The effects of thumb sucking habit on the development of malocclusions in preschool age children in Hilla city

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ABSTRACT

Background: habit is any purposeless action repeated unconsciously. It is a sign of lack of harmony between the subject and the surrounding environment. Deleterious oral habits such as finger sucking could be one of the etiological factors for altered oro-facial growth development. This study conducted to explore the association between finger sucking habit and malocclusion in deciduous dentition.

Materials and method: Totally 40 chronic thumb sucker and 40 controls matching in age and gender were enrolled in the study. A study conducted by verifying different occlusal trait through the intra-oral examination. Thumb sucking habit diagnosed using data gathered from parents.

Results: The statistical analysis showed a highly significant difference ($p>0.01$) in the occurrence of anterior open bite, increased over jet between study and controls, in addition to that thumb sucking habit increased the likelihood of development of anterior open bite, increased overjet and posterior cross bite by 39 folds, 40 folds and 3 folds respectively.

Conclusions: Thumb sucking habit found to be a risk factor for the development of anterior open bite and increased overjet.

Key words: Thumb sucking habit, anterior open bite, increased over jet, posterior cross bite. **(Received: 15/8/2016; Accepted: 12/12/2016)**

INTRODUCTION

Habit is a behavior that had been obtained through persistent repetition or physiologic exposure (1).

Repetitive behaviors are prevalent during infantile period and most of these behaviors begins and discontinue spontaneously (2).

Oral habits are so common and one of the deleterious habits that represent a problem for both pediatricians and pedodontists (3, 4) because they had been implicated as an important environmental etiological factor associated with a faulty dento-facial development (5, 6).

Thumb/finger sucking habit are regarded to be the most prevalent of oral habit with detected incidence ranging from 13% to 100% at some time during infancy (3).

Thumb sucking habit have been submitted to participate in the development of incorrect occlusion in the deciduous dentition and this faulty occlusion can be carried forward to the permanent occlusion as there is a common believe that the deciduous dental arches are the basis for normal development of permanent dental arches (7).

Anterior open bite, increased overjet and posterior cross bite were the most recorded occlusal traits associated with the thumb sucking(8-11).

The tendency toward developing of abnormal swallowing had been reported to increase in children with finger sucking, who showed a high frequency of compensatory tongue thrust leading to higher frequency of anterior open bite, unilateral or bilateral disto-occlusion and increased maxillary overjet (12).

The severity of malocclusion developed as a consequence to thumb sucking habit depends on many factors including duration and times of doing the habit, the position of the finger in the mouth, the relation between the maxilla and mandible and the child's health (3, 13).

Larreson and Bishara(14) stated that the malocclusions that had been attributed to thumb sucking habit were more harmful than those produced by other non-nutritive sucking habit such as pacifier sucking as the thumb used in the sucking habit will act as a lever producing a force displacing maxillary teeth anteriorly causing greater increase in the overjet, elongation and proclination of anterior maxillary base than those caused by the pacifier.

In the first 3-4 years of age the deformity caused by thumb sucking is mainly confined to the anterior segment. This deformity usually temporary if the habit quitted before school age but if continues beyond this age children will invariably develop malocclusion at 12 years (15). There is apparent positive relationship between oral habit and anterior open bite with a higher

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predisposition toward class II molar relationship in those with initial class I (16).

Anterior open bite in turn had a bad outcomes such as the aesthetic problems, lingual interpositioning during swallowing, difficult biting on the incisors added to that speech problems represented by atypical phonation affect the production of the following phonetic sounds:/t/, /d/, /n/, /l/, /r/ (17).

Pădure , Ngru (18) stated that thumb sucking habit in addition to hereditary factor are important etiological factor for class II/ 1 malocclusion development.

Several authors stated that increased overjet attributed to thumb sucking habit resulted from elongation and advancement of anterior segment of maxillary arch in addition to the proclination of the upper incisors (8, 9, 19) .

Posterior cross bite may be results from thumb sucking habit practice if the habit continues after the age of 36 months.(11) and it is persistent and not a self-corrected if the habit ceases. (8) therefore, some malocclusion can be seen even in mixed dentition stage of dental development (20). Al-Dawoody (9) stated that posterior cross bite in thumb sucker developed as a result of decrease in maxillary arch width and increase in the mandibular arch width. The widening of mandibular arch resulted from positioning of tongue as it displaced by the thumb.

A previously conducted studies mentioned that posterior cross bite attributed to dummy sucking habit rather than thumb sucking habit (8, 11, 20-22). The harmful effect of thumb sucking habit on development of occlusion was found to be the main reason behind mothers attempts to stop this habit in their children (23).

MATERIALS AND METODS

A case control study conducted on 80 preschool children attending kindergarten and nursery schools in Hilla city. The first group of fourty children practicing the finger sucking habit at the time of examination and the other 40 children chosen to be a control for the cases and matching them in both age and gender.

The children with the thumb sucking habit diagnosed as a thumb sucker by using data obtained from parents through a selfadministered questionnaire.

Examination had been done during the school day in the day light and by using disposable dental mirror, millimeter graded vernier, face mask, and gloves. The results recorded in an organized case examination sheets.

Children with any oral or systemic condition that may influence the results; children with oral habits other than thumb sucking and children lost antagonist central incisors to whom overjet and over bite cant obtained were excluded from the study.

The occlusal relationship were examined by direct visual inspection of the teeth at centric occlusion and the arch characteristics were recorded using published definitions (7).

1. **Overbite:**

Gained by measuring the vertical distance between the incisal edges of upper and lower incisors while teeth in centric relationship by instructing the child to open and close the mouth many times and to swallow the saliva before examination and sometimes it is necessary to gently guided the mandible into centric occlusion by the examiner. The distance had been regarded normal when upper incisors covered the lowers up to 3 mm; and deep bite if it is greater than 3 mm. while the open bite recorded present if there was no overlap between the upper and lower teeth with a minimum space of 1 mm between edges. Reverse over bite represent the coverage of upper incisors by lower incisors where they were in inverted position.

2. **Over jet:**

Gained by measuring the horizontal distance between the upper and lower incisors while teeth in centric relationship. The distance between the incisal of most prominent upper incisor and the buccal surface of corresponding lower incisor considered normal when it is about 3 mm, while the distance more than 3 mm regarded as increased overjet. Reverse overjet(anterior cross bite) recorded when the incisors were in an inverted position with the lower incisal edge occluding buccaly to the upper incisal edge.

3. **Posterior cross bite:**

When the buccal cusps of mandibular molars where buccaly displaced regarding the buccal cusps of the upper molar, posterior cross bite recorded as present regardless of the side.

Data of this study had been translated into a computerized database structure. IBMSPSS version 21 computer software (IBM Statistical Package for Social Sciences) in association with Microsoft Excel were used for the statistical analysis.

RESULTS

Three occlusal trait which are anterior open bite, increased overjet and posterior cross bite were most commonly detected among children whom chronically suck their fingers with the anterior open bite recorded the highest frequency (50%) followed by increased overjet and posterior cross bite respectively Fig.(1).

Results in table (1) showed that there is a highly significant differences between the cases and controls groups in the occurrence of both anterior open bite and increased overjet which were higher among cases group subject, while the difference between the two groups in the prevalence of posterior cross bite failed to reach the level of statistical significance.

The result of adjusted odds ratio indicated that thumb sucking habit is a risk factor for development of anterior open bite, increased overjet and posterior cross bite and increase the likelihood of their occurrence by 39 folds, 40 folds and 3 folds respectively.

There is an obvious difference in the occurrence of posterior cross bite among gender groups with males children were higher than females. However, the difference between gender groups of children practicing the thumb sucking habit in the occurrence of malocclusion doesn't large enough to give a statistical significance. Table (2).

Table (3) summarizes the frequencies of increased over jet, anterior open bite and posterior cross bite in different age groups of children with a thumb sucking habit.

The occurrence of posterior cross bite obviously higher in older ages (4 years) than the younger age (3 years) but this difference together with differences in the incidence rates of the increased overjet and anterior open bite not statically significant.

Further details about the distribution of the mentioned malocclusions among age and gender group seen in tables (4),(5),(6).

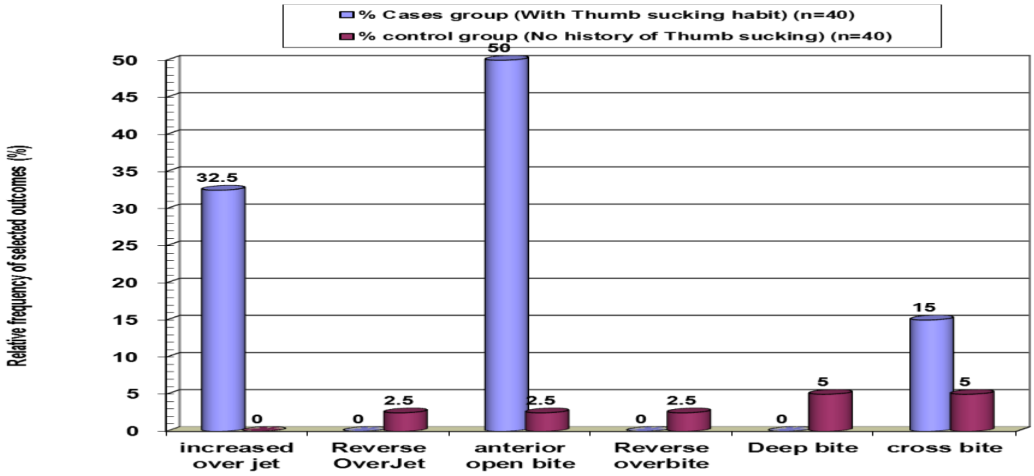

Figure 1: Bar chart showing the relative frequency of selected outcomes in subjects with a positive history of thumb sucking habit compared to controls.

Table 1: The risk of having selected outcomes in subjects with positive thumb sucking habit compared to controls.

variables	Thumb sucking				OR	Inverse OR	95%CI OR	P
	Negative		positive					
	N	%	N	%				
Increased over jet	13	32.5	0	0	39.76	**	(4.9 - 319.9)	>0.001[S]
Anterior open bite	20	50	1	2.5	39	**	(4.9 - 312.2)	>0.001[S]
Posterior cross bite	6	15	2	5	3.35	**	(0.63 - 17.74)	1.103 [NS]
Deep bite	0	0	2	5	0.19	5.26	(0.02 - 1.91)	0.24 [NS]
Reverse over bite	0	0	1	2.5	0.33	3.08	(0.03 - 3.73)	0.500 [NS]
Reverse overjet	0	0	1	2.5	0.33	3.08	(0.03 - 3.73)	0.500 [NS]

Table 2: The relative frequency of selected outcomes by gender among cases group only.

Malocclusions	Gender				P
	Females (n=22)		Males (n=18)		
	N	%	N	%	
Increased over jet	8	36.4	5	27.8	0.56[NS]
Anterior open bite	12	54.5	8	44.4	0.53[NS]
Cross bite	5	22.7	1	5.6	0.2[NS]

Table 3: The relative frequency of selected outcomes by age among cases group only.

Malocclusions	Age (years)				P
	3 years old (n=17)		4 years old (n=23)		
	N	%	N	%	
Increased over jet	4	23.5	9	39.1	0.3[NS]
Anterior open bite	10	58.8	10	43.5	0.34[NS]
Cross bite	1	5.9	5	21.7	0.22[NS]

Table 4: Distribution of anterior open bite malocclusion among cases and controls group.

Anterior open bite		Cases			Controls		
		Total N	Anterior open bite		Total N	Anterior open bite	
			N	%		N	%
Females	3 years	6	4	66.7	5	0	0.0
	4 years	61	8	50.0	16	0	0.0
	Total	22	12	54.5	22	0	0.0
Males	3 years	66	6	54.5	11	0	0.0
	4 years	7	2	28.6	7	1	14.3
	Total	18	8	44.4	18	1	5.6
Total	3 years	61	10	58.8	17	0	0.0
	4 years	23	10	43.5	23	1	4.3
	Total	40	20	50.0	40	1	2.5

Table 5: Distribution of increased over jet occlusal trait among cases and controls group.

Increased over jet		Non thumb sucking			Thumb sucking		
		Total N	Positive increased overjet		Total N	Positive increased overjet	
			N	%		N	%
Females	3 years	6	3	50	6	0	0.0
	4 years	16	5	31.3	16	0	0.0
	Total	22	8	36.4	22	0	0.0
Males	3 years	11	1	9.1	11	0	0.0
	4 years	7	4	57.1	7	0	0.0
	total	18	5	27.8	18	0	0.0

Table 6: Distribution of posterior cross bite among cases and controls group.

Posterior cross bite		ases group			ontrol group		
		Total N	Posterior cross bite		Total N	Posterior cross bite	
			N	%		N	%
Females	3 years	6	1	16.7	6	0	00.
	4 years	16	4	25	16	0	0.0
	Total	22	5	22.7	22	0	0.0
Males	3 years	11	0	0.0	11	2	18.2
	4 years	7	1	14.3	7	0	0.0
	total	18	1	5.6	18	2	11.1
Total	3 years	17	1	5.9	17	2	11.8
	4 years	23	5	21.7	23	0	0.0
	Total	40	6	15	40	2	5.0

DISCUSSION

The occurrence of anterior open bite, increased over jet and posterior cross bite were higher among the children who were practicing the oral habit, thumb sucking, than control group this result in accordance with other studies (16, 24-28). The most striking differences between cases and controls group were the incidence of anterior open bite and the relative increase in overjet which were significantly more prevalent in cases group. Indeed none of thumb sucking group children show an increase in the overjet measurement this is in accordance with a previous study by Botham (29).

The most dramatic evidence of the influence of thumb sucking habit on development of occlusion represented by the high occurrence of anterior open bite among thumb sucking practicing group this result in agreement with other researches (12, 30).

The adjusted odds ratio of anterior open bite indicates that thumb sucking habit was a risk factor for the development of anterior open bite by 39 folds.

This study found a highly significant statistical difference for the occurrence of increased overjet in thumb sucking children; this is in agreement with other researches(8, 12) who reported that thumb sucking causes more Class II division 1 types of malocclusion. In addition to that thumb sucking habit appeared to increase possibility of developing such malocclusion by 40 folds. This study concluded that there is no statistical difference between the cases group and controls group in the occurrence of posterior cross bite this result in accordance with Singh et al and Miotto et al (12, 22) but, disagree with results of previously conducted studies (27, 30) who found that the posterior cross bite had been observed to directly associated with oral habits

The adjusted odds ratio for posterior cross bite was giving an indication that thumb sucking habit was a risk factor and increasing 3 times the likelihood of the development of posterior cross bite.

From comparing the occurrence of malocclusions in cases group only the study showed that the frequencies of malocclusion are not age related neither gender related as there is no statistical difference among age and gender groups in the occurrence of malocclusions attributed to the oral habit this agree with Adair study (31).

Occlusal traits including anterior open bite, increased over jet and posterior cross bite were more prominent among children practicing thumb sucking habit this may be attributed to the forceful sucking of the thumb with associated strong buccal and lip musculature contraction in addition to the position of the thumb between teeth this is in agreement with Kamdar and AlShahrani (32).

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الخلاصة

الخلفية: العادة هي أي عمل يكرر بلا هدف ومن دون وعي بل هو دلالة على عدم الانسجام بين الفرد والبيئة المحيطة. ان العادات الفموية الضارة مثل عادة مص الإصبع هي واحدة من العوامل المؤثرة على النمو الطبيعي للوجه والفم وقد تم اجراء هذه الدراسة لغرض استكشاف العلاقة بين عادة مص الاصبع وسوء الإطباق في الأسنان اللبنية .

طرق ومواد: شملت الدراسة اربعون طفلا مستمرين على عادة مص الاصبع مع اربعون مطابقون في العمر والجنس . تم الكشف عن وجود سوء الاطباق عن طريق الفحص الفموي بينما استخدمت البيانات التي تم جمعها من قبل الاباء والامهات في تشخيص وجود عادة مص الاصبع .

النتائج: أظهر التحليل الإحصائي فرقا معنويا كبيرا في نسبة حدوث العضة المفتوحة الأمامية وزيادة المسافة الافقية بين الاسنان الامامية في مجموعة الاطفال المستمرين على عادة مص الاصبع مقارنة بالأطفال الطبيعيين بالإضافة إلى ذلك وجد ان عادة مص الاصبع تؤدي الى زيادة احتمال حدوث العضة الامامية المفتوحة، وزيادة المسافة الافقية بين الاسنان الامامية و الاطباق العكسي الخلفي بنسبة 39 ضعف ، و 04 ضعف و 3 أضعاف على التوالي .

الاستنتاج: عادة مص الاصبع عامل خطر لتطوير العضة الامامية المفتوحة وزيادة المسافة الافقية بين الاسنان الامامية .