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EFFECTS OF MATERNAL EDUCATION, GENDER, AND HAND PREFERENCE IN DIGIT SUCKERS ON OCCLUSION CHARACTERISTICS AMONG EGYPTIAN CHILDREN (A CROSS SECTIONAL STUDY)

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ABSTRACT

Objective: This study aims to evaluate how maternal education, gender, and hand preference influence occlusal characteristics in 4 to 5-year-old children.

Materials and Methods: 218 Delta University's Pediatric Dental Clinics children participated in a cross-sectional study. Data on sucking habits and systemic disorders were collected via a questionnaire, and dental characteristics were clinically examined. Statistical analysis utilized IBM SPSS (version 26).

Results: About 54.6% of mothers had a moderate education level. Most children (84.9%) used their right hand for digit sucking, primarily their thumb (90.4%), with 50.9% of mothers not intervening. Chronic paronychia affected 20.9% of children, predominantly reported in 93.1% of cases. Dental findings showed 58.7% had a flush terminal molar relation, 63.3% exhibited a normal overbite, and 55% had a class I canine relation. Anterior crossbite affected 12.8%, unilateral posterior crossbite 11.5%, and open bite was rare (0.9%). Additionally, 3.7% exhibited maxillary midline shift, 35.8% had overjet >2 mm, and 34.9% had maxillary spacing.

Conclusions: Males showed lower anterior crossbite and overjet scores. Maternal education significantly affected canine relations and overjet scores. Thumb sucking correlated with increased molar and canine relations and spacing scores. Conversely, right-hand digit sucking correlated with higher molar and anterior crossbite scores but lower spacing scores.

Clinical relevance: Malocclusion, a significant oral disorder impacting oral function, facial aesthetics, and social well-being, is crucial to understand in primary dentition for effective preventive strategies.

KEYWORDS: Egypt, Gender, Malocclusion, Mother education, Primary dentition

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INTRODUCTION

Malocclusion was defined as "*a handicapping dentofacial anomaly.*" [1] It affects appearance, function, facial harmony, and psychosocial well-being. [2] This anomaly is widely distributed, with a prevalence ranging from 2.8% to 40.2%. [3] The frequently observed signs of this abnormality may be deep overbite, midline deviation, excessive overjet, anterior crossbite, misalignment, space, and open bite. It is a multifactorial disorder in which hereditary and environmental factors and many other dental diseases can play a role.[4]

Early in 1908, Otuyemi et al [5] Stated that malocclusion in primary dentition could persist in the succeeding permanent dentition. There has been growing awareness of the role of deciduous dentition in determining the position and occlusion of permanent teeth. Data on malocclusion varies significantly based on the population studied, the detection method used, and other factors like oral habits and attrition. [6]

However, although primary occlusion characteristics have been well reported in the literature, it is known that genetic and environmental factors as gender, maternal education and hand preference can influence occlusion either normal or abnormal. [4]Mothers with nutrition knowledge more likely to adapt food consistency to the skills manifested by the child and less likely to delay the introduction of new foods that required chewing and biting than other mothers with less or no nutrition knowledge. 2020 Malgorzata Kostecka et al [7] revealed that Educational level and nutrition knowledge significantly increased the age at which infants were introduced to solid foods and the correct identification of the sign's indicative of the child's readiness to explore new tastes and foods with a new consistency.

Hand preference refers to the consistent favoring of one hand over the other for the skilled part of an activity. It develops in the first two postnatal years with nearly half of infants exhibiting a consistent early preference for acquiring objects. Others exhibit a more variable developmental trajectory but by the end of their second postnatal year, most exhibit a consistent hand preference for role-differentiated bimanual manipulation. According to some forms of embodiment theory, these differences in hand use patterns should influence the way children interact with their environments, which, in turn, should affect occlusal characteristics. [8]

Given the limited number of studies in Egypt on occlusion characteristics in preschool children and the contradictory findings regarding age-related changes in deciduous molar relations, further investigation seemed warranted. Therefore, the objective of our study was to assess the impact of maternal educational levels, gender differences, and hand preference of digit suckers on the occlusion characteristics of their primary dentition. To achieve this, we investigated various parameters, including terminal molar relation, primary canine relation, overbite, overjet, open bite, anterior crossbite, posterior crossbite, spacing, and midline shift.

PATIENTS AND METHODS

Study design and settings

This cross-sectional study was conducted at the Pediatric Dentistry Outpatient Dental Clinics at (Delta) University. This clinic offers dental services to diverse patients from several governorates in the (Delta) Region, including Dakahlia, Damietta, and Kafr El-Sheikh. A Convenient sample was selected from this outpatient clinic for our study.

Ethical considerations

The ethical committee at (Delta) University's dental colleges approved the protocol of this study (#FODMRC-2022.00119). Before the commencement of the study, the purpose and methodology were discussed and clarified with the parents of the children, and their consent was obtained. It was assured that their participation would not affect the provision of their recommended services, and they could decline participation in the study at any time. Furthermore, they were informed that their data would be kept confidential.

Sample size estimation

The minimal sample size is calculated based on a previous study aimed to compare the occlusal characteristics of persistent digit suckers with those of a group of individuals who reported never to have sucked their thumb or finger. [9] Mistry et al. (2010) [9] reported that the odds of a reduced overbite being present were significantly higher in the digit sucking group compared to the non-suckers (OR: 5·6, 95% CI: 1·6–20·8). The sample size was calculated to assess the association (risk) of the maternal education, gender, and hand preference influence occlusal characteristics in 4 to 5-year-old children. Based Mistry et al. (2010) [9] , results (OR = 5.6), adopting a relative precision of 50%, confidence level of 95%, expected prevalence of the outcome in the absence group (no finger sucking) of 5%, expected odds ratio of 5, the time frame of the study is six months to include all children who attended the outpatient pediatric dental clinic at Delta University, and a minimum required sample size during this study time frame is not less than 217 eligible children. [10]

The following formula for the sample size, na,

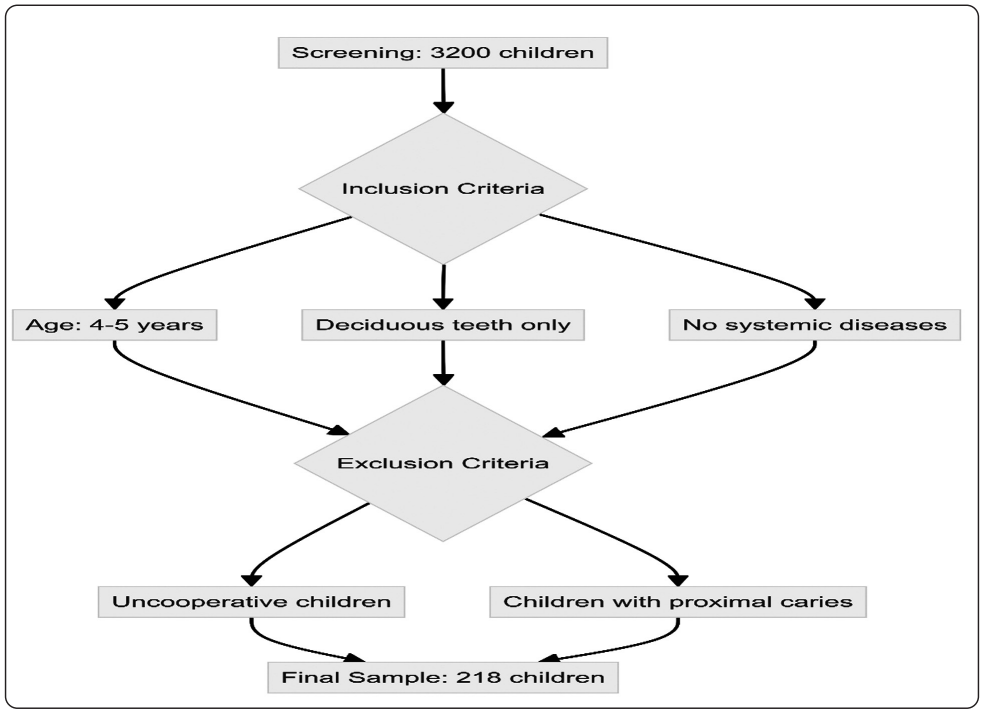
$na = [Z\alpha/22 / \log2(1-RP)] * [1/X + 1/Y]$

Where,

$X = 1 / \varrho p(1-\varrho p)k$, and $Y = 1 / \varrho a(1-\varrho a)$, and $Z\alpha/2$ is the critical value of the Normal distribution at $\alpha/2$ (e.g., for a confidence level of 95%, α is 0.05 and the critical value is 1.96), RP is the relative precision (the percentage by which the lower limit for your confidence interval is less than the estimated odds ratio), ϱp is the prevalence of the outcome in the presence group, ϱa is the prevalence of the outcome in the absence group, and k is the ratio of presences to absences being sampled (np/na).

Participant's selection

Almost all children (3,200 children) who attended the outpatient pediatric dental clinic at Delta University from June 2023 to November 2023 were screened for digit-sucking habits. Children who fulfilled the following criteria were recruited into the study: males and females ages 4 to 5 with deciduous teeth only and were free from systemic disorders. However, uncooperative children or those with proximal caries were excluded from the



study. Finally, 218 children were selected based on the inclusion and exclusion criteria.

A Flaw chart showing the sample selection process

Data collection

Intra-examiner reliability was conducted to ensure data validity. First, the examiner examined 30 children ages 4–5. One week later, he studied the same sample. The intra-examiner reliability had a Kappa value of 0.89, considered good.

A well-structured, closed-ended interview questionnaire was administered to the participating mothers before the clinical examination. The questionnaire included demographic data such as the child's age and gender, as well as the mother's educational level, which was classified into four categories: high-level education (college and postgraduate education), moderate-level education (high school and equivalents), those who can read and write only, and those who are not educated at all. The second part of the questionnaire focused on the child's digit-sucking habit, including which hand and finger were used and any measures to stop the habit. Finally, the mothers were asked about any systemic disorders that might affect their children.

Occlusion characteristics were examined by a trained and calibrated dentist using a Community Periodontal Index probe (CPI), plane mouth mirror, and measuring ruler under an artificial light source. The types of malocclusions, including molar relation (flush terminal plane, mesial step, distal step), canine relation (class I, II, and III), anterior crossbite (present or absent), posterior crossbite (unilateral, bilateral, or absent), overbite (ideal, increased, reduced), overjet (=2 or <2 or >2), open bite (absent or present>0), midline shift and spacing (presents in maxilla, mandible, or absent). (Table 1), overjet was calculated by measuring the distance between the labial surface of lower central incisors and labial surface of upper central incisors, while the over bite was measured by considering the amount of vertical coverage of upper central incisors to the lower central incisors. [11]

TABLE (1) Diagnostic Criteria for Children's Dental Features

Canine relation	When the cusp tip of the maxillary primary canine and the distal surface of the mandibular primary canine are in the same vertical plane then it is a Class I canine relation. In Class II, the cusp tip of the maxillary primary canine tooth is mesial and in Class III it is distal to the distal surface of the mandibular primary canine. [34]
Molar relation	Molar relation was classified as a flush terminal plane, mesial step, and distal step depending upon the relationship of distal surfaces of the upper and lower second primary molar. [35]
Spacing	Spacing was graded according to Kisling and Krebs criteria; no space, space in maxilla, space in mandible. [36]
Overjet	Overjet is measured with the help of a millimeter gauge; it is the distance between the incisal edges of the upper and lower primary incisors. It is registered as ideal overjet- when equal to 2 mm, increased–more than 2 mm, and decreased or reverse overjet in case of less than 2 mm. [34]
Overbite	Measurement of vertical overlapping of upper and lower central incisors is overbite. It was recorded as ideal, when the incisal edges of the lower incisors touched the palatal surfaces of the upper central incisors in centric occlusion, increased, if the lower incisors touched the palate, and when they were not in contact either with the upper incisors or the palate, recorded as reduced overbite. [34]
Anterior open bite	This refers to a negative overlap in the vertical plane, where the upper and lower incisors do not touch when the jaws are closed. [34] It was recorded as absent or present (>0) [27]
Anterior crossbite	This refers to one or more of the maxillary incisors occluding lingual to the mandibular incisors. [35]
Posterior cross bite	This refers to one or more of the maxillary primary canines or molars occluding lingual to the buccal cusps of the opposing mandibular teeth. [6]
Midline shift	It refers to a deviation or displacement of the dental midline from its normal position. [36]

Statistical analysis

The collected data was initially compiled into a Microsoft Excel spreadsheet, then accurately coded and statistically analyzed using IBM SPSS Statistics 26.0 for Windows. Descriptive statistics were used to analyze the frequencies of categorical variables. A multiple responses frequency test was utilized to explore questions with multiple selected responses from the questionnaire. Multivariate Regression Analysis was conducted to assess the impact of independent variables on various predictors. All tests were performed at a 5% significance level, with a p-value of less than 0.05 indicating statistical significance.

RESULTS

A total of 218 digit-sucking children participated in the study; the mean age of the study sample was 4.48 ± 0.36 years. Among them, 84.9% used their right hands for digit sucking, while 15.1% used their left hands. Only four children (1.8%) showed no malocclusion, whereas 214 (98.2%) exhibited one or more malocclusion characteristics. Of these, 97 children (44.5%) were male, and 121 children (55.5%) were female.

Most children's mothers have a moderate-level education, comprising 54.6%. The "Not educated" category is the least common, making up 9.6%. (Figure 1) Regarding digit usage, most children (90.4%) used their thumb, followed by their index finger (6.4%). Nearly equal percentages of children used their middle and little fingers (1.4% and 1.8%, respectively). (Figure 2)

Most children's mothers (50.9%) did not use measures to arrest the digit-sucking habit. Bitter oil and socks were the most minor standard measures used by 4.1% of children. (Table 2) Systemic disorders among participating children were analyzed using multiple-frequency tests. The total number of responses is 971, indicating the same respondent could report multiple disorders. Chronic paronychia was the most frequently reported disorder, with 203 responses, accounting for 20.9% of the reactions and 93.1% of the cases. However, poor feeding was the least reported, with 84 responses, accounting for 8.7% of the reactions and 38.5% of the cases. (Table 3)

TABLE (2) Measures Taken to Address Thumb-Sucking Habit

Taken measures	Frequency	Percent
No applied measures	111	50.9
Tying finger	11	5.0
Using night guard	32	14.7
Using oral screen	18	8.3
Applying bitter oil	9	4.1
Applying socks	9	4.1
Pulling the finger	28	12.8
Total	218	100.0

TABLE (3) Frequency Distribution of Reported Systemic Disorders Among Respondents

Systemic disorders Frequencies			
Variables	Responses		Percent of Cases
	N	Percent	
Snoring	182	18.7%	83.5%
Vomiting and diarrhea	192	19.8%	88.1%
Difficult writing	173	17.8%	79.4%
Poor feeding	84	8.7%	38.5%
Bad mouth smell	137	14.1%	62.8%
Chronic paronychia	203	20.9%	93.1%
Total	971	100.0%	445.4%

-Multiple Response Frequency Analysis

The study examined the dental characteristics of 218 children, revealing that 58.7% had a flush terminal molar relation, 13.8% a mesial step, and 27.5% a distal step. Ideal overbite was observed in 63.3% of participants, while 3.7% had an increased overbite, and 33% had a reduced overbite.

Regarding canine relation, 55% exhibited class I and 45% class II, with no cases of class III. Anterior crossbite was found in 12.8% of children, unilateral posterior crossbite in 11.5%, and bilateral crossbite in 6%. The open bite was rare, affecting only 0.9% of the sample. Midline shift was present in 3.7% of the maxilla and 1.8% of the mandible. Regarding overjet, 3.7% had an ideal overjet, 35.8% had an overjet more significant than 2 mm, and 60.6% had an overjet less than 2 mm. Spacing in the maxilla was noted in 34.9% of children, while 55.1% had mandibular spacing. These findings highlight the common occlusal characteristics in young children. (Figure, 3)

Table 4 presents the impact of maternal education and Gender on occlusal characteristics. Maternal Education: Higher maternal education is significantly associated with decreased canine relation scores (B = -0.205, p = 0.010) and overjet scores (B = -0.218, p = 0.005). No significant effects were found for other occlusal characteristics. Gender (Male): Male children showed significantly lower anterior crossbite scores (B = -0.198, p < 0.001) and higher overjet scores (B = 0.184, p = 0.009). No significant effects were observed for molar relation, canine relation, posterior crossbite, midline shift, overbite, spacing, or open bite.

Regarding thumb sucking and hand preference, thumb sucking is significantly associated with an increase in molar relation scores (B = 0.288, p = 0.008), canine relation scores (B = 0.263, p = 0.020), and spacing scores (B = 0.215, p = 0.044). No significant effects were observed for posterior crossbite, midline shift, overbite, anterior crossbite, open bite, or overjet. Hand Preference (Right): Preferring the right hand is significantly associated with an increase in molar relation scores (B = 0.415, p < 0.001) and anterior crossbite scores (B = 0.257, p < 0.001) and a decrease in spacing scores (B = -0.300, p = 0.002). No significant effects were observed for canine relation, posterior crossbite, midline shift, overbite, open bite, or overjet. (Table, 5)

TABLE (4) Influence of Maternal Education and Gender on Occlusal Characteristics

Occlusal Characteristics	Predictors	B	Std. Error	T	Sig.
Molar relation	Mother's education (high/moderate)	0.030	0.076	0.392	0.696
	Gender (male)	-0.049	0.070	-0.704	0.482
Canine relation	Mother's education (high/moderate)	-0.205	0.079	-2.609	0.010
	Gender (male)	0.004	0.073	0.054	0.957
Posterior crossbite	Mother's education (high/moderate)	-0.091	0.062	-1.478	0.141
	Gender (male)	-0.085	0.057	-1.480	0.140
Midline shift	Mother's education (high/moderate)	-0.012	0.037	-0.329	0.743
	Gender (male)	0.057	0.034	1.654	0.100
Overbite	Mother's education (high/moderate)	0.022	0.031	0.708	0.479
	Gender (male)	-0.013	0.028	-0.447	0.655
Spacing	Mother's education (high/moderate)	-0.050	0.074	-0.668	0.505
	Gender (male)	-0.126	0.069	-1.823	0.070
Anterior crossbite	Mother's education (high/moderate)	-0.039	0.052	-0.742	0.459
	Gender (male)	-0.198	0.048	-4.092	0.000
Open bite	Mother's education (high/moderate)	-0.013	0.016	-0.845	0.399
	Gender (male)	-0.003	0.014	-0.211	0.833
Overjet	Mother's education (high/moderate)	-0.218	0.076	-2.871	0.005
	Gender (male)	0.184	0.070	2.623	0.009

TABLE (5) Influence of Thumb Sucking and Hand Preference on Occlusal Characteristics

Occlusal Characteristics	Predictors	B	Std. Error	T	Sig.
Molar relation	Finger (thumb)	0.288	0.108	2.666	0.008
	Hand preference (right)	0.415	0.096	4.320	0.000
Canine relation	Finger (thumb)	0.263	0.112	2.346	0.020
	Hand preference (right)	0.159	0.100	1.592	0.113
Posterior crossbite	Finger (thumb)	0.076	0.088	0.869	0.386
	Hand preference (right)	0.054	0.078	0.692	0.490
Midline shift	Finger (thumb)	0.005	0.053	0.099	0.921
	Hand preference (right)	0.033	0.047	0.710	0.479
Overbite	Finger (thumb)	0.017	0.044	0.388	0.698
	Hand preference (right)	-0.036	0.039	-0.925	0.356
Spacing	Finger (thumb)	0.215	0.106	2.029	0.044
	Hand preference (right)	-0.300	0.094	-3.180	0.002
Anterior crossbite	Finger (thumb)	-0.061	0.075	-0.819	0.413
	Hand preference (right)	0.257	0.066	3.883	0.000
Open bite	Finger (thumb)	0.009	0.022	0.382	0.703
	Hand preference (right)	0.010	0.020	0.514	0.608
Overjet	Finger (thumb)	-0.035	0.108	-0.321	0.749
	Hand preference (right)	-0.183	0.096	-1.902	0.059

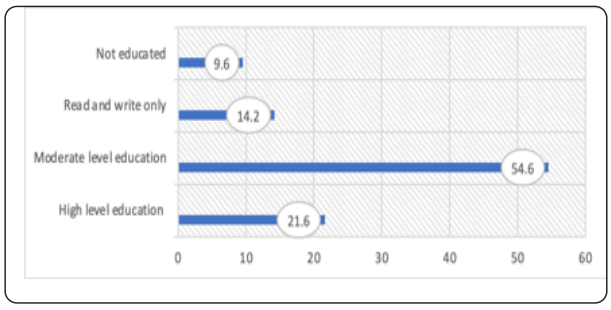


Fig. (1) Distribution of Mother's Education Levels

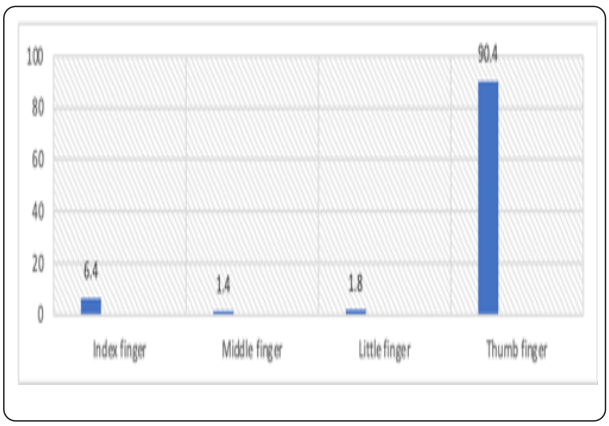


Fig. (2) Distribution of Digit Preference Among Children During Sucking

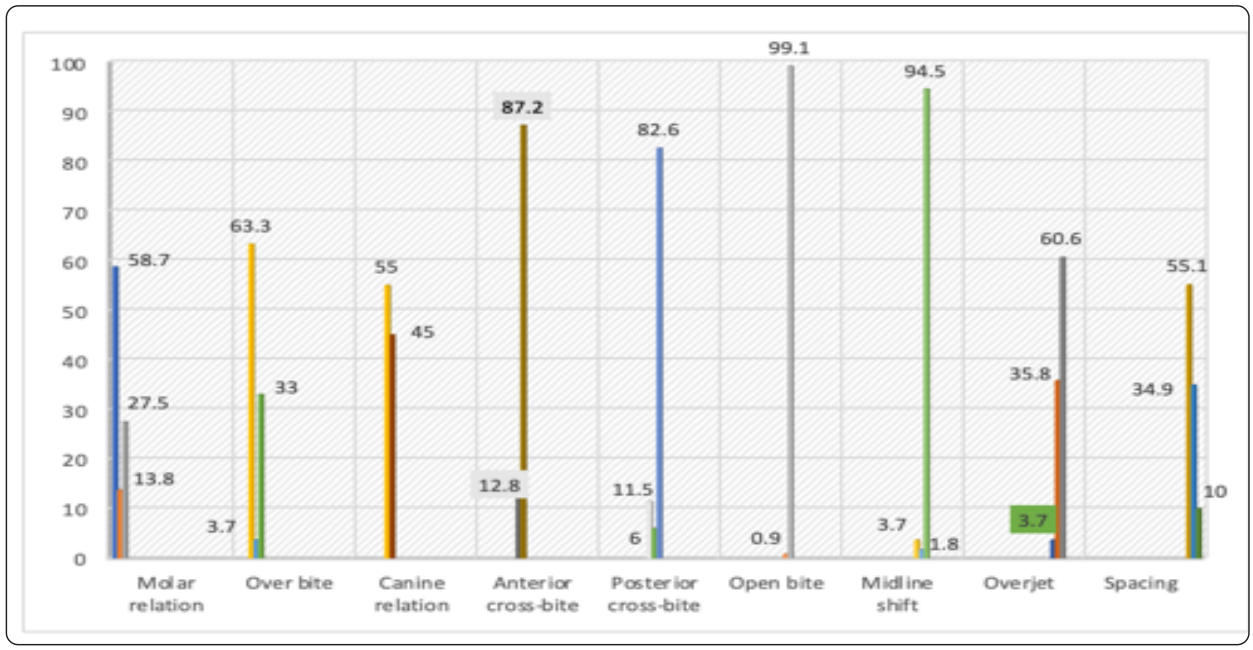


Fig. (3) Dental Characteristics Among Study Participants

DISCUSSION

By age three, all deciduous teeth have fully erupted, establishing their occlusal relationships. This stage lasts until age six when the first permanent molar erupts. Understanding the relationship between primary teeth and the initial permanent dentition stage is crucial for effective early interceptive treatment. This study aims to analyze dental characteristics in a group of digit-sucking children in Egypt, examining the influence of maternal education and gender to provide insights into potential socio-demographic factors affecting oral health in this population.

The findings revealed that nearly all participating children predominantly used their right hand for the sucking habit, with the thumb being the most used digit. Surprisingly, most mothers did not implement any measures to stop the digit-sucking habit. Chronic paronychia was the most frequently reported disorder.

In terms of dental characteristics, Canine and molar relationship together can be a diagnostic aid to predict changes in occlusal relationship. Therefore, bowth the molar and canine relationships are taken into consideration to make a reliable prediction of the intermaxillary relationship in the permanent dentition [12].

In this study the flush terminal molar relation was prominent among the children (58.7%) and about half of the participants exhibited a class I canine relation (55%). The flush terminal molar relation considered ideal for transition to class 1 in permanent dentition. In the present study, since flush terminal plane was the most common molar relationship with more than half of the participants exhibited a class I canine relation, we anticipate that the majority of the sample may have a favorable permanent molar relation. Rai *et al*. [13] reported a significant relationship between digit sucking habit with distal step molar relationship and class 2 canine relation among children of Nepal. Farsi, Salama (1997) in Saudi Arabian children revealed the same results [14].

More than half of the participants displayed an ideal overbite (63.3%), participants had an overjet

of more than 2 mm were (34.8%). The higher prevalence of ideal overjet and overbite may be conducive to achieve ideal anterior relation in permanent dentition. A cross-sectional study was conducted on 583 thump sucker's Saudi children aged 3-5 years reported 33.33% of the participants with overjet more than 2mm. [14] Similarly, another study was performed in Sweden to evaluate the prevalence of malocclusion traits in children with sucking habits among 3-year-old children in a sample of 457 children, The results showed that participants with overjet more than 2mm were (23%).[15]

In relation to unilateral crossbite, our recorded percentage of 11.5% not far from the values obtained by Ovsenik (14.0%) [16], Bandeira (10.4%) [17]. Lower values reported by Zhifei Zhou (7.56%) [18] and Wagner (3.4%) [19], while values higher than our own have been published by Peres (18.2%) [20] and Germa (20%) [21].

Thadchanamoorthy V and Dayasiri K. [22] reported that 62 (75.6%) children had used their right hand for sucking. Sixty-six children (80.5%) had been using the thumb.

Regarding methods used to break the sucking habit, Onyekachi et al., [23] reported that only eight (9.5%) mothers made multiple efforts to break the habit, with punishment being the most common method (50%) and wrapping the hand and rewarding the child being the least employed method (1.2%). Thadchanamoorthy V and Dayasiri K [22] cleared that 37.8% of parents did nothing to stop digit sucking while 30.5% applied bitter oil and the majority tried pacifiers without success. All children were referred to the dental surgeon for further management of digit sucking.

Impact of Maternal Education

Children of mothers with high and moderate education levels showed a significant negative association with changes in canine relation (class II) and overjet scores (more or less than 2 mm). However, no significant association was found between a mother's education level and other malocclusion traits. This weak association can be partly attributed to the uneven distribution of maternal education levels, with the majority (54.6%) being moderately educated. Furthermore, maternal education is just one of many factors influencing dental characteristics, alongside genetic and environmental factors.

Mai et al. [24] demonstrated that the risk of malocclusion in children whose mothers had less than a college education was 1.6 times higher compared to those whose mothers had a college education or higher. Consistently, Corrêa et al. (2020) [25] mentioned that mothers' schooling (≤8 years) was significantly associated with a greater frequency of crossbite (PR 1.91; 95% CI 1.203–3.060; p = 0.006). However, Zhou et al. [18] did not find a significant association between parental education level and malocclusion among children with primary dentition (p>0.05).

Gender Differences in Dental Characteristics

The study identified significant gender differences affecting various dental parameters. Specifically, females were found to have less pronounced overbite and anterior crossbite compared to males. Additionally, females exhibited a higher prevalence of spacing issues, suggesting a lower likelihood of malocclusions among females than males. Males are significantly associated with anterior crossbite and overjet scores.

Our results align with previous studies by Sharma et al., [26], who found that males exhibited more spacing than females, primarily in the anterior region. Gowada S,V. and Das U,M[27], and Thilander B et al., [28] also reported more frequent spacing in males and crowding in females. Corrêa et al., [25] reported that male gender was significantly associated with crossbite (PR 1.79; 95% CI 1.100–2.917; p = 0.019).

However, Yadav NR et al., [29] The opposite was observed, with spacing more prevalent in females and crowding more common in males. Additionally, Zhou et al, [18] Did not find any significant differences among genders regarding malocclusion features. Chevitarese et al., [30] Showed that girls had a higher prevalence of malocclusions, with open bite being the most common, while boys had a higher prevalence of deep bite.

Handedness and Dental Characteristics

The relationship between handedness and dental characteristics revealed that right-handed children are more likely to exhibit certain dental traits. The preferred hand (right) is significantly associated with molar relation, spacing, and anterior crossbite scores. These findings suggest that handedness, a relatively less explored factor in dental studies, could play a role in the development of occlusal characteristics and should be considered in pediatric dental assessments.

Heikkinen [31] reported that unilateral crossbite occurred in 140 cases with a complete set of laterality tests: 65 were right-sided and 75 left-sided. True right-sided children had more bilaterally symmetric occlusions and less crossbite on the right side than those having non-right-sidedness in their functions, with the differences being statistically significant ($p<.01$).

Finger Preference in Digit Sucking

The preference for specific fingers showed a positive significant association between the thumb-sucking habit (finger = thumb) and molar relation, canine relation, and spacing scores. As the preference for using certain fingers (thumb) increased, the molar relation (mesial or distal step), class II canine relation, and spacing also tended to increase. This suggests that the type of finger used in digit sucking could influence the development of malocclusions. It should be noted that harmful oral habits may be risk factors or factors associated with malocclusion in children. However, the presence of such habits does not necessarily indicate that a child will develop malocclusion. The habit's frequency, intensity, and duration (Graber's triad) and each child's facial growth should be considered. [32]

Corrêa et al. [25] showed that harmful habits like finger sucking were significantly associated with open bite (PR 1.49; 95% CI 1.123–1.991; $p = 0.006$). Increased overjet (O.R. = 4.42, $p < 0.001$) and canine relation (O.R. = 4.02, $p < 0.001$) were reported among digit suckers. Al-Dawoody et al. [33] reported that finger suckers showed a significant increase in overjet and anterior open bite and a decrease in deep bite and lower arch spacing. No significant difference was noted between finger suckers and the control group concerning upper anterior spacing, upper and lower crowding, and posterior crossbite. Chevitarese et al. [30] showed that oral habits, such as thumb-sucking, were identified as decisive etiological factors for developing malocclusion. Moreover, Zhou et al. [18] reported that the finger-sucking habit was at a higher risk (1.573 times) of malocclusion ($P<0.05$).

CONCLUSION

This study provides valuable insights into the impact of maternal education, gender, handedness, and finger preference on the dental characteristics of children. Maternal education significantly affected canine relations and overjet scores. Males showed lower anterior crossbite and overjet scores. Thumb sucking correlated with increased molar and canine relations and spacing scores. Right-hand digit sucking correlated with higher molar and anterior crossbite scores but lower spacing scores. Educational programs aimed at improving maternal awareness about the impact of digit sucking and the importance of early dental check-ups could be beneficial. Furthermore, dental practitioners should incorporate these factors into their treatment plans to provide more comprehensive and personalized care for young children.

Compliance With Ethical Standards

Conflict of Interests

The authors declare that they have no conflict of interest.

Ethical approval

Delta University's ethical committee (#FODMRC-2022) approved the study.

Informed consent

After a detailed discussion of the study's purposes and methodology, the parents of the participating children provided their written informed consent.

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