

RESEARCH ARTICLE

# Frequency of parafunctional oral habits and their relationship with age group.

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## ABSTRACT

**Objective:** To compare the frequency of parafunctional oral habits and their relationship with the age group: toddlers or preschoolers.

**Material and Methods:** A cross-sectional study was performed in a sample of 269 infant children and preschoolers with the express authorization of their parents. The survey consisted of the oral examination and questionnaire application (Cronbach's  $\alpha=0.832$ ) after intra-calibration of a Dental Surgeon ( $Kappa \geq 0.941$ ). The value of Cronbach's  $\alpha$  was calculated to measure the reliability of the questionnaire and Pearson's Chi-square for the associations.

**Results:** The habit of biting objects was the most frequent (31.2%), onychophagia and mouth breathing showed statistically significant differences concerning the group of preschoolers ( $p=0.004$ ;  $p=0.023$ ), while bottle-feeding was for the Infant-children group ( $p=0.0001$ ).

**Conclusions:** The frequency of the parafunctional habits had similar behavior in both toddlers and preschoolers. The differences observed were related to the type of habit most frequent in each age group.

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## KEYWORDS:

Cross-Sectional Study; Preschoolers; Infant-children; Age groups; Dysfunctional oral habits.



## INTRODUCTION

*Habits* are behaviors that are acquired by the constant repetition of specific actions present in everyday life<sup>1-5</sup>. In this regard, parafunctional oral habits are acquired customs or practices whose constant repetition lacks functionality, which initially can be performed consciously; however, if its activity is prolonged, it can become an involuntary habit that can cause alterations in orofacial development<sup>6-11</sup>. Its frequency is variable, as cases ranging from 40.7% in Colombian children<sup>12</sup> to 100% in Cubans<sup>13</sup> have been observed. To date, no type of connection in terms of sex or age has been demonstrated<sup>14-18</sup>; however, concerning this last variable, it seems that the epidemiological behavior of this type of habit can be distributed differently depending on the age group to which it refers.

Regarding their behavior, it has been observed that both the prolonged use of pacifiers and Bottle-Feeding tend to be more frequent in toddlers, while onychophagia and finger sucking are the most prevalent in preschoolers and schoolchildren<sup>12-17, 19, 21-30</sup>. Likewise, reports indicate that onychophagia and finger sucking are the most frequent in preschoolers, meanwhile bottle-feeding and pacifier use are the most prevalent in toddlers<sup>14,19-22</sup>.

This research aimed to compare the frequency of parafunctional oral habits and their relationship with two age groups: toddlers and preschoolers, enrolled in the Child Care and Attention Centers (CACI) of the Mexico City government.

## MATERIAL AND METHODS

### Study Design and participants

A descriptive, cross-sectional study was conducted in a convenience sample initially composed of 297 children (including toddlers aged 1 and 2 years old) and preschoolers (including children between 3 and 5 years of age), enrolled in five Child Care Centers (CACI) in Mexico City.

Twenty-eight children (9.42%) were excluded from the study due to their parents not agreeing

with their inclusion, because they were absent the day of data collection, or because the child refused the oral examination; finally, 269 of them were surveyed.

### Ethical and legal considerations of the study.

The study was approved by the Bioethics and Biosafety Committee of the Dental Occlusion Research Line (LIFESZ-230506), attached to the Faculty of Higher Studies Zaragoza, National Autonomous University of Mexico. Additionally, the informed consent of the parents/proxies was requested for their child to take part in the study. During the standardization of the examiner and the epidemiological survey, the dispositions of the Mexican Ministry of Health (NOM013-SSA2-200635) were considered, which contemplates the regulations for the prevention of the transmission of infections.

### Examiner calibration.

For data collection, the intra-examiner calibration of a Dental Surgeon was carried out, ensuring its reliability by calculating absolute and relative concordance and Cohen's kappa coefficient, which guaranteed that such concordance was not due to chance. In all cases, the kappa value was equal to or greater than 0.941, that is, an almost perfect degree of concordance.

### Data collection procedure

The epidemiological survey was carried out in a school classroom during school hours by a Dental Surgeon illuminating the clinical field with a MOICO®, USA, rechargeable, 1000LM white light headlamp, examination gloves, and a Hu-Friedy® MIR5 #5 Front Surface Mouth Mirror with no magnification.

A questionnaire, designed specifically for the study, was administered to each of the parents/guardians. It included a series of items that allowed confirmation of the presence of the parafunctional habits of interest for this study.

### Variables and clinical assessment

The parafunctional oral habits analyzed in preschoolers were: non-nutritive sucking (finger or lip sucking), use of pacifiers or bottle-feeding, onychophagia, tongue thrusting, cheilophagia,

object biting, and mouth breathing and their distribution by age group- whether toddler or preschooler - and by sex<sup>1-6,12-15,18,21,30</sup>.

During the clinical examination, fingers were scrutinized to verify their cleanliness and evidence of calluses; regarding lips, it was observed whether the upper lip covered two-thirds of the incisors and whether the lip closure was performed passively without forcing the lower lip. If the lower lip remained undisturbed in relation to the upper lip, and whether it showed any sign of irritation of the skin surrounding it.

Examination of the nose made it possible to identify the contour of the nasal flaps and to observe the sealing of the lips during the act of breathing. As for the fingers, nails and cuticles were examined to verify any wear or bite on them or the presence of inflammation or infection. Finally, the contour, insertion, and tone of the buccinator, orbicularis oculi, and mentalis muscles were verified.

**Statistical Methods**

The SPSS v.21.0 (IBM, USA) statistical package for Windows was employed for statistical analysis.

Absolute and relative frequencies were calculated to measure the presence of parafunctional oral habits. Cronbach's alpha coefficient was calculated to measure the reliability of the questionnaire. To determine the frequency, absolute and relative frequencies were calculated, as well as confidence intervals. To measure the association between each habit and age group, and sex, the Pearson Chi-square value was calculated. A confidence level of 95% was considered in all cases. The tables were designed in Office Microsoft® Excel v.365.

**RESULTS**

The study sample consisted of 269 children, 27.9% of whom belonged to the toddler group and 72.1% to the preschool group, with a gender representation of 44.6% for females and 55.4% for males (Table I).

Regarding the questionnaire, the Cronbach's alpha coefficient was 0.832, which showed it

Table I: Distribution of the composition of the study sample by age group and sex.

	Toddlers		Preschoolers		Total	
Sex	f	%	f	%	f	%
Girls	40	14.9	80	29.7	120	44.6
Boys	35	13.0	114	42.4	149	55.4
<b>Total</b>	<b>75</b>	<b>27.9</b>	<b>194</b>	<b>72.1</b>	<b>269</b>	<b>100.0</b>

f = absolute frequency

Table II Distribution of cases of parafunctional habits.

	f	%	IC <sub>95%</sub>
<b>Parafunctional Habits</b>			
Absent	111	41.3	[39.8 – 44.2]
Present	158	58.7	[53.2 – 65.6]
<b>Bottle-Feeding</b>			
Absent	256	95.2	[92.7 – 96.4]
Present	13	4.8	[2.3 – 5.8]
<b>Finger Sucking</b>			
Absent	242	90.0	[88.2 – 93.5]
Present	27	10.0	[6.0 – 14.0]
<b>Lip Sucking</b>			
Absent	248	92.2	[90.4 – 94.3]
Present	21	7.8	[5.3 – 11.0]
<b>Onychophagia</b>			
Absent	227	84.4	[81.9 – 86.1]
Present	42	15.0	[11.8 – 20.3]
<b>Cheilophagia</b>			
Absent	250	92.9	[90.8 – 93.8]
Present	19	7.1	[5.1 – 10.2]
<b>Object biting</b>			
Absent	185	68.8	[67.1 – 69.8]
Present	84	31.2	[26.4 – 37.3]
<b>Tongue Thrusting</b>			
Absent	263	97.8	[95.2 – 98.6]
Present	6	2.2	[0.04 – 4.2]
<b>Mouth Breathing</b>			
Absent	222	82.5	[80.7 – 84.6]
Present	47	17.5	[13.6 – 22.1]
<b>Total</b>	<b>269</b>	<b>100</b>	

f = absolute frequency. IC<sub>95%</sub> = 95% confidence interval

to be a reasonably homogeneous and reliable instrument per the purpose of the questionnaire.

In terms of the presence of parafunctional habits, 58.7% of the children presented at least one of these habits, with the habit of biting objects being the most frequent (31.2%) compared to the others, followed by onychophagia (15%) and nocturnal mouth breathing (11.9%) (Table II).

Regarding the distribution of parafunctional habits by age group, it was observed that they were more frequent in the preschool group (42.8%) compared to toddlers (16%) (Table III).

The pattern of each of these habits showed that biting objects, lip sucking, tongue thrusting, finger sucking, and mouth breathing were more frequent in preschoolers than in the toddler's group; however, none of these differences were statistically significant ( $p=0.294$ ;  $p=0.061$ ;  $p=0.536$ ;  $p=0.116$  and  $p=0.142$ ). Bottle-feeding was more frequent in toddlers, a condition that was statistically significant ( $p=0.0001$ ).

As for onychophagia and cheilophagia, they were more frequent in preschoolers; In these two cases, the differences observed were associated with the age group ( $p=0.004$  and  $p=0.023$ ) (Table IV).

Regarding the frequency of parafunctional habits by sex, it was observed that it predominated more in males (34.6%), as well as in each of the different types of parafunctional habits studied, with no statistically significant differences being found in any of the cases:

biting objects ( $p=0.237$ ); onychophagia ( $p=0.069$ ); cheilophagia ( $p=0.866$ ); tongue thrusting ( $p=0.788$ ); finger sucking ( $p=0.404$ ); mouth breathing ( $p=0.064$ ); as is the case of bottle use ( $p=0.648$ ) (Table V).

## DISCUSSION

According to the results obtained in this research, the prevalence of parafunctional oral

habits was lower than that reported in similar populations by Mendoza et al.<sup>14</sup>, Chumi et al.<sup>7</sup> and Aróstica et al.<sup>4</sup> but higher than that reported by Lopes et al.<sup>15</sup>

In terms of their frequency by age group and sex, it was observed that it predominated more in preschoolers and males, dissimilar from what was reported by Al-Sadhan *et al.*<sup>2</sup> and by Pacheco *et al.*<sup>3</sup>, which illustrates that the environmental and the behavioral conditions of each individual 1,3-5 are relevant from the clinical point of view due to the fact that these can exert mechanical and functional actions that cause alterations in the stomatognathic system, which is why they are considered to be risk factors that can alter the establishment and development of dental occlusion.

Regarding its frequency by age group, it was observed more in preschoolers than in toddlers; In this regard, the risk of developing them may not change, although certain habits may become more likely to be adopted based on the conditions of their family, social and cultural environment under which they grow up. Thus, it was not a coincidence that bottle-Feeding was more frequent in toddlers than preschoolers since it is more likely that the former presents this habit.

Regarding sex, although males presented parafunctional oral habits more frequently, it was not enough to suggest that this variable had any relevance in the development of any dysfunctional habit. Independently of whether it was a girl or a boy, it seems that this condition did not favor a higher frequency in either of the two categories<sup>14-18</sup>.

The habit of biting objects was the most frequent, a higher pattern than that reported by Chumi et al.<sup>7</sup> yet less frequent than reported by Arias et al.<sup>1</sup>. The relevance of this data lies in the risk that this habit presents in the normal development of dental occlusion in the permanent dentition, altering the conditions of the relationship between the teeth in the anterior sextant, which can manifest itself in an increased anterior protrusion<sup>13,16-17</sup>.

Table III: Distribution of cases of Parafunctional habits by age group.

	Absent		Present		Total	
	f	%	f	%	f	%
<b>Toddlers</b>	32	11.9	43	16.0	75	27.9
IC <sub>95%</sub>	[9.7 – 12.3]		[11.3 -18.4]			
<b>Preschoolers</b>	79	29.4	115	42.8	194	72.1
IC <sub>95%</sub>	[27.1 – 31.6]		[36.3 -49.0]			
<b>Total</b>	111	41.3	158	58.7	269	100

f = Absolute frequency. IC<sub>95%</sub> = 95% Confidence Interval

Table IV: Distribution of Parafunctional Habits, by age group.

	Absent		Present		IC <sub>95%</sub>	Significance
	f	%	f	%		
<b>Bottle-Feeding</b>						
Toddlers	65	24.2	10	3.7	[21.3 – 26.4]; [1.09 – 4.60]	<i>p</i> =0.0001*
Preschoolers	191	71.0	3	1.1	[11.8 – 16.7]; [0.05 – 1.80]	
<b>Lip Sucking</b>						
Toddlers	73	27.1	2	0.7	[24.8 – 28.7]; [0.09 – 0.98]	<i>p</i> =0.061
Preschoolers	175	65.1	19	7.1	[62.4 – 67.1]; [3.80 – 9.10]	
<b>Onychophagia</b>						
Toddlers	71	26.4	4	1.5	[24.6 – 27.7]; [0.66 – 2.10]	<i>p</i> =0.004*
Preschoolers	156	58.0	38	14.1	[56.2 – 60.1]; [11.8 – 16.7]	
<b>Cheilophagia</b>						
Toddlers	74	27.5	1	0.4	[25.3 – 29.2]; [0.03 – 0.95]	<i>p</i> =0.023*
Preschoolers	176	65.4	18	6.7	[63.9 – 67.3]; [5.20 – 8.10]	
<b>Object Biting</b>						
Toddlers	48	17.8	27	10.0	[15.9 – 16.7]; [8.30 – 12.40]	<i>p</i> =0.294
Preschoolers	137	50.9	57	21.2	[48.6 – 53.0]; [17.2 – 24.8]	
<b>Tongue Thrusting</b>						
Toddlers	74	27.5	1	0.4	[24.8 – 29.7]; [0.02 – 0.93]	<i>p</i> =0.536
Preschoolers	189	70.3	5	1.9	[68.6 – 72.5]; [0.08 – 2.70]	
<b>Finger Sucking</b>						
Toddlers	64	23.8	11	4.1	[21.9 – 24.7]; [1.3 – 5.9]	<i>p</i> =0.116
Preschoolers	178	66.2	16	5.9	[64.4 – 67.9]; [2.4 – 7.3]	
<b>Mouth Breathing</b>						
Toddlers	66	24.5	9	3.3	[22.1 – 25.8]; [2.10 – 4.60]	<i>p</i> =0.142
Preschoolers	156	58.0	38	14.1	[56.2 – 60.1]; [11.0 – 16.3]	

f = Absolute frequency. IC<sub>95%</sub> = 95% Confidence Interval \**p*≤0.05.

Table V: Distribution of Parafunctional Habits, by gender group.

Parafunctional Habit	Absent		Present		IC <sub>95%</sub>	Significance
	f	%	f	%		
<b>Parafunctional Habit</b>						
Female	55	20.4	65	24.2	[19.2 – 21.8]; [21.3 – 26.9]	<i>p</i> =0.215
Male	56	20.8	93	34.6	[19.4 – 21.6]; [30.6 – 36.9]	
<b>Bottle-Feeding</b>						
Female	115	42.8	5	1.9	[41.5 – 44.0]; [0.08 – 2.6]	<i>p</i> =0.648
Male	141	52.4	8	3.0	[50.3 – 54.8]; [1.15 – 4.2]	
<b>Lip Sucking</b>						
Female	111	41.3	9	3.3	[39.7– 43.6]; [0.09 – 5.2]	<i>p</i> =0.866
Male	137	50.9	12	4.5	[48.4 – 52.7]; [2.7 – 6.10]	
<b>Onychophagia</b>						
Female	100	37.2	20	7.4	[36.1 – 38.3]; [5.9 – 8.6]	<i>p</i> =0.669
Male	127	47.2	22	8.2	[45.3 – 48.8]; [6.4 – 9.7]	
<b>Cheilophagia</b>						
Female	114	42.4	6	2.2	[40.6 – 43.9]; [1.4 – 3.1]	<i>p</i> =0.866
Male	136	50.6	13	4.8	[48.7 – 51.1]; [2.9 – 6.3]	
<b>Object Biting</b>						
Female	87	32.3	33	12.3	[31.2 – 33.5]; [8.3 – 14.4]	<i>p</i> =0.237
Male	98	36.4	51	19.0	[34.4 – 37.8]; [17.2 – 24.8]	
<b>Tongue Thrusting</b>						
Female	117	43.5	3	1.1	[41.5 – 44.0]; [0.03 – 0.98]	<i>p</i> =0.788
Male	146	54.0	3	1.1	[52.8 – 56.2]; [0.06 – 2.3]	
<b>Finger Sucking</b>						
Female	110	40.9	10	3.7	[38.9 – 42.3]; [2.3 – 4.9]	<i>p</i> =0.404
Male	132	49.1	17	6.3	[48.2 – 51.0]; [4.4 – 7.8]	
<b>Mouth Breathing</b>						
Female	105	39.1	15	5.6	[37.7 – 41.1]; [4.1 – 7.2]	<i>p</i> =0.064
Male	117	43.4	32	11.9	[41.3 – 43.9]; [10.3 – 12.8]	

f = Absolute frequency . IC<sub>95%</sub> = 95% Confidence Interval

Bottle-Feeding had a higher prevalence than that reported by Mendoza et al.<sup>14</sup>, but lower than described by Oregul et al.<sup>23</sup>, it was observed more frequently on toddlers, showing statistically significant evidence. Its relevance lies in the fact that the bottle teat's length and width are more extensive and displaces the tongue downwards to the floor of the mouth, preventing the proper anterior movement of the mandible, which causes it to remain in a distal position, resulting in delayed bone growth and dental malpositions such as crossbite, open bite and increased overjet and overbite<sup>23</sup>.

Lip sucking was lower than reported by Mendoza et al.<sup>14</sup> but higher than observed by Arias et al.<sup>1</sup>. In terms of age group, it was predominant in the preschooler group and males; however, these differences were not statistically significant; therefore, this condition was not considered relevant.

Onychophagia had a lower prevalence than that reported by Orozco et al.<sup>77</sup> but higher than that observed by Chumi et al.<sup>17</sup>. It was more frequent in preschoolers, being these results statistically significant. This behavior could be explained since onychophagia has been reported as a parafunctional habit that occurs more frequently in children and young adults. Its presence has been explained due to very particular reasons such as a way to attract attention when exposed to a violent family environment, lack of parental attention or emotional maturity, continuous changes in the family context, or, due to mimicking; therefore, each individual has different chances of developing it. Its clinical relevance is that it can lead to reduced masticatory muscle strength, incisal edge wear, tooth rotation, mobility, and malocclusion, mainly in anterior teeth<sup>1-3,7-8</sup>.

Cheilophagia was observed with a lower frequency than that reported by Kamdar et al.<sup>18</sup> but higher than that reported by Rodriguez et al.<sup>22</sup>. It was slightly higher in the male sex with predominance in the preschooler group. This difference was statistically significant; nevertheless, it should be considered that this

parafunctional habit is not necessarily a causal factor of dental malocclusion but its consequence. Therefore, its presence does not cause as much concern as the type of malocclusion presented by the child.

Tongue thrusting habit had a lower prevalence than that reported by Mendoza et al.<sup>14</sup>, being slightly more frequent in preschoolers than toddlers. This parafunctional habit is relevant since it can alter the occlusion because the forces produced during the execution of this habit are sufficient to cause dentoalveolar modifications that lead to an anterior or posterior open and crossed bite.

As for finger sucking, it showed a lower frequency than that reported by Mendoza et al.<sup>14</sup> and Dođramacı et al.<sup>9</sup>. It was observed that preschoolers performed this parafunctional habit more frequently than toddlers, predominantly in the male sex; however, these differences did not prove significant, that is, it did not matter the age range or sex, since they all presented a similar risk of developing this parafunctional habit.

Regarding mouth breathing, its prevalence was lower than that reported by Arias A. et al.<sup>1</sup>. According to age, it was observed that the prevalence was slightly higher in the preschooler group and was predominant in the male sex, with no significant differences between these variables.

The importance of this habit in the study sample lies in the fact that this habit is considered normal up to three years of age<sup>27-28</sup>. However, when prolonged, the alterations in the structures could be irreversible, which can manifest themselves in vestibuloversion of the upper incisors, linguoversion of lower incisors, diastemas, mandibular retrognathism, deep palatal vault, anterior or posterior open bite (which will depend on the fingers sucked and their direction), transverse micrognathism, crossbite and interference in eruption and dental position<sup>26-29</sup>.

## CONCLUSION

Parafuncional habits were independent of the age group; the differences were observed concerning the most frequent habit in each age group.

The importance of developing educational activities with the parents regarding these habits is emphasized to eradicate them, thus avoiding sequelae, or preventing their occurrence in those children who did not present them.

## CONFLICT OF INTEREST

The authors have declared no conflict of interest.

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#### HOW TO CITE THIS ARTICLE

Murrieta J, Ramírez M, Salgado L, Salamanca R. Frecuencia de hábitos bucales parafuncionales y su relación con el grupo etario. *Appl Sci Dent.* 2021;1(1);1-10  
DOI: 10.22370/asd.2021.1.1.2529

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