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## Dentofacial anomalies related to the digit sucking habit

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### Summary

Digit (thumb or finger) sucking is the most common oral habit, frequently seen among young children. With an increase in the prevalence of the oral habit in Nigeria in recent years there should be an expected increase in the dentofacial effects of the habit. In this study 81 children, 29 males and 52 females aged 3-16 years were examined. Each child was still actively engaged in the digit sucking habit. Subjects were divided into 3 age groups – 3-6 years, 7-10 years and 11 years and above. The dentofacial effects of the habit on each subject were assessed. Increased overjet was observed in 63-705 of the children in the different age groups while the occurrence of anterior open bite ranged from 33.3% to 80% declining in frequency with increase in age. Unilateral posterior crossbite was observed in 8.65 of children while no case of bilateral crossbite was observed. Lip incompetence occurred in 51.8% of children examined, occurring most frequently in the oldest age group. Class 2 skeletal pattern was observed in 22.2% of the sample population. Results show that malocclusion is a frequent result of digit sucking especially when prolonged. There is a need to increase social awareness of the detrimental effects of this habit and if necessary offer alternative non-nutritive sucking methods.

**Keywords:** *Digit sucking, malocclusion*

### Résumé

Le sucage du doigt est une habitude orale commune fréquemment observée chez les enfants. Avec une augmentation de la prédominance de cette habitude en Nigeria ces dernières années, on ne s'attend pas à une hausse des effets dento-faciaux dans cette étude, 81 enfants 29, de sexe masculin et 52 de sexe féminin âgés de 3-16 ans ont été examinés. Chaque enfant était encore activement engagé au sucage de doigt. Les sujets ont été divisés en trois groupes – 2-6 ans, 7-10 ans, 11 ans et plus. Les effets, dento-faciaux de cette pratique sur chaque sujet étaient évalués. D'augmentation du décalage des dents était observé sur 63-70,5 des enfants d'âge différent alors que l'existence de la bouche supérieure ouverte allait de 33,3% à 80%, diminuant en fréquence avec l'augmentation d'âge. La morsure postérieure unilatérale était observée chez 8,65 des enfants alors qu'aucun cas bilatéral n'était observé. L'incapacité de fermer les lèvres se présentait à 51,8% surtout chez ceux à un âge avancé. 22,2% des individus avaient un défaut du squelette de classe 2. Les résultats montrent que la mauvaise occlusion est fréquente chez les succeurs de doigt, surtout lorsque celui-ci est prolongé. Il y a donc nécessité d'intensifier la conscience sociale des effets néfastes de cette habitude et si possible offrir des méthodes alternatives non nutritives au sucage.

### Introduction

Digit (thumb or finger) sucking is the most common oral habit, seen frequently among young children [1]. Infant digit sucking in Western countries has been reported to be as high as 45% [2], with an increase in age being related to a decrease in the prevalence of the habit [3,4]. However, in some Western

countries a marked reduction in the prevalence of digit sucking has been reported in recent times due to a corresponding increase in pacifier use [5-8].

Early studies on the digit sucking habit in Nigeria showed a relatively low prevalence of the habit [9]. More recent studies taken over a decade later have shown a great increase in the prevalence of the habit, being 16.9% and 18.3%, respectively [10,11]. With an increased occurrence of this habit there will be an expected increase in the dentofacial effects seen. These effects have made the digit sucking habit of great interest to general practitioners and specialists in the field of dentistry.

The duration, frequency as well as intensity of the digit sucking habit are all important factors in the development of malocclusion in the digit sucker [2,12,13]. Proffit stated that pressure against the teeth has to exist for at least 6 hours/day to result in tooth movement [14]. The method of insertion of the chosen digit into the mouth may also affect the occlusal anomalies arising from the habit [15]. Studies comparing digit suckers with non-suckers show there is an increased occurrence of malocclusion among children with the habit. [1,4] The most prominent effect of the habit on the dentition is anterior open bite [2,5,12]. Other common features include: maxillary protrusion [5,12,16], posterior crossbite [1,17] proclination or retroclination of the lower incisors [5]. An increased occurrence of Angle's Class II molar relationship has also been noted among some digit suckers [17,18].

The purpose of this study is to assess a selected group of Nigerian children with an active digit sucking habit and determine the influence of this habit on their dentofacial structures.

### Materials and methods

The sample population consisted of 81 patients – 52 females and 29 males - aged 3-16 years of age attending the Orthodontic or Paedodontic unit of The Lagos University Teaching Hospital Dental Centre. Only children who were actively engaged in a digit sucking habit at the time of examination were included in this study.

A formatted questionnaire was filled for each child recording the digit sucked and the duration of the habit. Each subject was examined both extra-orally and intra-orally while seated in a dental chair using overhead artificial illumination.

The subjects were divided into 3 age groups as follows:

- 3-6 years – 20 subjects
- 7-10 years – 46 subjects
- 11 years and above – 15 subjects

Data for the following variables were similarly recorded:

- a. Overjet
- b. Overbite
- c. Buccal crossbite
- d. Upper incisal proclination
- e. Lower incisal retroclination
- f. Lip competence
- g. Skeletal pattern

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### Statistics

Data for the 3 age groups were compared. Results were analyzed using the chi-square test with  $P < 0.05$  being the level of significance.

### Results

Overjet was observed to be increased in the majority of children examined in all age groups occurring in 70%, 63% and 66.7% of children in each respective age group as seen in Table 1. Table 2 shows that anterior open bite was the most common overbite relationship seen most frequently in 3-6 year olds (80%) and declining gradually to 45.6% in 7-10 year age group and 33.3% in children aged 11 years and above. Incomplete and reduced overbite occurred in a total of 21% of the sample population.

**Table 1:** Overjet values among sample population

Overjet	3 - 6 years		7 - 10 years		11 years	
	No.	%	No.	%	No.	%
Increased	14	70.0	29	63.0	10	66.7
Normal	6	30.0	12	26.1	3	20.0
Reduced	0	0.0	5	10.9	2	13.3
Total	20	100.0	46	100.0	15	100.0

$$\chi^2 = 2.76 \quad df = 4 \quad P > 0.05$$

**Table 2:** Distribution of overbite values among sample population

Overbite	3 - 6 yrs		7 - 10 yrs		11 yrs & above	
	No	%	No	%	No	%
Complete and deep	0	0	8	2.2	1	6.7
Complete and normal	3	15.0	8	17.4	1	6.7
Complete and reduced	0	0	1	2.2	2	13.3
Incomplete and normal	0	0	5	10.9	1	6.7
Incomplete and reduced	1	5.0	11	23.9	5	33.3
Anterior open bite	16	80.0	21	45.6	5	33.3
Total	20	100.0	46	100.0	15	100.0

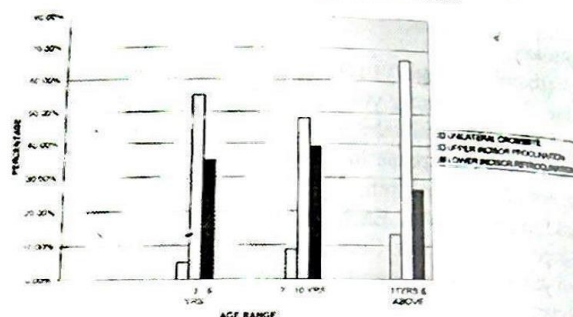
$$\chi^2 = 23.43 \quad df = 12 \quad P < 0.05$$

Unilateral buccal crossbite was observed to occur in 8.6% of children examined with an increased frequency of occurrence with increased age (not statistically significant). There were no cases of bilateral crossbite observed among the children.

Upper incisal proclination was another commonly occurring anomaly occurring in 55%, 47.8% and 66.7% of children in each age group. On the other hand, lower incisor retroclination was less frequently occurring (35.8% of total) and seen least frequently in the 11 years and above age group (Fig 1).

Lip incompetence was observed to occur in 51.8% of the children examined and occurring most frequently in the oldest age group (Table 3).

**FIG 1:** DISTRIBUTION OF UNILATERAL CROSSBITE, UPPER INCISAL PROCLINATION AND LOWER INCISOR RETROCLINATION AMONG DIGIT SUCKERS



**Fig. 1:** Distribution of unilateral crossbite, upper incisal proclination and lower incisor retroclination among digit suckers

**Table 3:** Lip competence among sample population

Lips	3 - 6 yrs		7 - 10 yrs		11 yrs and above	
	No	%	No	%	No.	%
Competent	8	40.0	26	56.5	5	33.5
Incompetent	12	60.0	20	43.5	10	66.7
Total	20	100.0	46	100.0	15	100.0

$$\chi^2 = 3.14 \quad df = 4 \quad P > 0.05$$

**Table 4:** Distribution of skeletal pattern among sample population

Skeletal Pattern	3 - 6 yrs		7 - 10 yrs		11 yrs and above	
	No	%	No	%	No	%
1	13	65.0	39	84.8	11	73.3
2	7	35.0	7	15.2	4	26.7
3	0	0	0	0	0	0
Total	20	100.0	46	100.0	15	100.0

$$\chi^2 = 3.45 \quad df = 4 \quad P > 0.05$$

Clinical assessment of skeletal pattern revealed a preponderance of skeletal pattern 1 among the children examined. Skeletal pattern 2 was recorded in 22.2% of the children, occurring most frequently in the youngest age group. No cases of Skeletal 3 were seen.

### Discussion

Up to the age of 3 years digit sucking may be considered an early developmental response [12,19,20]. Beyond this age it is considered a learned habit resulting in marked deformation of occlusion in children in which it is active [3,12,19]. Due to the increase in digit sucking in Nigeria [9-11] there should be an expected increase in related occlusal anomalies.

No control group was included in this study therefore findings were compared with established norms for the general population of Nigeria involving children of comparable ages.

In the course of this study only one patient (1.3%) showed a complete lack of occlusal effects from the digit sucking

habit. This indicates that 98.7% of those examined presented with occlusal anomalies related to the habit. Even though this selected group could be considered biased as many had presented in the dental clinic for treatment, it still infers that digit sucking, especially the prolonged habit, will have a detrimental effect on the occlusion in the majority of those involved as long as it persists. Similarly, Kjellgren reported that 87% of a group of thumb suckers had a malocclusion needing correction [21].

Normal overjet values among Nigerians has been established to range between 1 and 3mm [22,23]. Overjet values above this were considered increased. Increased overjet (Fig. 2) was observed in 63-70% of all age groups. The frequency of occurrence of this anomaly among digit-suckers has been previously noted in other studies [1,18]. Popovich demonstrated in an earlier study that thumb or finger sucking pushed the maxillary teeth and alveolar process forward and produced greater antero-posterior disparity between the upper and lower teeth [18].



Fig. 2: Incisal proclination and increased overjet due to prolonged digit sucking in an 11 year old female

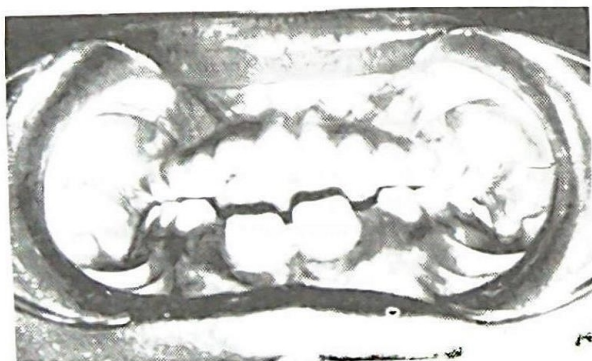


Fig. 3: Anterior open bite in a 7-year old boy as a result of a digit sucking habit.

Anterior open bite (Fig. 3) is considered one of the most commonly seen malocclusions among digit suckers [1,2,5]. Findings in this study showed that the occurrence of this anomaly was seen in 33.3-80% of children in the different age groups, declining in frequency with increase in age ( $P < 0.05$ ). When compared with findings among Nigerian schoolchildren in the general population where 4.6-7.4% were observed to have anterior open bite [24-26]. Findings of the present study show a great increase in the occurrence of this occlusal anomaly.

Anterior open bite in children with the digit sucking habit may be of dental or skeletal origin. Larson and Ronnerman reported that it occurs as a result of reduced alveolar development rather than intrusion of teeth [16]. Less frequently, digit sucking can alter the angulation of the maxillary plane causing downward movement from the anterior region with upward movement from the posterior region resulting in increased lower facial height [27]. In addition the body of the mandible has been noted to bend in a downward and backward direction relative to the ramus [2].

The prevalence of unilateral crossbite among all children was 8.6% which does not differ greatly from findings in the general population where cross bite values of 3-8% have been observed among Nigerian children. [24,28,29]. These findings are in agreement with those of Larsson who reported that the prevalence of crossbite in a group of children with prolonged finger sucking did not exceed that which was normal for that age group [30]. Another study on posterior crossbite showed that the majority of patients with this anomaly did not have a history of pacifier or finger sucking [31].

Incisal proclination seen in 48-66% of children in the different age groups shows that this too is a frequently occurring anomaly associated with the digit sucking habit. Reports from a previous study on 4-15 year old Nigerian schoolchildren showed that incisal proclination occurred in only 25.2% of children with no oral habits. This number doubled (50.3%) among those with oral habits [10]. The position of the digit in the mouth as well as associated lip habits could lead to the occurrence of this anomaly among digit suckers. It has been observed that the horizontally directed force component from the digit being sucked results in anterior displacement of the maxillary incisors leading to their proclination [5]. Cephalometric studies have also shown that the maxillary incisors were significantly more proclined in the digit sucking group when compared to non-suckers [27].

Incisor retroclination, seen in 36% of children in this study, is believed to occur due to increased lower lip activity during sucking [5]. However, in contrast, some studies have shown that lower incisor proclination may also occur. This is usually due to pressure from the tongue against the lingual surface of the lower incisors during sucking activity [2,17,32].

Lip incompetence was observed in 33-56% of children in the different age groups. Compared to findings in the general population of 5.1% there is a significant increase in its occurrence among this group [33]. Bowden also noted an increased incidence of lip incompetence and lower lips functioning under the upper incisors among digit suckers [34]. The presence of lip incompetence may also lead to attempts by the tongue to create an oral seal and an abnormal swallow as seen in some digit suckers [35].

In a previous study it was observed that the proportion of Skeletal 2 relationships was higher among digit and dummy suckers than among non-suckers [34] while Brenchley concluded that from evidence obtained during his study the skeletal pattern of a growing child can be modified by the digit sucking habit [17]. In this study 15-35% of the children examined were determined to have Class 2 skeletal pattern. This is significantly higher than that seen in a normal population where only 4.2% of children were determined to have this skeletal pattern [33].

Early cessation of the digit sucking habit often results in spontaneous correction of associated anomalies [3,35]. However, when the sucking habit is prolonged beyond the pubertal growth spurt, spontaneous correction is not likely to

occur [5]. The age of 4-5 years has been reported as a suitable time at which to proceed with steps to break the habit if it has not ceased by then [1,2,13].

### Conclusion and recommendations

Results of this study have shown that malocclusion is a frequent result of the digit sucking habit (especially when prolonged). The most frequently seen anomalies include increased-overjet, anterior open bite and upper incisal proclination.

In an era when there is noticeable increase in the digit sucking habit, attempts must be made to increase social awareness on the detrimental effects of the habit on the occlusion. The use of alternative non-nutritive sucking methods, e.g., pacifier - the use of which has a reduced tendency to become prolonged - may be introduced if necessary.

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