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Relationship between Malocclusion and Oral Habits in a Sample of Patients Aged (7-20) Years Old in Erbil City

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ABSTRACT

Background and Objectives: Detrimental oral habits can significantly impact dental alignment, inter-arch relationships, jaw development, and orofacial muscle function, ultimately contributing to malocclusion—defined as a deviation from the normal relationship between teeth within the same arch or opposing arches. This study aimed to evaluate the prevalence of oral habits and their association with malocclusion.

Materials and Method: A cross-sectional study was conducted among 143 patients (72 males, 71 females) aged 7 to 20 years attending the diagnostic department of HMU/College of Dentistry in Erbil City. The contingency coefficient test was used to examine the relationship between oral habits and malocclusion traits, as well as associations with age and gender. Statistical significance was set at $P \leq 0.05$.

Results: Poor oral habits were observed in 70.6% of participants, with a higher prevalence in males (38.4%) compared to females (32.2%). The age group of 7–11 years exhibited the highest prevalence (26.6%). The most common habit was mouth breathing (37.8%), followed by nail biting (30.1%), lip biting (28.7%), thumb sucking (11.9%), and tongue thrusting (6.3%). Class I malocclusion was predominant (74.1%). Significant correlations were identified between tongue thrusting and lip biting with spacing ($P < 0.05$) and between thumb sucking with overbite and crossbite ($P < 0.05$). Mouth breathing demonstrated a significant association with age and gender, while no significant relationship was found between Angle classifications and oral habits ($P > 0.05$).

Conclusion: This study found that oral habits were prevalent in 70.6% of assessed patients, with mouth breathing as the most common habit, strongly linked to age and gender. Specific oral habits, such as thumb sucking, tongue thrusting, and lip biting, were significantly associated with distinct malocclusion traits, highlighting the importance of early identification and intervention.

Keywords: *Prevalence of malocclusion, Malocclusion, Oral habits, Malocclusion risk factors, Dental arch alignment*

1. INTRODUCTION

Malocclusion is a global dental issue that affects individuals to differing extents. Numerous reasons contribute to the abnormality in dentition, encompassing genetic and environmental elements. tooth caries, pulpal and periapical lesions, tooth trauma, developmental abnormalities, and oral habits are the most prevalent dental issues in children that are closely associated with malocclusion [1].

Habit has been defined as an action or condition that has become spontaneous through repetition, while oral habits are recognized as the stereotypical, repetitive behaviors of the masticatory system, often occurring subconsciously and differing both qualitatively and quantitatively from its physiological function. Abnormal oral habits operate softly and silently, frequently rendering the patient unaware of their existence. Initially, all such simple tasks are performed through intentional effort. With each repetition, it necessitates diminishing cognitive effort and strictly applicable only to motor reactions. Ultimately, it is pre-formed entirely unconsciously, becoming a part of the routine of the mind from which the consciousness is removed [2].

The prevalence of oral habits differs between countries and serves as significant environmental factors that may contribute to dental malocclusion. The degree of malocclusion associated with oral habits is contingent upon the frequency, duration, and strength of the behavior. These habits disturb muscle equilibrium and bone growth, resulting in alterations to the dental arch and occlusal attributes. Prolonged habits like as thumb sucking and tongue thrusting can lead to adverse outcomes, including an increased prevalence of anterior open bite, maxillary incisor protrusion, posterior crossbites, and lip incompetence. The cost, time and resource implications of the treatment of malocclusions caused by prolonged oral habits are considerable for several patients, particularly those lacking the means to afford such therapy [3].

Oral habits must be a main clinical concern for orthodontists, as they can lead to malocclusion and hinder treatment progress. Early diagnosis is essential; otherwise, these habits may evolve into complex issues that are tough to rectify later. This study was done to determine the incidence of deleterious oral habits and their impact on malocclusion, necessitating careful attention to ensure adequate care for pediatric patients.

2. MATERIALS AND METHODS

The sample comprised of patients aged 7 to 20 years, of both genders, attending the diagnostic department of HMU/College of Dentistry in Erbil City, Kurdistan Region of Iraq. The data was collected over a two-month period from November 2021 to January 2022. The convenience sampling method was utilized. The entire sample size comprised 150 patients, comprising 75 females and 75 males. Of the 150 patients reviewed, one case sheet was excluded due to incomplete or inaccurate information, and 6 patients were omitted due to a history of or deliver orthodontic treatment or craniofacial deformity. Accordingly, the sample size dropped to (143) patients, included 72 males (50.3%) and 71 females (49.7%).

A written consent form was obtained from the parents or patient. Patients with a history of or currently undergoing orthodontic treatment, patients with a history of a craniofacial deformity and incomplete or inaccurate case sheet were excluded.

The examination was conducted in a room designated for patient diagnosis. The patients were seated on the dental chairs in upright position, while the examiners stood in front of them. At the outset of the procedure, the examination's objective was explained, and consent was obtained from both the patient and their relatives.

A researcher-designed questionnaire was employed for data collection, consisting of three sections: the first section addressed general information, the second focused on habits, and the third pertained to intraoral clinical evaluation. Prior to conducting any dental examination, general information such as name, age, gender, date of examination, and patient serial number was documented. This was followed by the second section of the questionnaire, which contained inquiries about oral habits.

1-Thumb sucking: this habit was examined first by asking the patients and then examination of their thumb/index to find if there is a callus formation, cleaner finger nail or reddish color.

2-Nail biting: this habit was examined by asking the patients whether they bite their nails or not and then examined whether it was possible to see from their nails that they were nail biters.

3-Mouth breathing: this habit was investigated by asking the patient or the parents whether they or their child breath from the mouth or the nose. There was also an extra oral examination to diagnose if there was any increase in the lower facial height and incompetent lip.

4- Lip habit: this habit was investigated by examining the lips whether they were inflamed, dry and capped or not.

5-Tongue thrust: this habit was investigated by a simple examination. The patients were asked to close and swallow and during their swallowing their lips was pulled apart to observe his tongue position whether it protruded forward against the anterior teeth or not, and whether the teeth are at centric occlusion during swallowing or not.

Intra oral examination

1- Overjet

Measurement of the horizontal relation of the incisors is made with the aid of millimeter graded Vernier while the subject is in centric occlusion.

2- Over bite

It is the amount of vertical overlap of the upper incisor on the lower incisor while the subject is in centric occlusion.

3-Cross bite

Cross bite was diagnosed when there was a discrepancy in the buccolingual relationship of the upper and lower teeth. Cross bite could be anterior cross bite and posterior cross bite unilateral (right or left) or bilateral.

4- Spacing and crowding:

They were assessed for both maxillary and mandibular anterior and posterior segments

5- Median diastema

A midline diastema was considered to be present when there was a space between the maxillary central incisors.

6- Open bite

It is the lack of vertical overlap between the opposing teeth.

7- Antero-posterior molar relationship (Angel classification).

This assessment was most often based on the relation of the permanent maxillary and mandibular first molars according to Angel classification.

Data entry, evaluation, and descriptive and inferential statistics were performed using SPSS software version 28 and Microsoft Excel 2016. The association between categorical variables was assessed using the Contingency Coefficient (C) test. P-values less than 0.05 and 0.001 were considered statistically significant and highly significant, respectively.

3. RESULTS

A total of 143 patients attending the diagnostic department of HMU/College of Dentistry (141 male and 142 female), aged between 7 and 20 years, were included in this study. The patients were categorized into three age groups: (7-11), (12-16), and (17-20) as shown in table 1.

Table 1: Total number of examined patients.

Gender		Age Classes			Total
		7-11	12-16	17-20	
Male	No.	29	23	20	72
	%	20.3	16.1	14.0	50.3
Female	No.	27	11	33	71
	%	18.9	7.7	23.1	49.7
Total	No.	56	34	53	143
	%	39.2	23.8	37.1	100.0

Prevalence of oral habits were displaced in table 2, where (70.6%) of the sample had oral habits including (38.4%) male and (32.2%) female and about (29.4%) of the sample including (11.9%) male and (17.5%) female had no any habits, where the mouth breathing was the most dominant oral habit in this study (37.8%), and least dominant oral habit was tongue thrust (6.3%) as shown in fig 1. Statistically there was no significant difference between the oral habits with gender (P> 0.05) and age (P> 0.05).

Table 2: Prevalence of bad oral habits according to gender and age.

Oral Habits	Gender				Age Classes						Total	
	Male		Female		7-11		12-16		17-20			
	No.	%	No.	%	No.	%	No.	%	No	%	No	%
Habits	55	38.4	46	32.2	38	26.6	27	18.9	36	25.2	101	70.6
No habits	17	11.9	25	17.5	18	12.6	7	4.9	17	11.9	42	29.4
Total	72	50.3	71	49.7	56	39.2	34	23.8	53	37.1	143	100
	C= 126 P= 128				C= 107 P= 436							

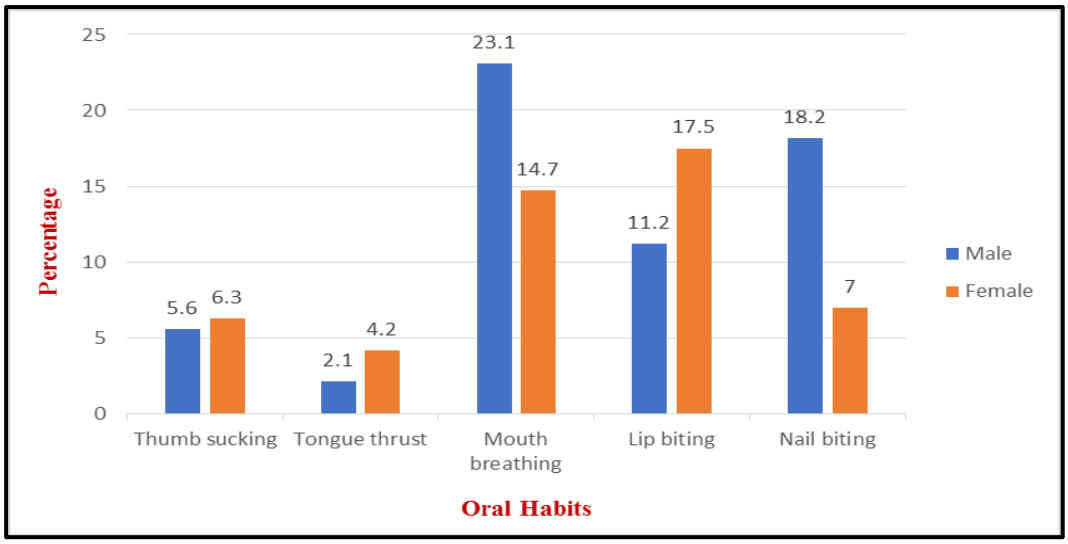

Fig 1: Distribution of the types of oral habits according to gender.

Regarding the malocclusion traits, it was found that Cl I was the most dominant angle classification which was about (74.1%) including (35.7) male and (38.5) female, followed by Cl II malocclusion (19.6%) then C III malocclusion (6.3%). About the malocclusion traits, crowding was the most dominant traits which was about (79%).

Statistically there was no significant relation between all the types of oral habits and angle classification (P>0.05), while there was a significant relation between tongue thrust with spacing and thumb sucking with crossbite and overbite (P<0.05) and no significant relation between the other types of oral habits (thumb sucking, mouth breathing and nail biting) with spacing (P>0.05).

About the relationship between each type of oral habits with age and gender, there was no significant relation between thumb sucking, tongue thrust and nail biting with age (P >0.05) and gender (P >0.05), while a significant relation was found between mouth breathing with age and (P >0.05) and gender (P >0.05) and lip biting with age (P<0.05) as shown in table 3.

Table (3): Relationship between each type of oral habits with age and gender.

Oral Habits	Gender				Age classes						Total	
	Male		Female		7-11		12-16		17-20			
	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
Thumb Sucking	8	5.6	9	6.3	10	7.0	2	1.4	5	3.5	17	11.9
No Thumb Sucking	64	44.8	62	43.4	46	32.2	32	22.4	48	33.6	126	88.1
Total	72	50.3	71	49.7	56	39.2	34	23.8	53	37.1	143	100
	C=0.024 P= 0.773				C=0.152 P= 0.184							
Tongue thrust	3	2.1	6	4.2	3	2.1	3	2.1	3	2.1	9	6.3
No Tongue thrust	69	48.3	65	45.5	53	37.1	31	21.7	50	35.0	134	93.7
Total	72	50.3	71	49.7	56	39.2	34	23.8	53	37.1	143	100

	C=0.088 P= 0.292				C=0.058 P= 0.783							
Mouth breathing	**33**	**23.1**	**21**	**14.7**	**25**	**17,5**	**17**	**11.9**	**12**	**8.4**	**54**	**37.8**
No Mouth breathing	**39**	**27.3**	**50**	**35.0**	**31**	**21.7**	**17**	**11.9**	**41**	**28.7**	**89**	**62.2**
Total	**72**	**50.3**	**71**	**49.7**	**56**	**39.2**	**34**	**23.8**	**53**	**37.1**	**143**	**100**
	C=0.165 P= 0.045				**C=0.236 P= 0.015**							
Lip biting	**16**	**11.2**	**25**	**17.5**	**8**	**5.6**	**10**	**7.0**	**23**	**16.1**	**41**	**28.7**
No Lip biting	**56**	**39.2**	**46**	**32.2**	**48**	**33.6**	**24**	**16/8**	**30**	**21.0**	**102**	**71.3**
Total	**72**	**50.3**	**71**	**49.7**	**56**	**39.2**	**34**	**23.8**	**53**	**37.1**	**143**	**100**
	C=0.142 P= 0.086				**C=0.271 P= 0.004**							
Nail biting	**26**	**18.2**	**17**	**11.9**	**13**	**9.1**	**14**	**9,8**	**16**	**11.2**	**43**	**30.1**
No Nail biting	**46**	**32.2**	**54**	**37.8**	**43**	**30.1**	**20**	**14.0**	**37**	**25.9**	**100**	**69.9**
Total	**72**	**50.3**	**71**	**49.7**	**56**	**39.2**	**34**	**23.8**	**53**	**37.1**	**143**	**100**
	C=0.132 P= 0.113				**C=0.149 P= 0.197**							

4. DISCUSSION

Oral habits are repetitive behavior in the oral cavity such as mouth breathing, abnormal swallowing, thumb sucking, lip sucking and nail-biting. These habits can directly impact quality of life and damage the stomatognathic system of the body. This study assessed the incidence of harmful oral behaviors and examined their correlation with associated malocclusion in a sample of patients aged 7 to 20 years attending the diagnostic department of HMU/college of dentistry in Erbil city/ Kurdistan region.

The current study revealed a high prevalence of oral habits at 70.6%, which is comparable to the 84% prevalence reported by Giugliano *et al* [4]. These habits were more prevalent among males (38.5%), aligning with the findings of Motta *et al* [5]. However, there was no statistically significant difference in oral habits concerning gender and age, consistent with the results of studies by Hamasha *et al* [6].

Motta *et al* [5] indicated that mouth breathing was the most common harmful oral habit at 49%, which is consistent with the current finding of 37.8%. Conversely, Zakirulla *et al* [3]. reported a significantly high prevalence rate of nail biting in their study. This may be due to racial difference, different method used in data collection and/ or age of patients.

The current study revealed a statistically significant age difference in mouth breathing, with a higher prevalence observed in the 7-11 age group, representing 17.5% of patients. This finding aligns with the studies conducted by Sasigornwong *et al* [7] and Al-Waely [8]. Concerning gender, mouth breathing exhibited a statistically significant disparity, with a higher prevalence in males (23.1%) compared to females (14.7%). These findings align with those reported by Om et al [9], which indicated a greater occurrence of mouth breathing in males (7.8%) than in females (5.3%).

Numerous studies have established a correlation between mouth breathing and narrow dental arches, dental crowding, increased overjet, posterior crossbite, and open bite, as evidenced by Gippaudo *et al* [10]. The discrepancies with the current study may stem from a limited sample size, differing methodologies in data collection, and variations in the measurement of overjet and overbite values. Several studies indicate that an overjet and overbite exceeding 3mm is classified as increased, while measurements below 2mm are deemed decreased. However, research by Sasigornwong *et al*[11] demonstrated no significant correlation between mouth breathing and open bite. Additionally, a study by Al-Atabi found no significant association between mouth breathing and increased overbite, decreased overjet, or spacing [12].

The thumb-sucking practice was frequent among children aged 7 to 11, consistent with the findings of Jabur and Nisayif, who reported prevalence among children aged 8 to 11 [13]. Furthermore, it was determined that thumb sucking was the least common oral habit (6.3%), corroborating the findings of the study conducted by Giugliano et al. (2014).

Tongue thrusting is an atypical tongue posture that deviates from the standard swallowing pattern, leading to malocclusions not identified in this study, such as large overjet, posterior crossbite, and open bite, which were observed in the research

conducted by Zakirulla *et al* [3]. The drawback of this discovery was the exceedingly small sample of patients exhibiting tongue thrusting. A significant relationship has been identified between tongue thrust and spacing, aligning with the findings of Suneetha *et al* [14].

This study identified a significant statistical correlation between occlusal traits, such as crossbite and overbite, and thumb sucking, corroborating findings from Vejdani *et al* and Al-Kinane and Al-Dahan [15, 16]. This association may be ascribed to the forceful thumb sucking, which involves vigorous contraction of the buccal and lip musculature, along with the thumb's positioning between the teeth, resulting in a reduction of overbite. This study concluded that there is no significant relationship between thumb sucking and open bite, increased overjet, spacing, or crowding, which contradicts the findings of prior studies. Al-Atabi and Al-Kinane and Al-Dahan discovered that the most significant evidence of the impact of thumb sucking on occlusal development is reflected in the elevated prevalence of open bite and increased overjet within the thumb-sucking group; these variations may be attributed to sample size and the methodologies employed to document malocclusion characteristics.

No significant difference was observed between thumb sucking and gender or age, aligning with the findings of Rodríguez Olivos *et al* [17], yet contradicting the results of Grade *et al*, who identified a significant correlation between thumb sucking and gender (more prevalent in females) and age (more common in the younger age group of 6-8 years) [18].

This study identified a substantial correlation between tongue thrust and spacing, aligning with the findings of Suneetha *et al* [14]. Tongue thrusting is an atypical tongue posture that deviates from the standard swallowing pattern, resulting in malocclusions not identified in this study, such as large overjet, posterior crossbite, and open bite, which. The limitation of this finding was the very small number of patients that presented with the tongue thrusting.

The present study found that tongue thrust habits are not age related as there is no significant difference among age class in occurrence of tongue thrust and this finding agree with that of Zakirulla *et al* [3], but in contrast with results of Dixit and Shetty who found that tongue thrust decrease with age because of an improved muscular balance during swallowing and self – correction [19].

Concerning lip biting A significant statistical correlation was identified between lip biting and age, particularly affecting individuals aged 17 to 20, as lip biting is associated with stress and worry. The current study identified a significant statistical correlation between lip biting and spacing, which contradicts the findings of Hanfoosh [2].

Nail biting is a stress-relieving habit adopted by several children and adults; this abnormal behavior may lead to various malocclusions, such as crowding and increased overjet, as noted by Sachan [20]. The current study indicates that the prevalence of nail biting is around 30.1%, making it the second most common oral behavior after mouth breathing. This conclusion significantly contrasts with the results of Alanazi *et al*, which identified nail biting as the least widespread oral habit [21].

5. CONCLUSIONS

Prevalence of bad oral habits found to be (70.6%), from which the mouth breathing was the most common oral habit (37.8%) while tongue thrust was the least common (6.3%).

Significant difference was found between gender and age for mouth breathing habits in which male and (7-11) age class showed higher percentage of this habit and between age with lip biting in which (17-20) age class showed more prevalence of this habit.

There was a significant relationship between some types of oral habits with some malocclusion traits like thumb sucking with posterior crossbite and overbite, tongue thrust and lip biting with spacing..

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