

## Oral Habits and Occlusal characteristic in Preschool Children in Khartoum State

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### Abstract

**Background:** Habits are acquired automatisms, represented by an altered pattern of muscle contraction with complex characteristics, which proceed unconsciously and in a regular basis.

**Objectives:** To determine the prevalence of oral habits in preschool children 2-5 years old and to assess the correlation between habits and malocclusion.

**Material and method:** A cross-sectional study conducted by questionnaire and clinical examination for 417 preschool children aged 2-5 years using a stratified cluster random sampling technique. Chi-square test in SPSS was used for statistical analysis.

**Results:** Thumb sucking habit is the most common occurrence of oral habit (23.7%), followed by mouth breathing (11.5%), pacifier sucking (10.1%) and tongue thrust (4.3%). All the habits were more frequent among 4 years of age. Anterior open bite was found to be (31%) and high significant value with thumb sucking and mouth breathing (P-value=0.000). A significant difference was recorded between thumb and pacifier sucking habit and cross bite (P-value=0.00).

**Conclusion:** Oral habits among a sample of Sudanese preschool children were found to be very frequent 48.9%. Education program should be established for parents and preschool teachers about the sound effects of oral habit on occlusion.

**Keywords:** Oral habits; Thumb sucking; Mouth breathing; Preschool children

### Introduction

Oral habits are acquired automatisms, represented by an altered pattern of muscle contraction with complex characteristics, which proceed unconsciously and in a regular basis. Some habits occur in the oral region and may have harmful effects on health, promoting changes in dental, bone and muscle tissues [1].

The severity of habits determined by intensity, frequency and duration of in appropriate pressure [2]. Oral habits, especially if persist beyond the preschool age; have been implicated as an important environmental etiological factor associated with the development of malocclusion [3-5].

Malocclusion can be defined as an occlusion in which there is abnormal relationship in a vertical, horizontal, or transversal dimension or in which there are abnormal tooth positions beyond the acceptable range of normal limits [6].

Nutritive sucking habits are breast and bottle feeding, whereby the infant obtains food, or through non-nutritive sucking on objects such as digits, pacifiers, or toys that may serve primarily to satisfy psychological needs. These behaviors are normal in infants and young children, prolonged duration of such behaviors may have consequences in regard to the developing oro-facial structures and occlusion [7].

The prevalence of nonnutritive sucking habits among preschool children found in the previous literature 17% [8] to 50% [9]. This high percentage is commonly linked with some social factors; family income, parents' educational level, and difficult access to dental services [10].

Sucking habit is one of the most common reflexes seen in infants. It manifests when they are in intrauterine life around 29 weeks of

age. This is the first pattern of behavior observed in infant and may use finger, thumb, pacifiers, or other objects to feel secure and learn the outside world. Sucking habit is commonly seen when the child is anxious, insecure or surrounded by strangers and in families when they are separated from their parents. Sucking habit induces sleep and hence makes infant and child calm and relaxed [11].

The habits are normal up to 2-4 years of age. It becomes a concern when continued for longer time and even seen in mixed dentition phase. This is the first sign for child to manifest future malocclusion or discrepancy during mixed dentition. It has been documented that parental education, child's nutrition, and sucking habits are associated with each other [12].

The effect of prolonged sucking habit in children may result in anterior open bite, increased over jet, lingual inclination of lower incisor and labial inclination of maxillary anterior, posterior cross-bite, deep palate, compensatory tongue thrust, and sometimes speech defect [13].

Management of oral habits should be directed for correction of the underlying problem. Thumb sucking that persists beyond the age of six

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years should be treated. Behavioral conditioning techniques, positive reinforcement and dental appliances are important aspects of treatment [14].

Tongue thrust an abnormal tongue position and deviation from the normal swallowing pattern, and mouth breathing may be associated with anterior open bite, abnormal speech, and anterior protrusion of the maxillary incisors [15].

A wide range of tongue thrust incidence has been reported in the literature. Tulley [16] reported an incidence of 2.7%, while Bell and Hale [17] found 74% of children in grades 1 through 3 to be tongue thrusters.

The prevalence of tongue thrusting decreases with increasing age. Various epidemiological studies have reported prevalence of tongue thrusting to be 40-80% in children between age 4 and 6 years [18] and 3-25% for children between age 12 and 15 years [19].

Most frequent signs of tongue thrusting are said to be forward tongue posture and tongue thrusting during swallowing, contraction of the perioral muscles (hyperactive mentalis and orbicularis oris), excessive buccinator hyperactivity, and swallowing without the momentary tooth contact normally required [20]. Management may consist of simple habit control, myofunctional therapy, habit appliances, orthodontics, and possible surgery [21].

Mouth breathing habits may occur as a result of adenoid and tonsil hypertrophy, rhinitis, nasal septum deviation; it may lead to postural changes such as lowered position of the mandible, raised position of the head, low posture of the hyoid bone and anterior inferior position of the tongue. Paul and Nanda state that "the mouth breathing produces deformities of the jaws, inadequate position or shape of the alveolar process and malocclusion and results in the development of "adenoidal faces" or "long face syndrome" [22]. The prevalence of mouth breathing varies from 5% to 75%. As to gender, there is a slight predominance in females when compared to the males [23].

Childhood is imitated reflecting the propensities of adulthood and primary dentition is the indicator for future normal permanent dentition. Normal development of deciduous dentition leads to appropriate esthetics, speech mastication and maintain the perfect occlusion and spacing for the successor permanent dentition.

Identification of oral habits and assessment of its site effects on the dentition and orofacial structure should be recognized as early as possible for prevention and interception of malocclusion. The literatures was rich with studies concerning different types of oral habits their prevalence, effect on occlusion and treatment among different population [24-32].

Therefore, the present study has been designed to identify the prevalence of oral habits and its effect on the development of normal occlusion in 2-5 year's old preschool Sudanese children in Khartoum area.

## Methodology

Permission to carry out the study was obtained from the University of Medical Sciences and technology (UMST) and the head master of selected school consents with covering letter explaining the nature of the study was sent through head master of the preschool to parents to be completed and recollected after one week.

A list of the kindergartens in Khartoum state was obtained from the Ministry of Education of preschool education section.

The sample size was calculated from the equation below the sample size was found to be 417 preschool children, which randomly selected from 11 preschools in Khartoum state.

## Sampling size

The sample size was calculated through the following formula:

$$n = \frac{z^2 pq deff}{(d^2)}$$

Where:

n=the sample size.

z=the critical value from standard normal distribution that achieve 95% confidence level 1.96.

p=key indicator (prevalence rate) which is always chosen from previous studies (35%).

q=1-p.

d=the desired margin of error 6%.

Deff=design effect which an indicator used when applying complex sampling design it always take value from 1.5 to 2.

By applying the above formula, the sample size will be 417 child.

All children whose parents have completed and retained the questionnaire were included in the study.

The following information was obtained through the parent questionnaire: demographic information; such as child's age, gender and child rank in the family.

Questions about the child's past or present oral habits which expressed in terms of the type of habit (digit or pacifiers sucking, tongue thrust and mouth breathing), duration of the habit and if he/she continue or stop the habit and duration of habit during the day.

The intraoral examination for the children whose parents agree to participate in the study were performed in the teacher office in day light, while the child is sitting in an up-right position in front of the examiner and biting in maximal intercuspation, using mouth mirror, gloves and masks in compliance with the international standards of infection control protocol.

The following parameters were recorded [33]:

Terminal plane relationship of the primary second molars, recorded as flush, mesial or distal on each side.

1. Primary canine relationship recorded as class I, II or III on each side.
2. Degree of overbite was recorded as normal (less than or equal to 50%, greater than 50% overlap, or edge to edge relationship) or anterior open bite.
3. Amount of over jet measured from the lingual surfaces of the mesial corner of the most protruded maxillary incisor to the facial surface of the corresponding mandibular incisor recorded in millimeters (over jet, equal or more than 4mm was designated as increased over jet).
4. Presence or absence of posterior cross bite (either unilateral or bilateral); recorded when one or more of the maxillary primary molars occluded palatally to the buccal cusps of the opposing mandibular teeth.

### Statistical analysis

Data were entered into master sheet in computer and analyzed using statistical package of social science (SPSS) version 18.0 Descriptive statistics includes tables and graphs. Chi square test was applied to test the associations between habits and gender, age of the child.

### Results

A total 417 children were examined 211 (51%) girls and 206(49%) boys selected from 11 kindergartens from Imtidad and Al Mansheia regions in Khartoum city Figure 1.

Figure 2 show the age distribution of the examined children (n=417), the majority of children were found on the age 4 years (40%). And few children are 2 years old (4.3%).

It clear from Figure 3 that thumb sucking habit is most frequent type of oral habit (23.7%) followed by mouth breathing (11.5%) and the tongue thrust is the least of oral habit occurrence (4.3%).

Figure 4 showed ongoing habit practicing by the child, and it cleared that (27%) of the children are still practicing the bad habits.

Table 1 was show that 54% of children were practicing the habit almost all of the day, while (13%) of them practicing the habit during watching TV.

Correlation between oral habits and age among the boys was shown in Table 2, most of habit are more frequently at age 4 years of age (thumb and pacifier sucking, mouth breathing) and there was a significant difference between the sucking habits and age groups

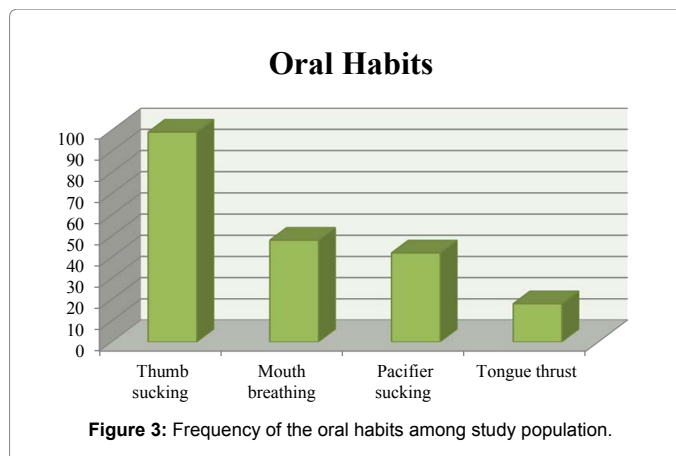


Figure 3: Frequency of the oral habits among study population.

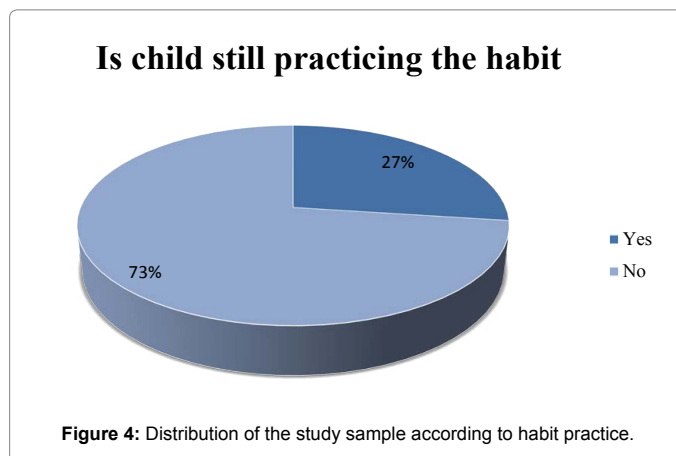


Figure 4: Distribution of the study sample according to habit practice.

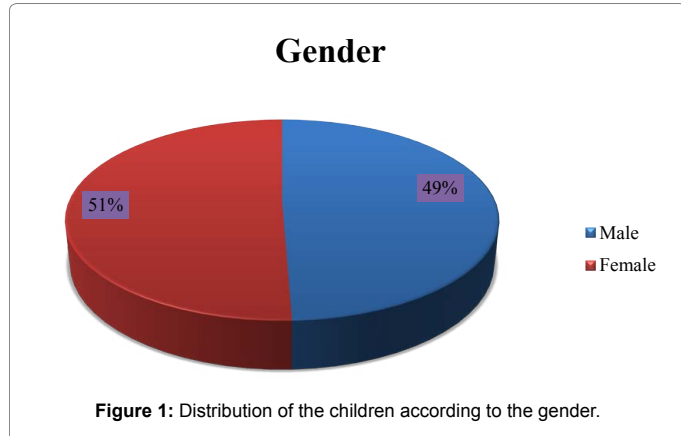


Figure 1: Distribution of the children according to the gender.

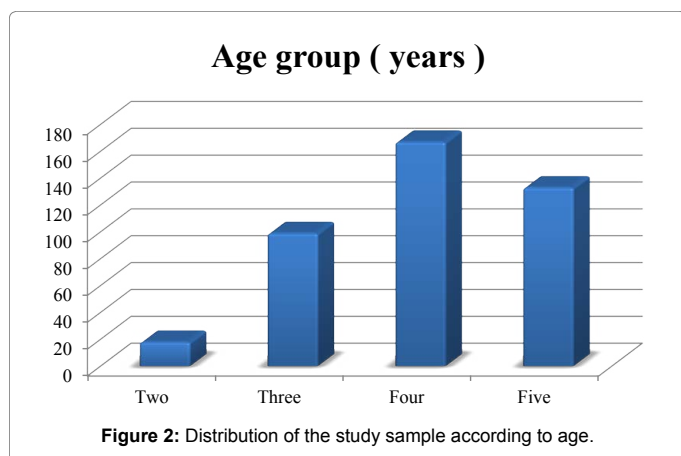


Figure 2: Distribution of the study sample according to age.

If yes, what the periods	Frequency	Percent
All the day	61	54%
During sleeping	37	33%
During watching TV	15	13%
Total	113	100%

Table 1: Distribution of the study sample according to the period of habit practice.

Table 3 showed correlation between oral habit and age group among girls, most oral habit are found at age 5 years (tongue thrust and mouth breathing), whereas thumb sucking was more common at age 4 years old and the pacifier sucking at 3 years. A significant difference was recorded between Thumb and pacifier sucking habits and mouth breathing and age group.

Figure 5 showed the occlusal characteristic and it cleared that (77%) of the examined children were found to have mesial step, whereas (20%) had straight terminal plane relationship and only (3%) had distal step.

Figure 6 showed (75%) of the examined children were found to have CI I primary canine relationship, whereas (23%) of them showed CI III.

The Figure 7 showed the majority of examined children had normal over jet (1-3 mm) in (69%) of children, where as the rest had increased (>4 mm).

Figure 8 showed that 6% of examined children had Cross bite, while the rest are free from it.

Oral Habit		Boys				Chi square p value
		Age (Years)				
		2 years	3 years	4 years	5 years	
Thumb sucking	Yes	6 (2.90%)	7 (3.40%)	14 (6.80%)	9 (4.40%)	0.001
	No	3 (1.50%)	46 (22.30%)	67 (32.50%)	54 (26.20%)	
Pacifier sucking	Yes	5 (2.40%)	5 (2.40%)	8 (3.90%)	2 (1.00%)	0.000
	No	4 (2.00%)	48 (23.40%)	73 (35.10%)	61 (29.80%)	
Tongue thrust	Yes	0	1 (0.50%)	3 (1.50%)	7 (3.40%)	0.096
	No	9 (4.40%)	52 (25.20%)	78 (37.90%)	56 (27.20%)	
Mouth breathing	Yes	0	5 (2.40%)	15 (7.30%)	12 (5.80%)	0.231
	No	9 (4.40%)	48 (23.30%)	66 (32.00%)	51 (24.80%)	

Table 2: Correlation between oral habits and age group among boys (206)

Oral Habit		Girls				Chi square p value
		Age (Years)				
		2 years	3 years	4 years	5 years	
Thumb sucking	Yes	6 (2.8%)	8 (3.80%)	25 (11.80%)	24 (11.4%)	0
	No	3 (1.40%)	38 (18.00%)	61 (28.90%)	46 (21.80%)	
Pacifier sucking	Yes	5 (2.40%)	9 (4.30%)	2 (0.90%)	6 (2.80%)	0.347
	No	4 (1.90%)	37 (17.50%)	84 (39.80%)	64 (30.30%)	
Tongue thrust	Yes	1 (0.50%)	2 (0.90%)	1 (0.50%)	3 (1.40%)	0.018
	No	8 (3.80%)	44 (20.90%)	85 (40.30%)	67 (31.80%)	
Mouth breathing	Yes	0	2 (0.90%)	3 (1.40%)	11 (5.20%)	0.018
	No	9 (4.30%)	44 (20.90%)	83 (39.30%)	59 (28.00%)	

Table 3: Correlation between the oral habits and age group among girls (211).

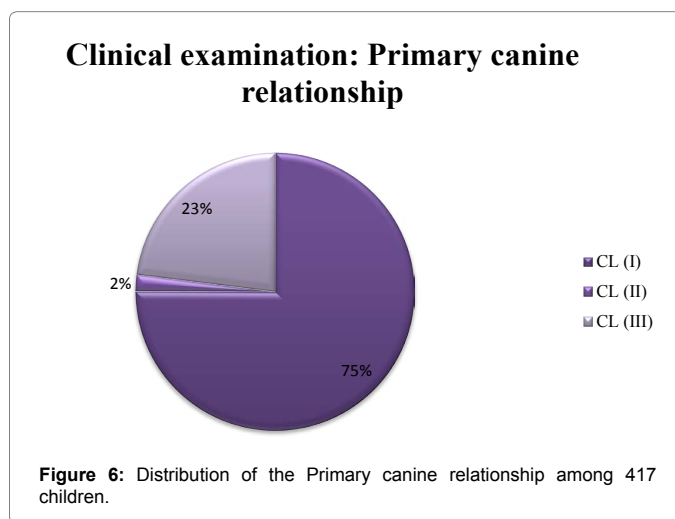
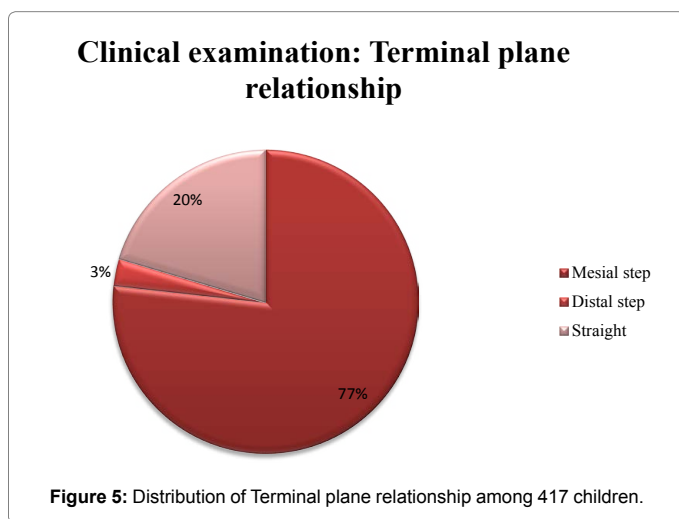
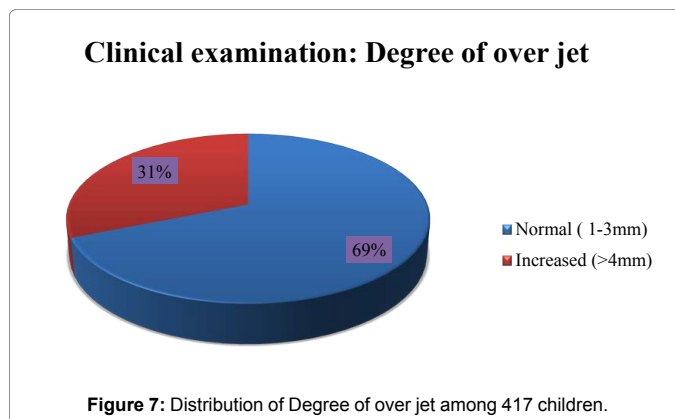
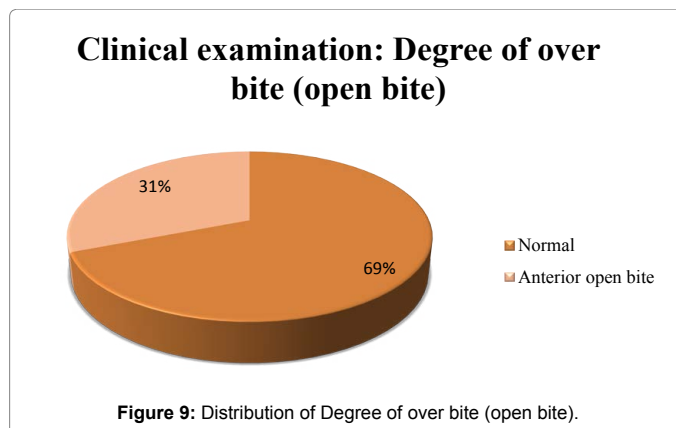
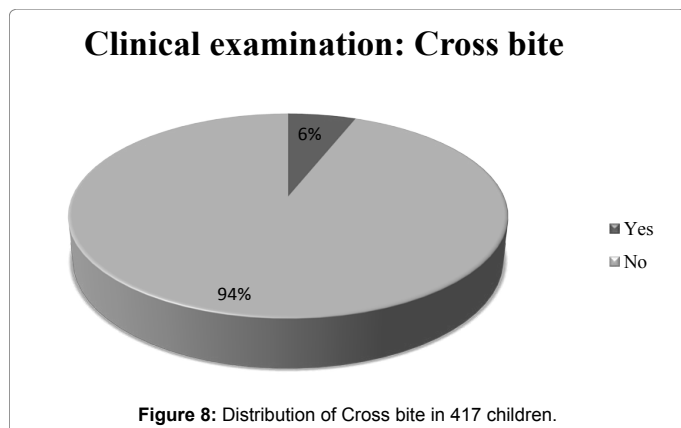


Figure 9 showed that (31%) of the children have anterior open bite, whereas the rest have normal over bite.

In Table 4 showed the correlation between the occlusal characteristic and age group, no significant differences were observed in relation to the age group and malocclusion in boys. Whereas in girls there was significant difference where observed between age group and primary canine relationship and anterior open bite Table 5.

Tables 6 and 7 showed correlation between thumb sucking and the terminal plane relationship, there is significant difference between the thumb sucking habit and terminal plane relation and increase of over jet (> 4 mm).





Clinical exam.		Boys				Chi square p value
		Age group (years)				
		2 years	3 years	4 years	5 years	
Ter. plane rel.	Mesial step	8 (3.90%)	43 (20.90%)	63 (30.60%)	53 (25.70%)	0.857
	Distal step	0	0	2 (1%)	1 (0.50%)	
	Straight	1 (0.50%)	10 (4.90%)	16 (7.80%)	9 (4.40%)	
1ry canine rel.	CI I	9 (4.40%)	39 (18.90%)	57 (27.70%)	47 (22.80%)	0.424
	CI II	0	3 (1.50%)	2 (1.00%)	0	
	CI III	0	11 (5.30%)	21 (10.20%)	16 (7.80%)	
	None	0	0	1 (0.50%)	0	
Degree of over jet	Normal (1-3mm)	8 (3.88%)	43 (20.87%)	57 (27.67%)	39 (18.93%)	0.643
	Increased (>4mm)	1 (0.48%)	10 (4.85%)	24 (11.65%)	24 (11.65%)	
Cross bite	Yes	0	1 (0.50%)	8 (3.90%)	5 (2.40%)	0.253
	No	9 (4.40%)	52 (25.40%)	73 (35.10%)	58 (28.30%)	
Degree of over bite (open bite)	Normal	8 (3.88%)	44 (21.36%)	56 (27.17%)	41 (19.90%)	0.143
	Anterior open bite	1 (0.48%)	9 (4.37%)	25 (12.13%)	22 (10.70%)	

Study population=206 (100.00%)

Table 4: Correlation between the occlusal characteristic and age group.

Occlusal characteristic		Girls				Chi square p value
		Age group (years)				
		2 years	3 years	4 years	5 years	
Ter. plane rel.	Mesial step	5 (2.40%)	39 (18.60%)	58 (27.60%)	51 (24.30%)	0.177
	Distal step	0	2 (1%)	4 (1.90%)	3 (1.40%)	
	Straight	4 (1.90%)	5 (1.90%)	24 (11.40%)	16 (7.60%)	
1ry canine rel.	CI I	9 (4.30%)	43 (20.40%)	59 (28%)	50 (23.70%)	0.007
	CI II	0	0	0	0	
	CI III	0	3 (1.40)	27 (12.80)	18 (8.5%)	
	None	0	0	0	2 (0.90%)	
Degree of over jet	Normal (1-3mm)	9 (4.26%)	39 (18.48%)	56 (26.54%)	36 (17.06%)	0.715
	Increased (>4mm)	0	7 (3.32%)	30 (14.21%)	34 (16.11%)	
Cross bite	Yes	0	1 (0.50%)	6 (2.80%)	4 (1.90%)	0.587
	No	9 (4.30%)	45 (21.30%)	80 (37.90%)	66 (31.30%)	
Degree of over bite (open bite)	Normal	9 (4.26%)	39 (18.48%)	56 (26.54%)	35 (16.60%)	0.000
	Anterior open bite	0	7 (3.32%)	30 (14.22%)	35 (16.60%)	

Study population=211 (100.00%)

Table 5: The correlation between primary canine relationship, anterior open bite and age group.

## Discussion

This is a cross-sectional study aimed to evaluate the oral habits among 417 preschool children (51%) girls and (49%) boys in Khartoum area. The most common perceived oral habits were found to be thumb sucking habit (23.7%), followed by mouth breathing (11.5%), and tongue thrust (4.3%).

Moreover, the prevalence of thumb sucking habit in the present study was found to be (23.7%). However, a high prevalence has been reported in previous studies; Bitola (35.4%) [29], Saudi Arabia (48.36%), [24] and Ireland (63%) [26].

In contrast, a very low percentage (1.7%) of thumb sucking habit



Terminal. plane rel.	Oral Habit (thumb sucking)		Total
	Yes	No	
Mesial step	66 (15.83%)	254 (60.91%)	320 (76.74%)
Distal step	4 (0.96%)	8 (1.92%)	12 (2.88%)
Straight	29 (6.95%)	56 (13.43%)	85 (20.38%)
Total	99 (23.74%)	318 (76.26%)	417 (100.00%)

Chi square p value=0.021

**Table 6:** The correlation between thumb sucking and the terminal plane relationship.

Over jet relation	Oral Habit (thumb sucking)		Total
	Yes	No	
N Normal (1-3mm)	30 (7.19%)	257 (61.78%)	287 (68.82%)
Increased (>4mm)	69 (16.55%)	61 (14.63%)	130 (31.17%)
Total	99 (23.70%)	318 (76.30%)	417 (100.00%)

Chi square p value=0.128

**Table 7:** The correlation between thumb sucking and the degree of over jet.

was found in India [28], (3.4%) among 3-6 years old children in Iran [30], and (8.1%) in Nigeria [31].

These differences of percentages can be attributed partially to the difference in the sample size, age of examined children as well as the environmental factors.

In the existing study, mouth breathing was found to be (11.5%); however, high prevalence (13%) was reported in India [28].

The prevalence of tongue thrust in the present study was found to be (4.3%). In comparison, a slightly higher percentage (5%) was found among study children in Iran [32]. A higher percentage was also instituted (17.4%) among Indian children [28].

In the current study, cross bite was found to be (6%) among children with thumb sucking habit. In contrast, a high prevalence (26%) of cross bites was reported in Sweden among pacifier sucking girls [25].

In this study, the percentage of anterior open bite was found to be (31%), in addition to a high significant value with thumb sucking and mouth breathing (P-value=0.000), whereas, a high percentage (42.4%) was reported among 3-5 years old children in Brazil. Anterior open bite is considered as one of the most commonly seen malocclusions among digital suckers. Furthermore, a significant value was established between thumb sucking and distal molar relation in Brazil. [27], in contrast is no significant difference in the present study between the sucking habits and increased over jet.

## Conclusion

Thumb and pacifier sucking were found to be almost 34.3% of the examined children in the age group 2 to 5 years old. The majority of children are practice the habits all day (54%), whereas (13%) practice the habit during watching TV.

In the terminal plane relation, most of the children (77%) had mesial step, whereas straight was shown by (20%) of the children.

The normal overjet was recorded in (69%) of the children, cross bite was seen among (6%). No significant difference between thumb and pacifier sucking habit and cross bite (P-value=0.57).

Degree of over bite (open bite) was reported in 31% of the children with significant relation between thumb sucking and mouth breathing (P-value=0.000).

## Recommendation

The findings of this study reveal that there is a great need of a well established oral health education program for the Sudanese preschool children as well as parents, pediatricians and teachers in order to provide a better effective and timely care to these children with oral habits thus decreasing the risk of dental and skeletal alteration associated with these habits and improve their knowledge and attitude toward dental awareness regarding the effect of oral habits on the development of normal occlusion and to benefit from preventive and interceptive orthodontic care.

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