

Digit Sucking Habit, Prevalence and Effects on Occlusion in 7-12 Year Old School Children In Benin City, Nigeria

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ABSTRACT

Objective: Digit sucking (thumb and finger sucking) is one of the most common forms of non-nutritive sucking. It is a topic of interest in many fields, including psychology, paediatrics, speech therapy and dentistry, due to its frequent dentofacial manifestations. The objective of this study was to determine the prevalence of digit sucking habit in 7-12 years old school children in Benin City and identify the effect of the habit on the occlusion.

Methods: This was a descriptive cross-sectional study. A total of 650 school children selected by a multistage sampling technique were interviewed and examined for digit sucking habit and occlusion.

Results: The prevalence of digit sucking habit was 11.5%. There was a significant decrease in prevalence of the habit with increasing age ($P < 0.05$). There was a statistically significant relationship between digit sucking and posterior crossbite ($P < 0.05$). There was also a statistically significant relationship between digit sucking and anterior open bite ($P < 0.05$) and increased overjet ($P < 0.05$), there was however no significant relationship between digit sucking habit and molar relationship (Angle's).

Conclusion: The significant relationship between digit sucking habit and occlusion (posterior crossbite, anterior open bite and increased overjet), suggest the need for early identification of this habit in children and early intervention. The education of mothers on the deleterious effects of digit sucking habit is suggested as well as regular orthodontic assessment for children who are five years and older.

Keywords: Digit sucking habit, occlusal effects, 7-12 years old.

INTRODUCTION

One of the contributory factors in the establishment of occlusion in the child is oral habits, a point documented in several studies (Janeric & Carlos, 1968; Hansen et al., 1970; Onyeaso & Sote, 2001; Bahammam, 2020). Habits are formed reactions that are resistant to change (Peterson and Schneider, 1991). Of all habits, the oral group has been found to be the most prevalent among children (Subtenly & Subtenly, 1973).

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These include thumb/finger sucking, tongue thrusting, bruxism, pacifier, lip and tongue sucking, mouth breathing and fingernail biting (Subtenly & Subtenly, 1973). In infancy and early childhood, thumb and finger

sucking is considered the most common of habits (Johnson & Larson, 1993; Friman & Schmitt, 1989).

Habit is defined as an automatic response to a specific situation acquired normally as a result of repetition and learning. At each repetition, the act becomes less conscious and if repeated often enough, may result in an unconscious habit (Arathi, 2012). Digit sucking was defined as the placement of the thumb/one or more fingers in various depths into the mouth (Arathi, 2012). Digit sucking (thumb and finger sucking) is one of the most common forms of non-nutritive sucking (Johnson and Larson, 1993; Schneider and Peterson, 1982). It is a topic of interest in many fields including Psychology, Paediatrics, Speech therapy and Dentistry, due to its frequent dentofacial manifestations (daCosta & Orenuga, 2003). At birth, non-nutritive sucking is related to rooting and sucking reflexes (up to 12 months of age) (Josell, 1995; daCosta & Orenuga, 2003). Up to the age of 2 to 3 years, sucking is considered a normal developmental response (Klein, 1971; Fletcher, 1975; Reddy & Dawjee, 2019). After this, it is considered a learned habit (Johnson & Larson, 1993; Josell, 1995). The habit is considered prolonged when it is continued up to the age of 7 years and beyond (Larson, 1971; daCosta & Orenuga, 2003). Although it is mostly believed that sucking habit begins as an adaptive response which eventually becomes a learned habit, there still exists some evidence in the minority of patients that prolonged sucking habit is maintained by some underlying psychological or emotional disturbances (Klein, 1971).

In Nigeria, an initial study on digit sucking habit showed a very low prevalence (2.1%) in 10-15 year olds (Isiekwe, 1984). Studies carried out over a decade later have shown a marked increase in prevalence to 16.9% (Nnachetta, 1996) and 18.3% (Quashie-Williams et al., 2010). Previous reports have observed no gender differences in the distribution of sucking habits during infancy (Honzig & Mckee, 1962). However, from early childhood it has been reported to be stronger, more persistent and more widespread in girls than in boys (Honzig & Mckee, 1962; Ayer & Gale, 1970; Gelline, 1978; Shoaf, 1979; Johnson & Larson, 1993). Previous studies in Nigerian children (Nnachetta, 1996; Onyeaso & Sote, 2001; Quashie-Williams et al., 2010), showed that males had a slightly higher prevalence than females. These findings however, were not statistically significant.

Previous study by Adegbite et al. (2012) in 5-12 years old Nigerian children showed a 12.7% prevalence in those with digit sucking habit, children 5-7 years old showed a prevalence of digit sucking habit of 16.6%, 8-10 years old children showed a prevalence of digit sucking habit of 12.3%, while 11-12 years old children showed a prevalence of 6.5%. The prevalence of the habit was observed to be significantly lower in the older age group (Adegbite et al., 2012).

The deleterious effects of thumb and finger sucking habits and their treatment modalities have been documented (Graber, 1959; Davidson, 1967; Basavaraj, 2011). If the habit is discontinued well before the permanent incisors erupt, no residual damage to the alignment or occlusion of teeth is likely to result (Graber, 1959; Basavaraj, 2011; Reddy & Dawjee, 2019). In the first 3 to 4 years of life, the damage to the occlusion is largely confined to the anterior segment. This damage is usually temporary, provided the child starts with a normal occlusion (Reddy & Dawjee, 2019). Following cessation of the habit, there is generally some spontaneous correction in the form of reduction in open bite and maxillary incisor proclination. It is advisable to intercept the habit between the age of four years and eruption of permanent incisors at ages 6 to 7 years (Graber, 1959; Davidson, 1967; Basavaraj, 2011). The severity of displacement of the teeth and investing tissue depends on the trident conditioning factors- duration, frequency of indulgence and intensity of force (Graber, 1959; Davidson, 1967; Proffit et al., 2018; Bahammam, 2020).

The effect of persistent or prolonged digit sucking on the inter-arch relationship includes, increased overjet which is due to the flaring of upper incisors and retroclination of lower incisors, decreased overbite and anterior open bite (Otuyemi & Noar, 1997; Al-Kinane & Al-Dahan, 2019). Anterior open bite is caused by interference of normal incisor eruption by the interposed digit, excessive eruption of the posterior teeth due to separation of the jaws, opens up the bite further (Otuyemi & Noar, 1997; Al-Kinane & Al-Dahan, 2019;). Previous study (Schneider & Peterson, 1982) among children with digit sucking habit identified incomplete overbite or anterior open bite, an increased overjet and a higher incidence of Class II canines and molars, narrowing of the maxillary arch and increased mandibular arch width resulting in posterior crossbite. Mistry et al. (2010) reported that reduced overbite was higher in digit sucking group when compared to the control group. They also observed a higher prevalence of anterior open bite among the digit sucking group. Previous study (daCosta & Orenuga, 2003) in Nigerian children 3-11 years old and above with digit sucking habit, showed an increased overjet in 63-75 % of the children, while the recurrence 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 the study population. A previous study by Quashie-Williams et al. (2010) in Nigerian children showed increased overjet in 33% of the habit children, those without digit sucking habit recorded an increased overjet in 25.3%. Anterior open bite was observed in 12.5% of habit children and 3.1% of non-habit children. There was statistically significant difference in the occurrence of upper incisor proclination and lower incisor retroclination in the digit

sucking group when compared to the non-sucking group. Posterior crossbite was observed in 1.9% of the habit group and 1.5% of the non-sucking group. The difference was not statistically significant. Ize-Iyamu & Isiekwe (2012), in a study in 2-5 year old Nigerian children recorded a prevalence of 33% for thumb sucking habit and 26.6% for finger sucking habit, anterior open bite was present in 51.7% of girls with sucking habits while in boys it was 48.3%. Previous study (Adegbite et al, 2012) in a study in 5-12 year old Nigerian children recorded a prevalence of 16.6% for digit sucking habit, posterior cross bite was present in 5.5% of those with digit sucking habit and 1.2% in non-sucking group, anterior open bite was present in 16.9% of those with digit sucking habit and 5.2% of non-sucking group, overjet was increased in 40.9% of digit sucking group and it was 28.6% of non-sucking group. The purpose of this study was to determine the prevalence of digit sucking habit in 7-12 year old school children in Benin City, Nigeria and identify the effect of the habit on occlusion.

MATERIALS AND METHODS

This cross-sectional study was carried out in the 4 local government areas in Benin City which were Egor, Ikpoba Okha, Oredo and Ovia North East local government areas. The multi stage sampling method was applied in selecting the schools from the four local government areas comprising Benin City. A list of all the primary and secondary schools in the local government areas was made from which 16 schools were selected by simple random sampling. Four schools were selected from each local government (2 primary which includes 1 public and 1 private; 2 secondary which also includes 1 public and 1 private). The children were selected by simple random sampling after stratifying them by class, age and sex.

Sample size determined by using the highest prevalence rate of 17% from a similar study on digit sucking habit in Nigeria (Quashie-Williams et al 2010), and a formula for a prevalence study (Sofoluwe, 1996), $n = z^2 p(1-p)/d^2$ where n is sample size, z is 1.96, p is prevalence rate which is 17% (0.17) while d is the error margin of 5% with a preset confidence level of 95%. This gave a minimum sample of 217. In order to improve representation, a sample of 650 school children was applied in this study. The questionnaire for data collection included demographic characteristics, particularly age, sex and level of education. The informants were the child's parent or caregiver. The child and parent or caregiver were questioned about the presence of a digit sucking habit. The school authorities informed the parents or caregivers about this study and each questionnaire and a consent form was sent to them at home through the school authority. Oral examination was carried out in all selected children in the school premises under bright

light. The questionnaire including the oral examination was pre-tested in a pilot study in the largest local government area using 65 children under similar conditions to that used in this study. The intra-examiner reproducibility was assessed by re-examination of 65 children randomly selected school children two weeks apart, after their selection. The kappa score was 0.80 indicating a good agreement.

Inclusion criteria included children aged between 7 and 12 years with and without digit sucking habit, consent from parents or caregiver and child, no previous orthodontic treatment. Exclusion criteria included those with loss of anterior teeth due to trauma, extraction or physiological loss and attrition, previous orthodontic treatment, outside the age range, lack of consent from parent or caregiver and child.

An intra oral examination was carried out by one investigator (JNO) to assess the occlusal characteristics in the children selected for the study. Instruments used include disposable plastic metre rule, disposable sterile gloves and wooden spatulas. Angle's classification (Angle, 1899) was used to determine the posterior-anterior relationship of the jaws and to classify the occlusion of the participants. The horizontal relationship of the upper and lower incisors, with the teeth in centric occlusion, was measured from the labial surface of the lower incisor, to the labial surface of the upper incisor. The distance measured in mm as the overjet using a metre rule. Any value above 3mm was taken as an increased overjet and less than 1mm as reduced overjet (Isiekwe, 1986).

The overbite is the vertical relationship between the upper and lower incisors in centric occlusion and was measured using the degree of upper incisal coverage of the lower incisors (Isiekwe, 1989). It was regarded as reduced, if the coverage was less than one third of the crown of the lower incisors and increased if it was more than one half. It was regarded as an open bite, if there was an actual vertical gap between the upper and lower incisors (Isiekwe, 1989).

A study participant was diagnosed as having buccal crossbite, if the buccal cusps of the maxillary molars did not occlude buccal to those of the mandibular molars while the lingual cusps of the maxillary molars did not occlude in the fossae of the lower molars.

Data entry and analysis was carried out using Statistical Package for the Social Sciences, Chicago (SPSS) version 20. Frequency distribution was generated for all variables, measures of central tendency and dispersion were generated for numerical variables. P value ($P < 0.05$) was regarded as significant.

This research was approved by the Research Ethics Committee of the University of Benin Teaching Hospital, protocol number ADM/E22/A/VOL VIII/1216. Participants in this study experienced no direct benefit and no compensation was paid to them.

RESULTS

A total of 650 children from private and public primary and secondary schools from the four local government areas in Benin City constituted the study population. There were 247 children between the ages of 7-8 years, 244 were between the ages of 9-10 years and 159 were between the ages of 11-12 years (Table 1).

Table 2 shows the gender distribution of study population. 351 (54.0%) were males and 291 (46.0) were females. 75 children engaged in digit sucking habit, 40 (53.3%) were females and 35 (47.7%) were males. 259

(45.0%) females did not engage in the digit sucking habit and 316 (55.0%) males did not engage in digit sucking habit.

Table 3 shows the relationship between digit sucking habit and age. 38 (15.4%) of 7-8 years old children were involved in digit sucking habit, 27 (11.2%) of 9-10 years old children indulged in the habit, while 10 (6.4%) of 11-12 years old children indulged in the habit. This showed a significant decrease in the prevalence of digit sucking habit with increasing age ($P < 0.05$).

Table 1: Socio-demographic distribution of study population

Variable	Frequency (n)	Percent (%)
Age (years)		
7-8	247	38.0
9-10	244	37.6
11-12	159	24.4
School Type		
Private	273	42.0
Public	377	58.0
Total	650	100.0

Table 2: Gender Distribution of Study Population

Gender	Digit Sucking		Non Sucking		Total	
	n	%	n	%	n	%
Male	35	47.7	316	55.0	351	54.0
Female	40	53.3	259	45.0	299	46.0
Total	75	100.0	575	100.0	650	100.0

$P > 0.05$

Table 3: relationship between digit sucking habit and age

Age (years)	Digit Sucking		Non Sucking		Total	
	n	%	n	%	n	%
7-8	38	15.4	209	84.6	247	38.0
9-10	27	11.2	217	88.8	244	37.6
11-12	10	6.4	149	93.6	159	24.4
Total	75	11.5	575	88.5	650	100.0

$P < 0.05$

Table 4 showed the Molar relationship (Angle's Class) in the study population. 58 (78.0%) with digit sucking habit and 426 (74.0%) without digit sucking habit had Class I Molar relationship. 15 (20.0%) with digit sucking habit and 92 (16.0%) without digit sucking habit had Class II div 1 Molar relationship. 11 (2.0%) without digit sucking habit had Class II div 2 Molar relationship. 2 (2.0%) with digit sucking habit and 46 (8.0%) without the habit had Class III Molar relationship. There was no significant difference in the Molar relationship in both groups ($P > 0.05$).

Table 5 shows the relationship between digit sucking habit and posterior crossbite. 4 (5.6%) with digit sucking habit and 7 (1.3%) without digit sucking habit

had posterior crossbite, the difference was statistically significant ($P < 0.05$).

Table 6 shows the relationship between digit sucking habit and overbite. 13 (17.2%) with digit sucking habit and overbite. 13 (17.2%) with digit sucking habit had anterior open bite, while 31 (5.3%) without digit sucking habit had anterior open bite, the difference was statistically significant ($P < 0.05$).

Table 7 shows the relationship between digit sucking habit and overjet. 31 (41.0%) with digit sucking habit and 167 (29.0%) without digit sucking habit had increased overjet, the difference was statistically significant ($P < 0.05$).

Table 4: Molar Relationship (Angle's Class) of Study Population

Molar Relationship (Angle's Class)	Digit Sucking		Non Sucking	
	n	%	n	%
Class I	58	78.0	426	74.0
Class II Division I	15	20.0	92	16.0
Class II Division 2	0	0.0	11	2.0
Class III	2	2.0	46	8.0
Total	75	100.0	575	100.0

P>0.05

Table 5: Relationship between Digit Sucking and Posterior Crossbite

Posterior Crossbite	Digit Sucking		Non Sucking	
	n	%	n	%
Present	4	5.6	7	1.3
Absent	71	94.4	568	98.7
Total	75	100.0	575	100.0

P<0.05

Table 6: Relationship between Digit Sucking and Overbite

Digit Sucking	Complete		Incomplete		Anterior Open Bite		Total	
	n	%	n	%	n	%	n	%
Present	44	59.2	18	23.6	13	17.2	75	11.5
Absent	469	81.6	75	13.1	31	5.3	575	88.5
Total	513	78.9	93	14.3	44	6.8	650	100.0

P<0.05

Table 7: Relationship between digit sucking and Overjet

Digit Sucking	Normal		Reduced		Increased		Total	
	n	%	n	%	n	%	n	%
Present	38	51.4	6	7.6	31	41.0	75	11.5
Absent	376	65.4	32	5.6	167	29.0	575	88.
Total	414	63.7	38	5.8	198	30.5	650	100.0

P<0.05

DISCUSSION

The prevalence of digit sucking habit in 7-12 years old children in this study was 11.5%. Previous Nigerian studies in different age groups showed different prevalence values. Nnachetta (1996), in a study in 6-12 years old Nigerian children showed a prevalence of digit sucking of 16.9%. Quashi-Williams et al. (2010) in a study among 4-15 years old Nigerian children showed a prevalence of digit sucking habit of 17%. Adegbite et al. (2012) in a study among 5-12 years old Nigerian children showed a prevalence of digit sucking habit of 12.7%.

This study showed a prevalence of digit sucking habit of 15.4% in children 7-8 years old, 11.2% in children 9-10 years old and 6.4% in children 11-12 years old. The difference in the age groups was statistically significant. Adegbite et al. (2012) recorded a prevalence in digit sucking habit of 16.6% in children 5-7 years old, 12.3% in children 8-10 years old and 6.5% in children 11-12 years old. The difference in the prevalence among the age groups was statistically

significant, which is a similar finding in this study. The significant reduction in the prevalence of the habit as the children get older may be because as children get older a lot of them discontinue the habit. Peer pressure from their colleagues in school who jeer at them when they indulge in the habit may help in reducing the prevalence as they get older.

In this study, females showed a higher prevalence of digit sucking habit which is similar to previous studies (Honzig & Mckee, 1962; Ayer & Gale, 1970; Gelline, 1978; Shoaf, 1979; Johnson & Larson, 1993). Previous studies (Nnachetta, 1996; Onyeaso & Sote, 2001; Williams et al, 2010) among Nigerian children showed that males had a slightly higher prevalence than females, which was not statistically significant.

In this study, 15 (20%) of children with digit sucking habit had Class II div1 Molar relationship while it was 92 (16%) of children without digit sucking habit, there was no statistically significant difference between both groups in Molar relationship. This is at variance with a previous study (Schneider & Peterson, 1982) which

recorded significant Class II Molar relationship in children with digit sucking habit.

This study showed that, 4 (4.6%) of children with digit sucking habit had posterior crossbite, while 7 (1.3%) of children without the habit had posterior crossbite which was statistically significant. This is similar to findings from previous studies (Schneider & Peterson, 1982; daCosta & Orenuga, 2003). Previous study (Quashie-Williams et al, 2010) showed no statistically significant difference in occurrence of posterior crossbite in children with and without digit sucking habit.

This study showed that 13 (17.2%) of children with digit sucking habit had anterior open bite while 31(5.3%) of those without the habit had anterior open bite. The difference was statistically significant. This was a similar finding from previous studies (Schneider & Peterson, 1982; daCosta & Orenuga, 2003; Quashie-Williams et al, 2010' Al-Kinane & Al-Dahan, 2019).

In this study, 31 (41.0%) of children with digit sucking habit had increased overjet, while 167 (29.0%) of children without the habit had increased overjet. The difference was statistically significant. This was a similar finding in previous studies (Schneider & Peterson, 1982; daCosta and Orenuga, 2003; Quashie-Williams et al., 2010; AL-Kinane & Al-Dahan, 2019).

CONCLUSION

In conclusion, the prevalence of digit sucking habit among 7-12 years old children in Benin City was 11.5%, there was significant difference in the occurrence of posterior crossbite, increased overjet between children with and without digit sucking habit, which was similar to findings from previous Nigerian studies.

Source of support

None

Conflict of Interest

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Author Guidelines