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Prevalence of malocclusions and dysfunctional oral habits in preschool children of municipal establishments in Viña del Mar.

Prevalencia de maloclusiones y hábitos orales parafuncionales en preescolares de establecimientos municipales de Viña del Mar.

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Abstract: **Introduction:** Malocclusions are a public health problem at national and global level, being third in the ranking of the most prevalent oral pathologies.Its origin is multifactorial, with dysfunctional oral habits being a risk factor. The objective of this study was to determine the prevalence of malocclusions and dysfunctional oral habits in students aged between 4 and 6 years in state-run public schools in Viña del Mar, Chile. **Material and methods:** A prevalence study was carried out in 184 students selected by random cluster sampling. Malocclusions were assessed by clinical examination, while dysfunctional oral habits were assessed by questionnaires and clinical examination. The data were analyzed using Fisher's exact test, Chi-square test and the PHI correlation coefficient. **Results:** The prevalence of malocclusions was 54.35% (95% CI [47.04% - 61.47%]), with dental crowding being the most frequent, while prevalence of dysfunctional oral habits was 95.11% (95% CI [90.82% - 97.45%]), led by lingual interposition. In none of the cases statistically significant differences of age, gender or class were noticed. The evidence provided by this study indicates that the presence of malocclusions is independent of the presence of dysfunctional oral habits, except between open bite and interposition of objects, whose magnitude of dependence was minor (0.2). **Conclusion:** There is a high prevalence of malocclusions and dysfunctional oral habits in preschool children, with dental crowding and lingual interposition being the most frequent, respectively. The presence of malocclusions is independent of the presence of dysfunctional oral habits.

Keywords: Malocclusion; tooth, deciduous; habits; child, preschool; child; students

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Resumen: Introducción: Las maloclusiones constituyen un problema de salud pública a nivel nacional y mundial, ocupando el tercer lugar en el ranking de patologías bucodentales más prevalentes. Su origen es multifactorial, siendo algunos de sus factores de riesgo los hábitos orales disfuncionales. El objetivo fue determinar la prevalencia de maloclusiones y hábitos orales disfuncionales en alumnos entre 4 y 6 años pertenecientes a establecimientos municipales

de Viña del Mar. **Material y Métodos:** Se realizó un estudio de prevalencia en 184 alumnos seleccionados por muestreo aleatorio por conglomerados. Las maloclusiones fueron evaluadas mediante examen clínico, mientras que los hábitos orales disfuncionales a través de cuestionarios y examen clínico. Los datos fueron analizados utilizando el test Chi^2, prueba exacta de Fisher y el coeficiente de correlación Phi. **Resultados:** La prevalencia de maloclusiones fue de 54.35% (IC 95% [47,04% - 61,47%]), siendo el apiñamiento la más frecuente, mientras que la de hábitos orales disfuncionales fue de 95.11% (IC 95% [90,82% - 97,45%]), liderada por la interposición lingual. Para ambos casos no se observaron diferencias estadísticamente significativas con edad, género y curso. La evidencia aportada por este estudio señala que la presencia de maloclusiones es independiente de la presencia de hábitos orales disfuncionales, excepto entre mordida abierta e interposición de objetos, cuya magnitud de dependencia fue leve (0.2). **Conclusión:** Existe una alta prevalencia de maloclusiones y hábitos orales disfuncionales en pre-escolares, siendo los más frecuentes el apiñamiento y la interposición lingual, respectivamente. La presencia de maloclusiones es independiente de la presencia de hábitos orales disfuncionales.

Palabra Clave: *Maloclusión; Diente Primario; Hábitos; Preescolar; Niño; Estudiantes.*

INTRODUCTION.

Dento-maxillary anomalies or malocclusions are a public health concern at the national and international levels. They rank third among the most prevalent oral pathologies after dental caries and periodontal disease.[1] However, they have not been considered as a priority in the health objectives for the next decade.[2] These anomalies are of multifactorial origin, and some risk factors are genetic load, parafunctional oral habits, nutritional and/or congenital defects. There is controversial evidence that establishes an association between them and deformations in the jaw and poor position of the teeth.[3]

Worldwide, the prevalence of malocclusions and parafunctional oral habits has been extensively studied in different age groups. However, at the national level in Chile, even though there has been some research in this regard, studies are few and tend to have been carried out on groups of schoolchildren and adolescents.

They have not included preschoolers, despite the fact that occlusion alterations that begin at an early age, and which are not adequately treated, could compromise permanent dentition.[4]

This study aimed to determine the prevalence of malocclusions and relate it to parafunctional oral habits in children between 3 and 6 years old attending municipal schools in the city of Viña del Mar, Chile, since their distribution and complexity can help implement preventive and interceptive measures.[5]

MATERIALS AND METHODS.

A prevalence study was conducted. The sample size was calculated based on a pilot study that reported a prevalence of malocclusion of 81.25%. This was adjusted by a loss value of 60% according to Gantz *et al.*,[6] reaching a sample size of 140 preschoolers. The sample was randomly selected from seven schools, which were visited until completing the data collection process, from a total of 37 municipal-run schools in the city of Viña del Mar. The inclusion criteria consisted of preschool children between 4 and 6 years of age at the time of the clinical examination, who were attending preschool or kindergarten, and who had complete primary dentition. Preschoolers who were or had been under orthodontic-interceptive treatment, those with one or more erupted permanent teeth, those mentally and intellectually disabled, and those with uncooperative behavior during the clinical examination were excluded.

The variables selected for the study were age on the ordinal scale, gender, school grade or level, parafunctional oral habits (onychophagia, finger sucking, lip sucking, pacifier sucking, bottle sucking, interposition (biting of sucking) of objects, oral breathing) each measured on a dichotomous-category nominal scale, except lingual interposition, which was measured in seven categories. Dento-maxillary anomalies were evaluated through the Bonn's Modified Biogenetic Classification.[7]

Of these, only simple intermaxillary anomalies were considered, anterior inverted bite due to accommodation, with and without secondary alterations, disto-occlusion, overbite, crowding, open bite, protrusion, crossbite, bite, presence of dento-maxillary anomaly, and presence of parafunctional oral habits, all of them on a nominal scale, dichotomous category. Distal relationship of the second primary molars and sagittal relationship of the primary canines was measured on the nominal polychotomous

category scale. Overjet and overbite were measured on a discrete scale in millimeters.

Two calibrated operators performed the examinations. For the quantitative variables, Kappa was calculated and an almost perfect degree of concordance was obtained, both inter-examiner (0.86) and intra-examiner (0.92). For qualitative variables, Lin was applied, and a substantial degree of agreement was obtained, both inter-examiner (0.96) and intra-examiner (0.96).

Data collection was carried out from June to November 2016 by means of a clinical examination that consisted of evaluating a preschooler by one examiner. Subjects were sitting in a chair, with his/her back and head in the most upright position possible, while the examiner sat in front of the subject, at a distance no greater than 30 centimeters. Procedure gloves, masks, surgical drapes, "North Carolina" periodontal probes (Hu-Friedy®), Glatzel mirrors, and wooden tongue depressors were used for the examination. Illumination consisted of desk lamps with 52-watt warm light bulbs.

Oral articulation parafunctional habits were clinically diagnosed through various exercises related to this function, complemented with intraoral and extraoral examinations. A questionnaire validated by three experts in the area was sent to the parents to inquire about the presence of onychophagia, finger sucking, lip sucking, use of pacifier, bottle, and objects.

To detect oral breathing, the Glatzel mirror test was used, which consists of placing the patient in the mandibular rest position, placing the graduated mirror under the nostrils, and requesting 3 respiratory cycles. If a halo under 30 millimeters was formed in any of the 2 nostrils, it meant that there was low nasal flow, indicating the presence of oral breathing; if it is greater it was considered nasal breathing.

For data analysis, the statistical software "STATA", version 13, was used. Qualitative variables were expressed both in frequency and contingency tables, and quantitative variables were reported through descriptive measures of central tendency and dispersion, such as mean and standard deviation. In each case, the confidence intervals (95%) are reported to make inference of the estimators.

To relate the variables in the contingency tables, statistical significance tests were used: Pearson's Chi-square test for normal distribution data, and verified using the Monte Carlo method, while Fisher's exact test was preferred as an alternative, and the correlation coefficient Phi. For each case the assumptions of analysis were respected, and the results were considered significant when p-values ≤0.05.

The study was approved by the Institutional Scientific Ethics Committee of the Universidad Andres Bello according to resolution No. 25 of August 3rd, 2016. It was authorized by the Director of Education of the Municipal Corporation of Viña del Mar according to Ordinary Form No. 266 of April 12, 2016. It was also approved and authorized by the headmasters of the participating educational establishments. The parents or guardians were asked to provide informed consent and each preschooler had to explicitly agree to participate in the study.

RESULTS.

Of a total of 307 preschoolers from the seven educational establishments, 123 students (40.0%) were excluded for the following reasons: 53 (17.2%) without informed consent or explicit agreement, 46 (15.3%) with the presence of one or more permanent teeth, 21 (6.9%) with the absence of one or more deciduous teeth, two (0.6%) due to uncooperative behavior during the clinical examination, and one (0.3%) who was under interceptive-orthodontic treatment, resulting in a sample of 184 preschoolers.

The characteristics of the total sample according to age, gender and grade-level were as follows: by age group, 4 years old: 76 (41.30%) CI [34.35% - 48.62%], 5 years old: 90 (48.91%) CI of [41.70% - 56.18%], and 6 years old: 18 (9.78%) CI of [6.22% - 15.05%]. According to gender, 98 (53.26%) were male, CI of [45.97% - 60.42%]; and 86 (46.74%) were females, CI of [39.58% - 54.03%]. According to level, 100 (54.35%) [47.04% - 61.47%] were in preschool, and 84 (45.65%) [38.53% - 52.96%] were in kindergarten.

Prevalence of malocclusions affected 100 subjects out of 184 (54.35%) (95% CI [47.04% - 61.47%]), the distribution of the frequencies of malocclusions according to age, gender and level is detailed in Table 1, none of them showed significant differences.

Of a total of 132 malocclusions (1.32 malocclusions per affected subject)[20] (15.15%) (95% CI [9.93% - 22.43%]) corresponded to sagittal dento-maxillary abnormalities, 48 (36, 36%) (95% CI [28.52% - 45.01%]) to vertical abnormalities, and 64 (48.49%) (95% CI [39.98% - 57.08%]) to transversal abnormalities. The distribution of the type of malocclusion according to frequency is observed in

Table 2 where crowding, overbite, and crossbite were the most prevalent.

Regarding overjet, the mean and its standard deviation was 2.06 ± 1.34 millimeters (95% CI [1.86 - 2.25]), and in terms of overbite, the mean and its standard deviation were 2.27 ± 1.62 millimeters (95% CI [2.03-2.50]). In the types of distal relationship of the second primary molars, the bilateral mesial relationship was more prevalent, and in the types of sagittal relationship of the temporal canines, the bilateral Class I was more prevalent (Table 3 and Table 4).

Of the 184 evaluated preschoolers, the prevalence of parafunctional oral habits affected 175 subjects (95.11%) who had parafunctional oral habits (95% CI [90.82% - 97.45%]), and 9 (4.89%) who did not (95% CI [2.55% - 9.18%]. In total they accumulated 410 parafunctional oral habits, 2.23 per subject, their distribution is reported in Table 5. Lingual interposition was the most frequent, and this it is presented disaggregated in the table.

The contingency table that related the presence of any type of malocclusion and the presence of any type of parafunctional oral habits provides evidence of the independence between both variables. (Table 6)

And when evaluating each type of parafunctional oral habit with the different types of malocclusion. (Table 7)

Only a statistically significant relationship was found between open bite and interposition of objects; when determining the magnitude of this relationship, a value of 0.20 (mild) was obtained.

Table 1. Presence of malocclusion according to age, gender, and level in vulnerable preschoolers from Viña del Mar Chile.

	Presence of malocclusions			Absence of malocclusions			
Level	**Frequency**	**Percentage(%)**	**CI 95%**	**Frequency**	**Percentage(%)**	**CI 95%**	***p*-value**
4 years	43	43.0	[33.57 - 52.96]	33	39.3	[29.32 - 50.22]	0.65
5 years	46	46.0	[36.40 - 55.91]	44	52.4	[41.6 - 62.94]	
6 years	11	11.0	[6.15 - 18.89]	7	8.3	[3.98 - 16.62]	
Total	**100**	**100**		**84**	**100**		
Male	59	59.0	[49.02 - 68.29]	39	46.43	[35-93 - 57.25]	0.09
Female	41	41.0	[31.71 - 50.98]	45	53.57	[42.75 - 64.07]	
Total	**100**	**100**		**84**	**100**		
Pre-kinder	54	54.0	[44.09 - 63.60]	38	46.0	[36.39 - 55.92]	0.92
Kinder	46	46.0	[36.40 - 55.91]	46	45.24	[34.82 - 56.09]	
Total	**100**	**100**		**84**	**100**		

Table 2. Distribution of the type of malocclusion in vulnerable preschool children from Viña del Mar, Chile.

Malocclusion	**Frequency**	**Percentage(%)**	**CI 95%**
Crowding	47	35.61	[27.82 - 44.24]
Overbite	40	30.3	[22.99 - 38.77]
Crossbite	14	10.61	[6.34 - 17.22]
Open bite	8	6.06	[3.03 - 11.75]
Simple progenic form	6	4.55	[2.03 - 9.84]
Inverted anterior bite by accommodation, with secondary alterations	6	4.55	[2.03 - 9.84]
Inverted anterior bite by accommodation, without secondary alterations	5	3.79	[1.57 - 8.87]
Disto-occlusion	3	2.27	[0.72 - 6.90]
vis-a-vis bite	3	2.27	[0.72 - 6.90]
Total	**132**	**100**	

Table 3. Distal relationship of the second temporal and sagittal molars of the temporal canines in vulnerable preschoolers from Viña del Mar, Chile.

		Frequency	Percentage(%)	CI 95%
Distal relationship of second primary molars	Bilateral mesial step	134	72.83	[65.88 - 78.81]
	Post-lacteal plane bilateral	18	9.78	[6.22 - 15.05]
	Post-lacteal plane and mesial step	13	7.07	[4.13 - 11.84]
	Bilateral distal step	9	4.89	[2.55 - 9.18]
	Post-lacteal plane and distal step	6	3.26	[1.46 - 7.12]
	Mesial and distal step	4	2.17	[0.81 - 5.70]
Sagittal relationship of temporal canines	Class I bilateral	90	48.91	[41.70 - 56.18]
	Class I and class II	31	16.85	[12.07 - 23.03]
	Class III bilateral	21	11.41	[7.53 - 16.93]
	Class II bilateral	18	9.78	[6.22 - 15.05]
	Class I and class III	18	9.78	[6.22 - 15.05]
	Class II and class III	6	3.26	[1.46 - 7.12]

Table 4. Distribution of dysfunctional oral habits in vulnerable preschoolers from Viña del Mar, Chile.

Dysfunctional oral habit	Frequency	Percentage(%)	CI 95%
Lingual interposition	157	38.29	[33.69 - 43.11]
In phonoarticulation	56	13.66	[10.65 - 17.35]
In swallowing and phonoarticulation	45	10.98	[8.29 - 14.40]
At rest, in swallowing and phonoarticulation	24	5.85	[3.95 - 8.60]
At rest and in phonoarticulation	14	3.41	[2.03 - 5.69]
In swallowing	11	2.68	[1.49 - 4.79]
At rest	6	1.46	[0.66 - 3.23]
At rest and in swallowing	1	0.24	[0.03 - 1.72]
Onychophagia	66	16.1	[12.84 - 20]
Interposition of objects	57	13.9	[10.87 - 17.62]
Bottle sucking	41	10.0	[7.44 - 13.32]
Lip sucking	33	8.05	[5.77 - 11.12]
Digital suction	31	7.56	[5.36 - 10.57]
Oral breathing	21	5.12	[3.36 - 7.74]
Pacifier sucking	4	0.98	[0.37 - 2.58]
Total	**410**	**100**	

Table 5. Relationship between malocclusion and dysfunctional oral habits in vulnerable preschoolers from Viña del Mar, Chile.

Malocclusion	Dysfunctional oral habit				Total		*p*-value
	Absent		Present				
	Frequency	Percentage(%)	Frequency	Percentage(%)	Frequency	Percentage(%)	
Absent	6	66.66	78	44.57	84	45.65	0.17
Present	3	33.33	97	55.42	100	54.84	
Total	**9**	**100.00**	**175**	**100.00**	**184**	**100.00**	

Table 6. Independence relationship between type of malocclusion and type of dysfunctional oral habits in vulnerable preschool children from Viña del Mar, Chile.

Malocclusion	Dysfunctional oral habit							
	Onycho-phagia	Lingual interposition	Digital suction	Lip sucking	Pacifier sucking	Bottle sucking	Interposition of objects	Oral breathing
Simple progenic form	0.63	0.62	0.73	0.71	0.88	0.4	0.27	0.52
Inverted anterior bite by accommodation, without secondary alterations	0.41	0.45	0.61	0.22	0.9	0.69	0.49	0.54
Inverted anterior bite by accommodation, with secondary alterations	0.63	0.21	0.27	0.07	0.88	0.6	0.6	0.48
Disto-occlusion	0.71	0.62	0.57	0.45	0.94	0.13	0.23	0.69
Open bite	0.31	0.27	0.22	0.16	0.84	0.43	0.01	0.23
Overbite	0.38*	0.11*	0.19*	0.58*	0.63	0.41*	0.36*	0.5
Crowding	0.45*	0.60*	0.63*	0.28*	0.73	0.32*	0.19*	0.05*
Crossbite	1*	0.34	0.43	0.48	0.73	0.38	0.13	0.49
vis- a- vis bite	0.71	0.62	0.57	0.55	0.94	0.47	0.33	0.69

DISCUSSION.

The prevalence of dento-maxillary abnormalities obtained in this research was less than 66.31% (95% CI [64.32% - 68.24%]), figure reported in China by Zhou *et al.*,[9] and similar to 62.60% (95% CI [58.99% - 66.01%]) reported in Brazil by Sousa *et al.*,[8] the frequency of malocclusions is high in the 3 countries. At the national level, the prevalence of malocclusions was similar to 51.50% (95% CI [44.51% - 58.46%]) reported by Espinoza *et al.*,[10] and 38.80% (95% CI [25.88% - 53.47%]) reported by Gantz *et al.*,[6] Among the reasons that could explain the existence of these similarities is that the behavior of malocclusions is more or less constant regardless of the local context.

The high prevalence of malocclusions in preschool children in the present study could be explained by the findings of Calderón *et al.*,[12] who evaluated the implementation of the "Normas en la Prevención e Intercepción de Anomalías Dentomaxilares"[11] (Norms in the Prevention and Interception of Dento-maxillary Anomalies) that should be applied in primary care.

Of a total of 16 health centers, only 4 of them implemented these measures, mainly due to lack of training and the number dental care hours allocated for their implementation.

Regarding the occlusal characteristics evaluated (overjet, overbite, distal relationship of the second primary molars and sagittal relationship of the primary canines), it should be mentioned that the most frequent distal relationship of the second primary molars was the bilateral mesial step; this result differs from other studies.[13,14]

Results obtained in this research can be explained by the data collection method that was uncomfortable for preschoolers since, in order to evaluate this characteristic, the examiner had to be in the most perpendicular position possible to the distal aspect of the second primary molars and then pull the students' cheek with a wooden tongue depressor. This caused discomfort to the subjects, making it difficult to fully visualize the distal tooth surfaces. The method to collect these specific data is unreliable; it should be measured by other methods that do not cause discomfort to the preschool child.

Regarding the sagittal relationship of the temporal canines, most of the preschoolers had bilateral Class I, similar to the findings reported by Shavi *et al.*,[15] in

India. The most frequent distal relationships of the second temporal molars and the sagittal relationship of the temporal canines were the mesial step and Class I, both bilateral.

These conditions should result in a stable occlusion if it is transferred to the permanent dentition and there are no agents that distort these relationships. However, both at national and international levels, there is little evidence regarding the evaluation of these variables, making it difficult to compare these results.

There are various qualitative and quantitative systems for measuring the prevalence of malocclusions. A qualitative method (Modified Biogenetic classification) was used in this study. Among its disadvantages, there is a high component of subjectivity since an individual can have more than one malocclusion at once, which could make statistical analysis difficult.

However, this approach is widely used and allows to determine the proportion of malocclusion in primary dentition.[16] Baume also proposes a classification subdivided into type I and II, which assesses spacing in primary dentition, and is used to predict malocclusion in permanent dentition but not to define malocclusion in permanent teeth.[17]

On the other hand, a series of quantitative measurement methods (orthodontic indices of malocclusion) have been developed and applied to determine prevalence, severity and need for treatment in a more objective way, such as the "Index of Orthodontic Treatment Need (IOTN)" and the "Dental Aesthetic Index (DAI)". The latter is recommended by the World Health Organization (WHO) to use for the evaluation of dento-maxillary anomalies. However, this system, like the IOTN, requires that there are no deciduous teeth in the mouth, therefore, they cannot be used in primary dentition.[18]

Regarding parafunctional oral habits, the prevalence found in this research is similar to the figure of 95.90% (95% CI [84.43% - 99.03%]) reported by Gantz *et al.*,[6] and greater than 83.10% (95% CI [80.20% - 85.66%]) reported in Brazil by Facciolli *et al.*,[19] Of a total of 410 "poor oral habits", the most prevalent was lingual interposition (38.29%), mainly in phono-articulation (13.66%), a different result from that obtained by Espinoza *et al.*,[10] who reported sucking as the most prevalent (79.3%), particularly baby bottle-use (57.1%).

Regarding lingual interposition in phono-articulation, the information available in the literature is controversial, since according to the "Special educational needs associated with language and learning", developed by the Ministry of Education of Chile, the correct production of all the phonemes develops after 4 years of age.[20]

On the other hand, Aparici *et al.*,[21] point out that in many cases the production is only fully completed after 6 years of age. Therefore, it is considered that lingual interposition in phono-articulation should not be classified as a parafunctional oral habit in preschool children, since phonological acquisition is a complex process that requi-res several years to complete.

It is necessary to promote the development of promotional and prevention activities to avoid the perpetuation of parafunctional oral habits and to avoid the perpetuation of these risk factors.

This study provides evidence that the presence of dento-maxillary abnormalities is independent of the existence of "poor oral habits" in preschool children. The literature considers parafunctional oral habits as etiological agents of malocclusions in the upper age range.[19,22,24,25,26]

But at the age of 3 to 6 years it is debatable as although it is true that they can be risk factors, the manifestation of the malocclusion will take years to appear since it requires the poor habit to persist in time in order to cause the anomaly.[23,28]

That is, it is necessary that it remains after the deciduous teeth are replaced. In fact, a systematic review by Doğramacı reports that these habits only correspond to risk factors,[3,9,14,18,28] that must be controlled, but that do not necessarily result in a definitive anomaly.

On the other hand, diagnosing dento-maxillary anomalies in children aged 3 to 6 years is controversial because due to the growth dynamics and the influence of other variables, they can compensate for conditions that, when evaluated in a single exam, are not conclusive since they require follow-up.

Therefore, in this case, it is not possible to assert that patients will maintain their parafunctional habits and consequently will present malocclusion in mixed and/or permanent dentition.

Most of the studies, as well as the present one, focus only on identifying the presence of dento-maxillary anomalies,[3,8-10,28,29] and the presence of "poor oral habits."[3,10,19,25,28] It is suggested to further evaluate the exposure time since it could better explain the phenomenon of interest.

CONCLUSION.

It is concluded that there is a high prevalence of malocclusions in preschool children (around 50%), among these the most frequent are crowding and overbite.

On average, each preschool child has 2.23 parafunctional oral habits and the most frequent "poor oral habit" was lingual interposition, mainly during phono-articulation, followed by onychophagia, and interposition of objects.

Phono-articulation should not be considered a parafunctional oral habit in preschoolers, since it can be a stage of accommodation in phonological development, a process that requires several years to complete. This study provides evidence that malocclusions are independent of "poor oral habits," except for the interposition of objects and open bite, and are not conditioned by age or gender of preschoolers.

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REFERENCES.

1. Minsal. Guía clínica de atención primaria odontológica del pre-escolar de 2 a 5 años. Serie Guías Clínicas MINSAL. Santiago, Chile. 2009.
2. MINSAL. Estrategia Nacional de Salud Para el cumplimiento de los Objetivos Sanitarios de la Década 2011-2020. Elige vivir sano. Chile.
3. Gantz C, Santelices M. Prevalencia de anomalías dentomaxilares verticales y hábitos orales parafuncionales en niños de 4 a 6 años de edad con dentición temporal completa. Rev Chil Ortod. 2013; 30(2): 54-61.
4. Sandoval P, Bizcar B. Beneficios de la Implementación de Ortodoncia Interceptiva en la Clínica Infantil. IJO , 2013; 7(2): 253-65.
5. Burgos D. Prevalencia de maloclusiones en niños y adolescentes de 6 a 15 años en Frutillar, Chile. IJO, 2014; 8(1):13-19.
6. Gantz O, Santelices B. Prevalencia de anomalías dentomaxilares verticales y hábitos orales parafuncionales en niños de 4 a 6 años de edad con dentición temporal completa. Rev Chil Ortod. 2013,30(2):54-61.
7. Wauters M, Vergara D, Vergara P, Pérez D, Parada J, Aguilera J. Prevalencia de anomalías dentomaxilares y articulatorias en escolares, Cochamó. Rev Chil Ortod. 2014; 32(2):74-81.
8. Sousa R, Clementino M, Gomes M, Martins C, Granville-Garcia A, Paiva S. Malocclusion and quality of life in Brazilian preschoolers. Eur J Oral Sci, 2014; 122: 223-29.
9. Zhou Z, Liu F, Shen S, Shang L, Shang L, Wang X. Prevalence of and factors affecting malocclusion in primary dentition among children in Xi'an, China. BMC Oral Health, 2016; 16(91): 1-11.
10. Espinoza A, Parra N. Prevalencia de Anomalías Dentomaxilares y Malos Hábitos Orales en preescolares de zonas rurales de la población beneficiaria del Servicio de Salud Viña del Mar/Quillota. Rev Chil Ortod, 2011; 28(2): 58-65.
11. MINSAL. Normas en la prevención e intercepción de anomalías dentomaxilares. Chile, 1998.
12. Calderón N, Cerna N, Escudero D, Guzmán C, Leppe J, Álvarez E. Descripción de la Implementación de las Normas de Prevención e Intercepción de Anomalías Dentomaxilares a Nivel Primario del Servicio de Salud Metropolitano Oriente. Rev Chil Ortod, 2009;26(2):54-62.
13. Bhat SS, Rao HA, Hegde KS, Kumar BK. Characteristics of primary dentition occlusion in preschool children: an epidemiological study. Int J Clin Pediatr Dent. 2012;5(2):93-7.
14. Vegesna M, Chandrasekhar R, Chandrappa V. Occlusal Characteristics and Spacing in Primary Dentition: A Gender Comparative Cross-Sectional Study. Int Sch Res Notices. 2014;2014:512680.
15. Shavi GR, Hiremath NV, Shukla R, Bali PK, Jain SK, Ajagannanavar SL. Prevalence of Spaced and Non-Spaced Dentition and Occlusal Relationship of Primary Dentition and its Relation to Malocclusion in School Children of Davangere. J Int Oral Health. 2015;7(9):75-8.
16. Muñoz M, Skog F, Cueto A. Prevalencia de maloclusiones y su necesidad de tratamiento ortodóncico en una población de 12 a 15 años. [TESIS].Universidad Andrés Bello, Viña del Mar, Chile, 2014.
17. López Bazán C. "Prevalencia De Los Planos Terminales y Arcos De Baume En Pacientes Atendidos En La Clínica De La Especialización En Odontología Infantil, Del 2013 Al 2015, En La Ciudad De Xalapa, Veracruz.". Universidad Veracruzana; Xalapa, Veracruz. 2015.
18. OMS. Oral health surveys: basic methods - 5th edition. 2013.
19. Facciolli S, Cortellazzi K, da Silva E, Hebling E, Bovi G, de Castro M, Pereira A. Relationship between malocclusion and behavioral, demographic and socioeconomic variables: a cross-sectional study of 5-year-olds. Int J Clin Pediatr Dent. 2008; 33(1):75-9.
20. MINEDUC. Guia de apoyo Tecnico-Pedagogico. Necesidades educativas especiales asociadas en el nivel de educación parvularia.
Santiago, Chile. 2007
21. Aparici M, Igualada A. El desarrollo del lenguaje y la comunicación en la infancia. Cataluña. España, Editorial Universitat Oberta. 2019.
22. Marya C. Textbook of Public Health Dentistry. New Delhi, India. Editorial Jaypee Brothers Medical Publishers. 2011.
23. Álvarez M, Pérez A, Martínez I, García M, Suárez R. Hábitos bucales deformantes y maloclusiones dentarias en niños de 5-11 años. Matanzas, 2006. Rev Med Electrón. 2014;36(4): 396-407.
24. Chedid S. Ortopedia e Ortodontia para a dentição decídua: Atendimento integral ao desenvolvimento da oclusão infantil. São Paulo, Editorial Livraria Santos Editora. 2013.
25. Jajoo S, Chunawala Y, Nadeem M, Shah R, Kamble A, Karande N. Oral Habits in School Going Children of Pune: A Prevalence Study. J Int Oral Healt. 2015; 7(10):96-110.
26. Vieira R, Arrais G, Targino R, Castro C, Granville-Garcia A, Martin S. Prevalence and Associated Factors for the Development of Anterior Open Bite and Posterior Crossbite in the Primary Dentition. Braz Dent J. 2014; 25(4): 336-342.
27. Dhull K, Verma T, Dutta B. Prevalencia de hábitos orales nocivos en niños preescolares de 3 a 5 años en Bhubaneswar, Odisha, India. Int J Clin Pediatr Dent. 2018; 11(3): 210-213.
28. Corrêa-Faria P, Ramos-Jorge ML, Martins-Júnior PA, Vieira-Andrade RG, Marques LS. Malocclusion in preschool children: prevalence and determinant factors. Eur Arch Paediatr Dent. 2014;15(2):89-96.
29. Kasparaviciene K, Sidlauskas A, Zasciurinskiene E, Vasiliauskas A, Juodzbalys G, Sidlauskas M, Marmaite U. The prevalence of malocclusion and oral habits among 5-7-year-old children. Med Sci Monit. 2014;20:2036-42.