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## Need for preventive and interceptive orthodontic treatment in 3–5 year-old Nigerian children in two major cities

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### Summary

There is a growing emphasis world-wide for early orthodontic treatment but in Nigeria there is very little information regarding the occlusal development in pre-school children reported. The need for preventive and interceptive intervention for malocclusion was studied in a sample of 563 Nigerian children (289 boys and 274 girls) aged 3–5 years. Orthodontic intervention was estimated to be needed in 12.8% of the children due to cross bite of the anterior or lateral segments. Education was needed in 12.5% of the children in cases of digit sucking, lip sucking and tongue thrusting. Extraction was indicated in 0.4% of children in cases of retained primary incisors causing displacement of the erupting successors. The need for further follow-up of occlusal development was noted in 1.4% of the children due to double primary teeth (0.4%), numerical variation of primary teeth (0.4%), crown dilaceration of a tooth (0.2%) and true class III skeletal malocclusion (0.4%).

**Keywords:** *Epidemiology; dental; malocclusion; treatment need; Orthodontics.*

### Résumé

Il y a une croissance d'accentuation mondiale pour le traitement orthodontique très tôt mais un Nigeria il y a très peu d'information concernant le développement occlusal parmi les enfants préscolaires. Le besoin pour la l'intervention préventive et interceptée pour la malocclusion était étudié dans un sondage de 563 Nigériens (289 garçons et 274 filles) âgé du 3 à 5 ans. L'intervention orthodontique était estimé d'être requise dans 12,8% des enfants du fait de 'Crossbite' de segments antérieur et latéral. L'éducation était requise dans 12,5% des enfants des cas de sucer le doigt, le lèvre et le lancement de langue. L'extraction était indiquer pour 0,4% des enfants avec les cas de rétention des incisives primaires qui en effet est la cause de déplacement successive en cour d'éruption. Le besoin pour une suivie de développement d'occlusale était noté en 1,4% des enfants à cause des dents primaires doublés (0,4%), la variation numérique de dents primaire (0,4%), de lacération de base de dent (0,2%) et la vraie malocclusion de troisième classe (0,4%).

### Introduction

There is increasing emphasis on early recognition of conditions predisposing young children to malocclusion world-wide and corresponding preventive and interceptive procedures [1-9]. Adequate information is essential in this important aspect of modern orthodontics in any health sector of a growing population such as Nigeria. However, only few information is available in the literature concerning malocclusion in the primary dentition of Nigerian pre-school children [10,11]

Orthodontic interception has the advantage of being simple and the risk of root resorption associated with orthodon

tic treatment is reduced. It is inexpensive and equally helps in preventing iatrogenic caries. While teeth may move subsequent to interceptive treatment, they are not known to relapse [1]. Some criteria have been given for the proper assessment and treatment planning for the primary dentition [2,4,6,7].

Apart from the descriptive surveys of occlusal status in the permanent dentition stage and one in the primary dentition stage of Nigerians [10,12-14], only one study has quantified the need for orthodontic treatment in a Nigeria sub-urban population [11].

The purpose of this investigation therefore, was to determine the need for preventive and interceptive orthodontic interventions in a population sample of 3-5 year-old Nigerian children which form an early vigilance group.

### Materials and methods

This study was a part of an orthodontic screening exercise carried out by the authors in 1999. Five hundred and sixty three (563) 3-5 year-old pre-school Nigerian children comprised the study sample. A two-stage sampling method was adopted, the first stage being the random selection of nursery schools and day-care centres in Lagos and Ibadan cities of Nigeria. The second stage was defined as all children in nursery one and two (aged 3–5 years). The children's ages were obtained from the school registers and were recorded as the age at last birthday. None of them had received any orthodontic treatment as confirmed by the response to the note sent to the parents by the examiner. All the children were examined by one dentist (C. O. O.) in the school premises under natural lighting.

The need for preventive and interceptive orthodontic treatment was based on modified criteria for epidemiological registration developed by Jarvinen [6] which was in agreement with the proceedings of the Workshop Discussions on Early Treatment by the College of Diplomates of the American Board of Orthodontics in Quebec City, Canada on July 13–17, 1997 [10]. These criteria considered malocclusions and predisposing conditions with pathogenic potential on the dentition. Anterior and lateral crossbites with and without mandibular displacement in children were recorded for immediate orthodontic intervention. Early loss of primary molars which may require the maintenance of space to prevent arch length shortening or carious lesions as well as oral habits (e.g. digit sucking, lip sucking) were scored. Information concerning oral habits of the children were obtained from their school teachers and their classmates.

Children requiring further inspection in order to follow – up the development of the dentition were assessed for double teeth (fusion or gemination) and numerical variation of primary teeth as well as early loss of primary molar without observed risk of space loss. Also included in this category were skeletal class III malocclusion and dummy sucking.

Pre-survey calibration of the author was done to ensure reproducibility of the screening exercise and there were no significant differences ( $P > 0.05$ ) but it helped in minor modifications before the main study such as streamlining the information in the final questionnaire. It also helped the examiner in gaining speed in the course of examination. Fifty children were initially examined and were re-examined during the main study. There was a good association between the results of the first and the

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second examinations. Fisher's exact test was used to determine the level of statistical significance for observed relationships.

## Results

The total proportion of children with some kind of need for preventive or interceptive intervention for malocclusion was 144 (25.7%) (Table 2).

**Table 1:** Age and sex distribution of the subjects

Age (Yrs) at last birthday	Male n (%)	Female n (%)	Total n (%)
3	61 (10.8)	64 (11.4)	125 (22.2)
4	119 (21.1)	102 (18.1)	221 (39.3)
5	109 (19.4)	108 (19.2)	217 (38.5)
Total	289 (51.3)	274 (48.7)	563 (100)

**Table 2:** Need for preventive or interceptive intervention for malocclusion in children aged 3-5 years

Type of intervention.	Indication	No. of children	
		no.	%
Preventive or interceptive orthodontic treatment.	Crossbite of anterior segment*	25	4.4
	Crossbite of lateral segment**	5	0.9
	Functional crossbite of anterior or lateral segment***	42	7.5
	Early loss of primary molars	0	0.0
	Total	72	12.8
Education	Digit sucking	60	10.7
	Lip sucking	1	0.2
	Tongue thrusting	9	1.6
	Total	70	12.5
Restorative caries therapy	Caries of primary molars	0	(0.0)
Extraction of retained primary incisors	Retained primary maxillary and mandibular central incisor with their permanent successors erupting palatally and lingually, respectively in 5-year-old.	2	(0.4)
Total no. of children		(144)	25.7

\*A reversed overjet, the mandibular incisors being labial to the maxillary incisors

\*\*A narrow maxilla in relation to the mandible, the buccal cusps of the maxillary teeth occluding between the buccal and lingual cusps of the mandibular teeth, unilaterally or bilaterally.

\*\*\*An initial contact between the teeth guides the mandible into an anterior or lateral displacement (crossbite).

Orthodontic treatment was estimated to be needed for 72 (12.8%) of the children due to crossbite or functional crossbite of the anterior or lateral segments. Preventive measures in the form of educational advice were needed for digit sucking, lip sucking or tongue thrusting in 70 (12.5%) of chil-

dren 10.7% for digit circle 0.2% for lip sucking and 1.6% for tongue thrusting (Table 2). No child in this age group was found to require immediate restoration of primary molars but two 5-year-old (0.4%) children needed extraction of the retained primary incisors to enable proper alignment of the successors which were already erupting in displaced positions (Table 2).

The total number of children requiring further inspection in order to follow-up the development of dentition was 7 (1.4%) primary teeth while 2 (0.4%) also had double teeth (fusion or gemination).

No early loss of primary molars were detected in this age-group. A child (0.2%) had a developmentally dilacerated crown of an incisor while another 2 (0.4%) had true class III skeletal base relationship (Table 3).

**Table 3:** Need for further inspection in order to follow-up the development of the dentition

Dental anomaly	No. of children	(%)
Numerical variation of primary teeth	2	0.4
Double teeth (fusion or gemination) involving 52 and 82	2	0.4
Dilaceration of the crown of 51	1	0.2
Early loss of primary molar without observed risk of space loss.	0	0
True class III skeletal base relationship	2	0.4
Total	7	1.4

The relationships between digit sucking and anterior open bites were statistically significant ( $P < 0.001$ ) (Table 4).

**Table 4:** Relationship between digit sucking and anterior open bite (AOB) in the pre-school children

	No. of children with A.O.B.		No. of children without A.O.B.	
	n	%	n	%
Children without sucking habit	4	0.7	528	93.8
Children with sucking habit	31	5.5	0	0

Fisher's exact test

$P < 0.001$  (Highly significant)

## Discussion

In spite of several debates in the dental literature as to the ideal time to commence orthodontic treatment in the growing child, there is now a consensus that early treatment in the primary dentition following thorough assessment restores normal function, which, in turn, leads to normal development [2,4,7,8,9,15,16]

Many of the children examined showed the need for one form of preventive or interceptive intervention or the other. In cases of crossbite or a functional crossbite in the primary dentition which in this study accounted for 12.8%, the malocclusion can lead to hindered growth of the maxilla, forward growth of mandible or facial asymmetry or lateral crossbite in the permanent dentition [17,18] Kabue *et al* [19] reported crossbite malocclusion among Kenyan pre-school children as 6% (5% for

anterior segment and 1% laterally) and Kerosuo [20] reported this malocclusion to be 9% (anterior segment are accounting for 8% while 1% was for the lateral segment) among Tanzanian children aged 3-8 years but in the same study Kerosuo reported 19% for Finnish children (6% for anterior segment and 13% laterally). Otuyemi *et al.* [11] in an earlier Nigerian study had crossbite malocclusion as 17.9%, which compares with the present study. Jarvinen [6], reported the crossbite of the anterior segment as 1.4% and lateral segment crossbite of 7.4%. These available African reports indicate lower prevalence of lateral crossbite compared to the crossbite of the anterior segment, which is reversed among the caucasian children.

In cases of an early loss of a primary molar, the need for space maintenance was defined on the basis of an observed tendency to space closure [21]. However, no early loss of a primary molar was observed in our study. Sixty (10.7%) of the children were digit suckers (Table 2) which is lower than that reported by Modeer *et al.* [22] in 4 year old Swedish children (48%) and by Holn [23] in another group of 3-5 year old Swedish children (18%). Jarvinen [6] reported a prevalence of 2.7% among 3-5 year-old Finnish children. The 10.7% prevalence of digit sucking habit in this study compares well with the prevalences of 10% and 4% reported by Kerosuo [20] in Tanzanian and Asia/Arab children respectively.

In an earlier study among Nigerian adolescents, Isiekwe [24] reported a prevalence of 2.1% which can be explained by the fact that sucking habit prevalence is expected to drop with age. Transverse discrepancies were observed to a marked degree among children who continued sucking after 2 years of age [22]. There is no doubt that these children involved in digit sucking and other oral habits needed dental education including use of rewards to further motivate them to stop the habits. The relationship between anterior open bite and digit sucking in this study was significant ( $P < 0.001$ ).

Two 5-year-old children (0.4%) who were found having retained primary incisors with the permanent successors erupting palatally in the maxilla and lingually in the lower arch can be explained by the earlier eruption pattern among Nigerians compared to their caucasian counterparts according to Isiekwe [25]. Timely extraction of their primary incisors would allow the permanent successors to align properly.

There was no need for restorative therapy caused by caries of primary molars in the children examined. Untreated carious primary molars present a risk of shortening of the dental arch and crowding of the permanent dentition due to the loss of these teeth [26].

The total proportion of children needing further inspection in order to follow up the development of dentition was 7 (1.4%) (Table 3), which is lower than the report of Jarvinen [6] of 197 (21.2%) in Finnish children and also lower than the earlier report by Otuyemi *et al.* [11] in Nigerian suburban children aged 3-4 years.

The frequency of numerical variation of primary teeth was (0.4%), which is lower than that reported by Jarvinen [6] in Finnish children. Previous report by Otuyemi *et al.* [11] in Nigerian children showed no child with numerical variation of primary teeth. This study recorded two children with double teeth (0.4%) which is comparable to that of Jarvinen [6] in Finnish children and the previous report in Nigerian children [11].

The prevalence of double primary teeth reported by Umweni and Ojo [27] in their analysis of 24 cases was 0.53% which is comparable with our result. Double teeth anomaly occurs more frequently in the primary than in the permanent

dentition [28-31]. Double primary teeth is an indication of possible developmental dental anomalies in the permanent dentition [28-33].

The prevalence of the true class I skeletal malocclusion was only 2 (0.4%) which is comparable with the report of Jarvinen [6]. In the study by Otuyemi *et al.* [11] the prevalence of 1% was reported. No children with the habit of dummy sucking were found in this study, which agrees with the earlier report in Nigerian children [11]. The prevalence of this habit was as high as 13.1% among Finnish children [6]. This is a possible reflection of the fact that Nigerian children do not often engage in this social habit.

The 3-5 year-old group form a special vigilance group and the screening, detection, prevention and prompt intervention of the abnormal development in these children will be of immense help in their occlusal development. Moreover, the findings of this study should assist the development of orthodontic treatment strategies in preschool Nigerian children as well as to address the problems of malocclusion with regards to treatment goals, manpower and economic resources, public health interest in oral health and encourage a closer interaction between the orthodontists and other specialties such as paedodontists.

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