Nigerian Children aged 3 – 5-years.**

Relationship	No (%) of Children
Lingual crossbite	
Bilateral	63 (11.20)
Unilateral	9 (1.60)
Buccal Crossbite	
Bilateral	23 (4.08)
Unilateral	27 (4.80)

Table 6: **Arch spacing and crowding in the 563 Nigerian children aged 3-5-years.**

	Upper Arch n%	Lower Arch n%	Both Arches n%
Incisor spacing			
All spaced	414 (73.53)	421 (74.79)	420 (74.60)
Central spaces only	6 (1.07)	10 (1.57)	4 (0.57)
Bilateral spaces only	24 (4.26)	6 (1.07)	12 (2.13)
Unilateral spaces only	1 (0.17)	1 (0.17)	
Central and unilateral spaces	1 (0.17)		
No spaces	39 (6.93)	38 (6.75)	38 (6.75)
Imbrication	5 (0.89)	8 (1.42)	3 (0.53)
Precanine spaces			
Bilateral	564 (100)	497 (88.28)	464 (82.42)
Unilateral	1 (0.17)		1 (Rt)
None	3 (0.5)	3 (0.5)	3 (0.5)
Post canine spaces			
Bilateral	432 (76.73)	418 (85.44)	418 (74.25)
Unilateral	1 (0.17)	5 (0.33)	5 (0.33)
None	3 (0.5)		
Molar spaces			
Bilateral	203 (36.06)	206 (36.59)	203 (36.06)
Unilateral		1 (0.17)	1 (Rt)
None	43 (7.17)	43 (7.17)	43 (7.17)
No spacing in the arch	7 (1.24)	7 (1.24)	7 (1.24)
All teeth spaced	163 (29.00)	163 (29.00)	163 (29.00)

NOTE: *Table 6 shows the prevalence of the incisor spacing generally and anthropoid spaces (Precanine and postcanine in upper and lower arches respectively) Note also that there are good postcanine spaces in the upper arch and precanine areas of lower arches too but not as good as the anthropoid spaces.*

DISCUSSION

All the available dental literature in Nigeria showed that previous reports onmalocclusion were on permanent dentition[1-6] except one study made on the primary set. The criteria employed to diagnose malocclusion were based on the work of Foster and Hamilton[18]. The results are therefore derived from an objective

assessment and can be compared with similar studies in other parts of the world.

The percentage of children found to have some forms of malocclusions was 40.5%. This is less than that found by Kabue et al[15] among Kenyan children (51%) and higher than that reported by Kerosuo [10] among of Tanzanian children (18%) and Finnish children (36%). The difference is probably due to the criteria used in diagnosing malocclusion and possibly also the ethnic and racial differences.

Straight terminal plane relation of the primary second molars occurred in 63.59% of the sample. This finding compares well with that obtained by Kabue et al[15] which showed 53% of the children having class 1 molar relation in Nairobi, Kenya. This finding is also similar to that reported by Nanda[19] among British children. Mesial step and distal step accounted for 31.79% and 4.62% respectively which is similar to the finding of Kabue[15] in Nairobi who reported 44% and 1% for mesial and distal steps respectively. The study carried out by Infante [8] showed class I (straight terminal plane) as 88.7%, class II (distal step) as 4.3% and class III (mesial step) was 7.1% for the black children. This present study has shown the same pattern of results with a previous study in Nigeria[7] but contrasts with studies in the whites[8,10,11,18] where more cases of Class II were reported. The canine relationships followed the same pattern with the molar relationships.

In the present study, 12.79% of the children had cross bite – 11.90% anteriorly and 0.89% posteriorly. This compares well with the study of Kerosuo[10] on Tanzanian children which showed a prevalence of 8% in anterior and 1% in posterior cross bite. This result also agrees with that of Kabue et al[15] which showed anterior cross bite prevalence of 5% and 1% for the posterior. The study on Saudi Arabian children[20] showed prevalence of anterior cross bite and posterior cross bite as 2% and 4% respectively which is a reverse of the finding in the Nigerian population but agreed with that among Caucasians.

Comparing the vertical relationship obtained in this study with that of Kabue et al[15], there was less prevalence of anterior open bite of 6.22% as against 12% of Kenya and increased over bite of 1.24% against 13%. The study by Foster and Hamilton[18] on British children gave higher prevalence of anterior open bite (24%) and increased over bite (deep bite) of 20% when compared to the present study and the Kenyan study[15]. The higher prevalence of anterior open bite among the British children compared to the Nigerian or the Kenyan children could be explained by the greater use of pacifiers and digital sucking in the British children[10].

In the sagittal plane of the arches, the present study shows the following results: increased overjet (2.5 – 5mm) – 11.55%, Edge-to-edge – 8.17%, and reversed overjet as 11.5%. This again agrees with the study by Kabue et al[15] on Kenyan children which gave increased overjet as 13%.

The study by Foster and Hamilton[18] showed the following overjet results for the British children: Increased 72%, Edge-to-edge – 2% and reversed as 1%. Comparing the two results the black population showed a higher prevalence of edge-to-edge bite. This can be explained by the more fibrous food, which Africans eat unlike the white. The coarse food intake tends to increase attrition of teeth and removal of the intercuspal interferences with the mandible sliding a bit forward to achieve interdigitation[21].

Several authors[10, 18, 19, 22] have shown that the usual features of a primary dentition include incisal spacing, anthropoid spaces and attrition. Our results agree with this view. We found upper incisal spacing in 73.53% of the children, lower incisal spacing in 74.79% and anthropoid spaces - precanine spaces in the upper arch (100%) and postcanine spaces in the lower arch (88.28%). It is generally accepted that when the primary teeth erupt spaced in the arches, the permanent dentition has better chance of not being crowded[9, 12, 14, 15, 23-25]. The prevalence of lower (1.42%) and upper (0.89%) incisor crowding in this sample is similar to those found in Tanzanian[10] and Kenyan children[15], which were 5% (Tanzanian) and 10%, 4% for lower and upper anterior respectively for the Kenyans. The prevalence of incisal crowding in the upper and lower jaws has been reported to be 5% in a similar population of Finnish[10]. These low figures generally confirm that crowding is rare in all ethnic groups in primary teeth. Our figure for Nigeria shows the lowest prevalence so far.

The incisal centre (dental midline) displacement was 2.67% compared to 6% in Kenyan children[15]. The study by Foster and Hamilton[18] gave higher prevalence of midline deviation compared to this Nigerian study and that of Kenyan study[15]. This can be explained by considering the higher prevalence of posterior cross bite in the white, which results in midline shift as the mandible swings into intercuspation. Also there is less chance of canine interference in Africans due to their coarse diet, which encourages attrition of the primary teeth[26].

CONCLUSION:

The present study gives some knowledge on the occlusal characteristics of the primary dentition in a Nigerian population, which forms a basis for comparison with previous studies in other countries. Longitudinal studies are needed to follow up the dental development of children throughout the growth period with due regard to other relevant factors for better prediction of permanent dentition.

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