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Original Article

Clinic-pathological Study and Comparative Analysis of Orofacial Lesions in a Brazilian Population of Children and Adolescents

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Abstract

Objective: To describe the sample of Maxillofacial Complex (MFC) Lesions observed in a Brazilian service diagnostic reference for such lesions, and comparatively analyse observed data across the national and international literature. **Material and Methods:** A literature review of survey of MFC Lesions in Children and Adolescentes was performed. The keywords used were "Oral, Pathology" and "Child", and 18 articles were selected. Then, we surveyed the biopsy archives of the Department of Pathology and Legal Medicine and the Oral Pathology Laboratory of the Federal University of Ceará recorded from 1994 to 2010. The inclusion criterion was patients whose age fell within the range of 0-16 years old. **Results:** From a total of 4,775 histological results, 499 (10.4%) were selected. Most lesions were diagnosed in female patients, and the prevalence increased with age. Benign lesions represented 90.4% of those reported; some patients had mucocele and inflammatory lesions, and malignant lesions accounted for 1.8% of all lesions reported. These data, compared to the selected articles, showed little similarity between populations at the international level. **Conclusion:** the evaluated population had significant differences compared to the articles reviewed. The international level of distribution has little influence on this prevalence, which indicates the necessity for performing more local surveys to establish reliable epidemiological profiles.

Keywords: Oral, Pathology; Child; Epidemiology.

Introduction

Oral lesions in a paediatric population were classically described in 1950 by Boyes (report of clinical experience), who presented a variety of the most common pathological conditions that occur in the first years of life, emphasising the importance of the classification of pathological conditions in the diagnostic process [1]. The first epidemiological survey describing alterations of the maxillofacial complex (MFC) of children and adolescents was published in the United States in 1986 [2]. Despite the longstanding concern about oral diseases in the paediatric population, few studies [2-21] on this subject have been published in different countries, including Brazil [3,6,11,13,14,21], the United States [2,4,16], Taiwan [5,15,20], Thailand [7], England [8], Greece [9], Turkey [10], Nigeria [12], Argentina [17], Iran [18] and Chile [19].

These studies show a variable prevalence of MFC lesions in children and adolescents, ranging from 2.48% [3] to 24.80% [12]. Malignancies in children and youths are very rare [2,4-11,13-17,19-20]; therefore, most of the MFC lesion cases have a benign nature. Consequently, the diagnosis of these lesions may be oriented toward this specific group of alterations [2-20].

In most of the surveys, mucocele was the most common lesion in children and adolescents [2,3,5,6,8,9,11,14-21]. However, conditions such as dentigerous cyst [7], giant cell lesion [10] and fibroepithelial hyperplasia [17] were cited as more frequent in certain populations, which may suggest ethnic differences, differences in the diagnostic criteria [11] and differences in the standardisation of the studies [2-17].

Due to these limitations many of the studies present only descriptive analyses with little comparative data, which makes it difficult to interpret the data and accept the conclusions.

Therefore, the aim of this study was to perform an epidemiological survey of orofacial lesions in a Brazilian population of children and adolescents and to compare these results with relevant, previously published studies.

Material and Methods

This work has a binary character; it is a literature review and an epidemiological survey.

To start, we performed a literature review using the Virtual Libraries BIREME and PubMed and the keywords "Oral Pathology" and "Child" without imposing date restrictions. From a total of 15.760 articles, 20 English and Portuguese articles were selected. The inclusion criteria were epidemiological studies of orofacial lesions in children and adolescents that were diagnosed based on histopathological findings. Case reports, literature reviews and clinical surveys of oral lesions for which there were no histopathological reports were excluded.

Then, we surveyed the histopathological reports of the MFC lesions recorded in a reference center. This study was approved by the Research Ethics Committee (COMEPE) of the Federal University of Ceará (UFC) under protocol 280/05.

In this survey, the biopsy archives from 1994-2010 of the Department of Pathology and Legal Medicine of the School of Medicine and the archives of the Oral Pathology Laboratory of the

School of Dentistry of UFC were evaluated. The inclusion criteria were histopathological reports of patients from ages 0 to 16 years old, as previously published [3,7,8,12,19].

From a total of 4,775 histological results, 499 were selected and distributed in the following three groups: benign lesions, malignant lesions and lesions with inconclusive histopathological diagnosis. The benign lesions group was subdivided into the following six categories, according to the tissue of origin: lesions of salivary glands, epithelial lesions, odontogenic lesions, mesenchymal / haematological lesions, bone lesions, and others (developmental lesions, autoimmune lesions, inflammatory lesions, and lesions of uncommon origin) [8].

The prevalence of each lesion was also considered for statistical evaluation, as well as the patient sex, three age range (0-4 years old, 5-10 years old, and 11-16 years old) to decrease the reduction of the sample age group, and lesion location for the statistical analysis. The chi-square test and the Fisher's exact test were used with a 5% significance level ($p<0.05$). The overall prevalence for each study was individually compared with the present study by calculating the estimated difference in proportions with the significance level set at $p<0.05$ (5.0 BioEstat®). Additionally, cluster analysis was used to estimate, in absolute and percentual numbers, the degree of proximity of the most significant lesions from the present study and the examined articles; the studies were considered similar if they had a distance degree of no more than 25% (first quartile) (5.0 BioEstat ®).

Results

Ten point four percent (499) of the oral lesions recorded of different patients in the reference centers evaluated met the inclusion criteria of containing histopathological reports from patients aged 0 to 16 years old. (Table 1).The teeth most affected were the maxillary central incisors and there was no statistical difference between the right and left ($p = 0.999$) incisors. Most students had only one traumatized tooth n = 32 (91.4%) and the most prevalent injury was enamel fracture (n = 22/53, 6%) followed by enamel and dentin fracture without pulp exposure (n = 12/29, 4%) (Table 1).

In the present study, 300 (60.22%) histopathological reports were for female patients, while 198 (39.8%) were for male patients, and this difference was statistically significant ($p=0.0014$). The male:female ratio was approximately 0.6:1.0. In one histopathological report, it was not possible to identify the patient's sex. These findings are different from most of the studies, which do not show male and female differences (Table 1).

The age range that presented the highest prevalence in the studied population was 11-16 years old (285 cases, 57.1%), which was statistically higher than the other age ranges of 5-10 years old (186 cases, 37.3%) and 0-4 years old (28 cases, 5.6%) ($p<0.0001$). The lack of standardization in defining the age range groups in the analysed studies made it impossible to carry out a comparative analysis based on age groups. In most of the surveys, a higher number of lesions occurred in the oldest age groups (Table 2).

Table 1. Prevalence and distribution of MFC lesions in children and adolescents in the present study and in different surveys according to the patient sex and age range (period from 1986 to 2013).

Country	Survey	Inclusion Criteria	Prevalence	M:F Ratio	Age group
Brazil	This Study	0-16	10.4%	0,6:1,0	0-4; 5-10; 11-16[b,c]
	Vale[a]	0-18	13.2%	0,7:1,0	0-10;11-18[b]
	Mouchrek[a]	0-16	2.5%	1,2:1,0	0-6; 6-12; 12-16[b]
	Lima[a]	0-14	6.6%	0,9:1,0	0-6; 7-14[b]
	Sousa[a]	0-14	-	1,0:1,0	0-2; 3-4; 5-6; 7-8; 9-10; 11-12; 13-14[b]
	Maia[a]	0-12	-	-	-
	Cavalcante[a]	0-14	-	1,0:1,0	0-7; 8-14[b]
Chile	Zuñiga[a]	0-16	20.7%	0,6:1,0	0-6; 7-12[b]; 13-16
USA	Shah[a]	0-14	7.0%	-	1; 2; 3; 4; 5; 6; 7; 8; 9; 10 ;11; 12; 13; 14[b]
	Das[a]	0-20	12.3%	1,0:1,0	1-11; 12-20[b]
	Skinner[a]	1-19	12.8%	-	1-12; 12-19[b]
Taiwan	Lei[a]	0-15	2.6%	1,2:1,0	0-5; 6-10; 11-15[b]
	Wang[a]	0-14	6.6%	1,0:1,0	0-5; 6-10; 11-14[b]
	Chen[a]	0-15	6.0%	1,3:1,0	0-5; 6-10;11-15[b]
England	Jones[a]	0-16	8.2%	1,0:1,0	0-4; 5-8; 9-12; 13-16[b]
Greece	Sklavounou-Andrikopoulou[a]	0-18	5.2%	1,0:1,0	-
Iran	Siadati[a]	0-20	2.7%	0,8:1,0	-
Thailand	Dhanuthai[a]	0-16	15.0%	-	0-6; 6-12[b]; 12-16
Turkey	Gultelkin[a]	0-15	5.5%	0,9:1,0	0-5; 6-12[b]; 13-15
Nigeria	Lawoyin[a]	1-16	24.8%	1,3:1,0	1-9;10-16[b]
Argentine	Keszler[a]	0-15	6.8%	1,0:1,0	0-4; 4-8; 8-12;12-16[b]

[a]Surveys that have statistically significant differences in prevalence compared to the present study (estimated difference of proportions, $p<0.05$). [b]The age range with the highest prevalence in the evaluated study. [c]The prevalent age range in the present study, which has a statistically significant difference compared to the others (X^2, $p<0.0001$).

In the present study, benign lesions accounted for 90.4% (451) of the lesions, while 7.8% (39) presented with inconclusive histopathological diagnoses and 1.8% (9) had malignant neoplasms. From the 451 lesions of a benign nature, 115 (23.0%) were lesions of the salivary glands, 94 (18.8%) had an epithelial origin, 87 (17.4%) were odontogenic lesions, 65 (13.0%) had a mesenchymal / haematological origin, 50 (10.0%) were bone lesions, and 40 (8.0%) were lesions of other tissue origin.

In comparing each of the following groups separately, there were statistically significant differences: mucocele (salivary gland lesion); fibroepithelial hyperplasia and papilloma (epithelial lesions); dentigerous cyst, radicular cyst, odontoma and adenomatoid odontogenic tumour (odontogenic lesions); pyogenic granuloma, hemangioma and lymphangioma (mesenchymal / haematological lesions); and giant cell lesion and ossifying fibroma (bone lesions) (Table 2).

Among these lesions, mucocele, fibroepithelial hyperplasia, pyogenic granuloma, papilloma, dentigerous cyst, radicular cyst and giant cell lesions presented with statistically

significant differences, and they were evaluated according to the male to female ratio, age range and location using the chi-square test and the Fisher's exact test (Table 3).

Table 2. Distribution of benign MFC lesions in children and adolescents in the present study according to the tissue of origin, taking into consideration the patient sex and age range.

Group	Lesion	Total	(%)	Rate M:F	Age group (0–4:5–10:11–16)	P-value
Saliva-ry Glands	Mucocele[a]	101	(20.2%)	(33:68)	(1:51:49)	<0.0001
	Other	14	(2.8%)	(5:9)	(2:4:8)	0.1155
		115	(23.0%)	(38:77)	(3:55:57)	
Epithelial	Fibroepithelial Hyperplasia[a]	57	(11.4%)	(30:27)	(3:22:32)	<0.0001
	Papilloma[a]	31	(6.2%)	(5:26)	(4:13:14)	<0.0001
	Other	6	(1.2%)	(1:5)	(0:1:5)	0.7073
		94	(18.8%)	(36:58)	(7:36:51)	
Odontogenic	Dentigerous Cyst[a]	26	(5.2%)	(14:12)	(1:12:13)	0.0002
	Radicular Cyst[a]	19	(3.8%)	(10:9)	(0:3:16)	<0.0001
	Odontoma[a]	9	(1.8%)	(4:5)	(0:4:5)	0.0042
	Adenomatoid Odontogenic Tumour[a]	6	(1.2%)	(1:5)	(1:2:3)	0.0224
	Other	27	(5.4%)	(11:16)	(2:5:20)	0.0587
		87	(17.4%)	(40:47)	(4:26:57)	
Mesenc-hymal / Haemato-logical	Pyogenic Granuloma[a]	33	(6.6%)	(9:24)	(4:10:19)	<0.0001
	Hemangioma[a]	15	(3.0%)	(8:7)	(0:8:7)	0.0078
	Lymphangioma[a]	9	(1.8%)	(3:6)	(0:6:3)	0.0223
	Other	8	(1.6%)	(2:6)	(1:2:5)	0.1183
		65	(13.0%)	(43:22)	(5:26:34)	
Bone	Giant Cell Lesion[a]	19	(3.8%)	(10:9)	(0:9:10)	<0.0001
	Ossifying Fibroma[a]	13	(2.6%)	(4:9)	(0:1:12)	0.0032
	Other	18	(3.6%)	(9:9)	(0:5:13)	0.1307
		50	(10.0%)	(23:27)	(0:15:35)	
Others		40	(8.0%)	(20:20)	(6:14:20)	0.2668
Total		451	(90.4%)	(200:251)	(25:172:254)	

[a]The lesions with statistically significant differences compared to lesions of the same group as well as their respective p-values (X2, p<0.05).

Table 3. Distribution of benign MFC lesions in children and adolescents with significant difference in the present study according to the tissue of origin, taking into consideration the patient sex and age range.

Lesion	Total	%	(*p*)[b]	Sex	(*p*)[c]	Age group	(*p*)[d]	lesion location	(*p*)[e]
Mucocele[a]	101	20.2%	<0.0001	F	0.0150	5-10;11-16	<0.0001	Lip	0.0150
Fibroepithelial Hyperplasia[a]	57	11.4%	<0.0001	-	0.8515	11-16	0.0003	-	0.5981
Pyogenic Granuloma[a]	33	6.6%	0.0076	-	0.0769	11-16	0.0200	-	0.0983
Papilloma	31	6.2%	0.0362	F	0.0016	-	0.1028	-	0.0579
Dentigerous Cyst[a]	26	5.2%	0.0014	-	1.0000	5-10;11-16	0.0238	-	1.0000
Radicular cyst[a]	19	3.8%	0.0136	-	1.0000	11-16	0.0007	-	0.7152
Giant Cell Lesion[a]	19	3.8%	0.0310	-	1.0000	11-16	0.0267	-	0.0584
Haemangioma	15	3.0%							
Ossifying Fibroma	13	2.6%							
Odontoma	9	1.8%	0.1387						
Lymphangioma	9	1.8%							
Adenomatoid Odontogenic Tumour	6	1.2%							

[a]The lesions with statistically significant differences compared to lesions of the same group as well as their respective p-values (X2, p<0.05)[b]. [c]Sex distribuition of MFC lesions with statistically significant differences compared to lesions of the same group as well as their respective p-values (X2, p<0.05). [d]Age group distribution of MFC lesions with statistically significant differences compared to lesions of the same group as well as their respective p-values (X2, p<0.05).

The malignancies in children and adolescents found in this study (1.8%) consisted of two squamous cell carcinomas, two basal cell carcinomas, one rhabdomyosarcoma, one Hodgkin's lymphoma, one non-Hodgkin's lymphoma, one clear cell carcinoma, and one low-grade sarcoma. This prevalence is similar to most of the evaluated published studies (Table 4), whose most representative malignant lesions were, in general, Burkitt's lymphoma, rhabdomyosarcoma, and squamous cell carcinoma/severe epithelial dysplasia [3-21].

Table 4. Distribution of benign MFC lesions in children and adolescents with significant difference in the present study according to the tissue of origin, taking into consideration the patient sex and age range.

Country	Study	Total
Brazil	PRESENT Study[b,C]	9 (1.8%)
	Vale	0 (0.0%)
	Mouchrek[a,B]	8 (8.9%)
	Lima[a,B]	8 (1.2%)
	Sousa[b]	31 (1.3%)
	Maia[a]	8 (0.8%)
	Cavalcante[c]	6 (1.6%)
Chile	Zuñiga[b]	4 (0.7%)
USA	Shah[c]	8 (0.1%)
	Das[a,C]	3 (0.1%)
	Skinner	2 (0.1%)
	Lei[b]	6 (0.6%)
Taiwan	Wang	7 (0.9%)
	Chen[b]	5 (1.7%)
England	Jones[a,B,C]	31 (0.7%)
Greece	Sklavounou-Andrikopoulou[c]	15 (1.4%)
Iran	Siadati	0 (0.0%)
Thailand	Dhanuthai[a,B]	22 (1.8%)
Turkey	Gultelkin[b]	12 (2.5%)
Nigeria	Lawoyin[a,B]	82 (14.6%)
Argentine	Keszler[a]	21 (1.6%)

The most common oral malignancies in children and adolescents were [a]Burkitt's lymphoma, [b]rhabdomyosarcoma and [c]squamous cell carcinoma/epithelial severe dysplasia, which are cited in these referred surveys.

In literature review the, mucocele was the most common lesion in children and adolescents in 15 studies [2,3,5,6,8,9,11,14-21], however, dentigerous cyst [7], giant cell lesion [10] and fibroepithelial hyperplasia [17] were cited as more frequent in three distinct populations (Table 5).

Using a cluster analysis to compare the same lesions in absolute numbers, it was estimated that the results were similar in four Brazilian [3,6,14,21], one Nigerian [12], three Taiwaneses [5,15,20], one Iran [18] and one Chilean [19] studies (Figure 1A). The cluster analysis to compare these lesions in absolute numbers estimated how near of this study just one American study [2] (Figure 1B).

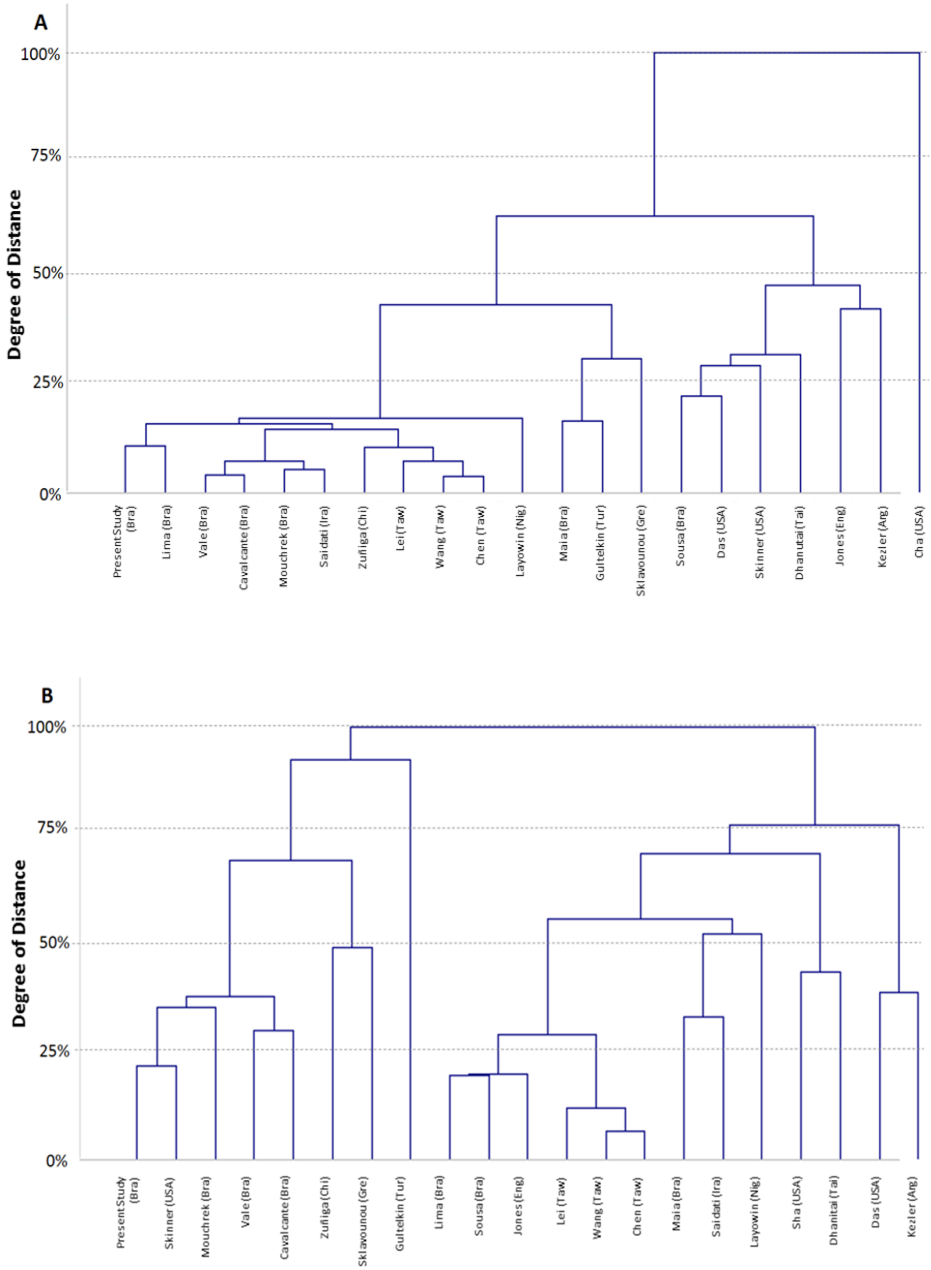

Figure 1. Dendrogram performed using a cluster analysis by the complete link aggregation method (full Euclidean distance with standardisation of variables). The variables considered were the seven lesions of statistical significance in the present study and their absolut (A) and percentual (B) values. Studies with a distance degree equal to or less than 25% were considered similar.

Table 5. A comparison of the prevalence of the seven lesions from the present study that have statistical significance with different surveys (between 1986 and 2013).

		Brazil					Chile		USA	
LESION	**THIS STUDY**	**VALE**	**MOUCHREK**	**LIMA**	**SOUSA**	**MAIA**	**CAVALCANTE**	**ZUÑIGA**	**SHA**	**DAS**	**SKINNER**
Mucocele	101[a] 20.2%	105[a] 33.3%	9[a] 10.1%	108[a.b] 17.3%	317[a] 13.5%	77 7.6%	94[a.b] 25.4%	302[a] 55.7%	1.148[a.b] 21.04	274[a] 11.6%	332[a.b] 21.8%
FH	57 11.4%	31[b] 9.8%	9[a.b] 10.1%	14 2.2%	129 5.5%	82 8.0%	12 3.2%	4 0.7%	234 4.3%	206[b] 8.8%	153[b] 10.0%
Pyogenic Granuloma	33 6.6%	10 3.2%	6[b] 6.7%	16 2.6%	45 1.9%	49[b] 8.8%	20[b] 5.4%	23[b] 9.5%	158 2.9%	74 3.1%	62 4.1%
Papilloma	31 6.2%	12 3.8%	2 2.2%	9 1.4%	2 0.1%	-	16[b] 4.3%	24[b] 2.6%	150 2.7%	6 0.7%	70[b] 4.6%
Dentigerous Cyst[a]	26 5.2%	7 2.2%	7[b] 7.6%	54 8.5%	154[b] 6.5%	130[a] 12.8%	21[b] 5.7%	13[b] 2.4%	1.291[a] 23.6%	122[b] 5.2%	129 8.5%
Radicular cyst[a]	19 3.8%	6 1.9%	1 1.3%	43 6.9%	114 4.8%	65 6.4%	-	14[b] 2.6%	209[b] 3.8%	194 8.2%	75[b] 4.9%
GCL	19 3.8%	9[b] 2.8%	4 4.5%	25[b] 4.0%	39 3.5%	83 8.1%	14[b] 3.8%	4 0.8%	48 0.9%	-	17 1.1%

	Taiwan			England	Greece	Iran	Thailand	Turkey	Nigeria	Argentine
LESION	**LEI**	**WANG**	**CHEN**	**JONES**	**SKLAVOUNOU-ANDRIKOU-POULOU**	**SIADATI**	**DHANUTHAI**	**GULTELKIN**	**LAWOYIN[c]**	**KEZSLER**
Mucocele	233[a,b] 22.8%	195[a.b] 24.5%	144[a] 27.0%	732[a.b] 16.7%	305[a] 29.3%	54[a,b] 22.1%	169 13.5%	28 5.9%	-	76 5.9%
FH	-	-	7 1.3%	191 4.3%	41 3.9%	7 2.9%	57 4.5%	15 3.1%	-	195[a] 15.0%
Pyogenic Granuloma	21 2.1%	22 2.8%	15 2.8%	135 3.1%	158 15.2%	19[b] 7.8%	143 11.4%	33[b] 7.0%	52[b] 9.3%	-
Papilloma	6 0.6%	6 0.7%	4 0.7%	8 2.1%	37 3.6%	-	7 0.6%	32[b] 6.7%	6 1.1%	15 1.2%
Dentigerous Cyst[a]	83 8.1%	84 10.5%	50 9.4%	157[b] 3.6%	-	14[b] 5.7%	259[a] 20.7%	15[b] 3.1%	42[b] 7.5%	68[b] 5.3%
Radicular cyst[a]	64 6.3%	38[b] 4.8%	24[b] 4.5%	238[b] 5.4%	-	13[b] 5.3	99[b] 7.9%	23[b] 4.8%	68 12.1%	148 11.5%
GCL	1 0.1%	2 0.2%	-	67 1.5%	69 6.6%	15 6.1%	-	81[a] 17.0%	-	84 6.5%

FH=Fibroepithelial Hyperplasia; GCL=Giant Cell Lesion. [a]The most prevalent lesion in the cited study. [b]The lesion that lacked statistically significant differences when compared with the present study (Estimated Difference of Proportions, $p<0.05$). [c]The most prevalent lesion in the study by Lawoyin (2000) was Burkitt's lymphoma.

Discussion

The epidemiological study of orofacial lesions in children and adolescents is of great importance because it provides information about different populations that can improve the diagnostic accuracy of the professionals in specific regions. These epidemiological studies also provide information that aids in the creation of preventive and health practices policies. In the past few years, there has been little interest in the assessment of children and adolescents with orofacial

lesions and, between 1986 and 2013, few articles of this type were published in English and Portuguese [2-21].

Many obstacles make it difficult to compare these studies, such as differences in the inclusion criteria and differences in the methods used for data analysis. These differences are not only reflected in the divergence of opinion among authors; they are also related to the very definition of childhood and adolescence, which is discordant, even in the texts from the United Nations [18] and the World Health Organization [19]. Thus, each author defines different relevance criteria for each study, which interferes with interpretation of the results and the overall reported prevalence of orofacial lesions in children and adolescents.

The age groups of the availed studies (0-12 to 0-20 years old) varies interests of authors and sometimes are suggested empirically [3,7,8,12]. In the present study has been suggested that the age point of 16 years old, because probably the teeth are the main impact factor in the prevalence of MFC lesions in children and adolescents. At this age, dentition is the main factor that influences the prevalence of orofacial lesions in children and adolescents because tobacco, alcohol abuse and other factors that may modify this prevalence are not very relevant in this age group [24]. Thus, the age range used as an inclusion criterion alleviates a selection bias, although different standards of hygiene, parafunctional habits and hormonal changes can still modify these prevalences.

The prevalence of MFC lesions in the studied population (10.45%) was greater than that in most of the studies evaluated. Different factors may have accounted for the significantly lower observed prevalence in other studies compared with the present study, such as the larger age range for the inclusion criteria [2,16,21], extensive coverage of the diagnostic centre evaluated [7] and the performance of epidemiologic studies in endemic areas of diseases with oral manifestations [12] and inherent factors of the population [19].

A female predominance was observed in the studied population. These data are in disagreement with the other studies evaluated because, despite their differences [3,6,10,12,15], most of the studies do not show a male or female predominance [5,8,9,11,14,16,17] nor do they make any reference to this variable [2,4,7,13].

Regarding the distribution of lesions by age group, it was observed that the prevalence of lesions increased with age. These data are in agreement with what is described by the evaluated case series [2-6,8,11,12,14-17,20,21], corroborating the hypothesis that the number of cases of MFC lesions in children and adolescents tends to increase with increasing age [11].

Mucocele was the most prevalent lesion in the studied population, which is also reported in previous studies [2,3,5,6,8,9,11,14,16,18-21]. The lip was the most frequently involved site, and trauma was the main etiological factor [21]. Mucocele is a rare lesion in early childhood [5,22,23], and it does not show a significant difference in prevalence starting from 6 years old (10,15). Therefore, it is suspected that there is a correlation between this lesion and the beginning and the end of the eruption of permanent dentition because its prevalence begins to decline in relative numbers by the end of the second decade of life [21].

The group of reactive inflammatory disorders, represented mainly by fibroepithelial hyperplasia, pyogenic granuloma and giant cell lesions, showed a relatively higher proportion in the present population compared with the analysed studies. Only a few studies reported a high prevalence of fibroepithelial hyperplasia [3,17] and giant cells lesions [10], and none reported a pyogenic granuloma [2-17].

The appearance of permanent dentition may also be the main factor associated with reactive inflammatory disorders in children and young patients because the prevalence of reactive inflammatory disorders is low or irrelevant in individuals younger than 2 years old [22,23]. Despite this correlation, a previous study [10] suggested that the high prevalence of this group of lesions is strongly associated with low social development, and this hypothesis is justified by the geographic distribution of these conditions (Table 5), which exhibit a high prevalence in developing countries. However, in developed countries, some authors [2,16] reported a large case series of reactive inflammatory disorders, which may be associated with the larger age range for their inclusion criteria.

Tumour-like lesions, such as the papilloma, had a relatively high prevalence in the studied population, but these lesions were reported in a similar proportion of cases in only studies [2,10,14]. The prevalence of this lesion is directly related to the contact of the population with the human papilloma virus [24], and it is likely that this lesion also has a social distribution [10].

Another important group of lesions in children and youths is cystic lesions of the jaw, mainly represented by dentigerous and radicular cysts. Nevertheless, the prevalence of these lesions varied considerably among the studies.

It is likely that the diagnostic criteria adopted for dentigerous cysts and the treatment of radicular cysts are the main factors responsible for the discrepant findings in the literature. The histological differentiation between a dentigerous cyst of small extensions or a dilated dental follicle often represents an exhausting academic exercise, which can affect the number of cases in a given population [29]. Likewise, the adoption of less invasive, non-surgical treatments, such as endodontic treatments, for periapical lesions can interfere with the proportion of cases of surgically removed radicular cysts [30].

Lesions with no conclusive diagnosis amounted to a high prevalence (7.8%). This diagnosis may occur due to conditions that do not require complement histopathological diagnosis [26,27] or reflects a practical diagnostic biopsy of lesions that could be treated differently [30]. A high prevalence of lesions with no conclusive diagnosis reveals the importance of a service performed by a specialized and multidisciplinary team to reduce diagnostic errors and the indication of costly and invasive tests (biopsy).

Malignant neoplasms accounted for only a few cases in the present study (1.8% of all lesions), which is in agreement with the literature [2,4-11,13-17]. Only one Brazilian [3], and one Nigerian [12], reported relatively high rates of malignancies, and despite the low prevalence of these lesions in children and adolescents, they should be carefully considered to determining an early diagnosis.

The most representative malignant lesions of the MFC in children and youth are Burkitt's lymphoma, rhabdomyosarcoma and squamous cell carcinoma (Table 6) [3,4,6-19]. The discrepant prevalence of Burkitt lymphomas in the Nigerian population [12] reflects the impact of a tertiary care center and the prevalence of this condition in African children [31]. Burkitt's lymphoma has predominance in this age group and it is associated to Epstein-Barr virus, the Human Immunodeficiency Virus, malaria and socioeconomic factors that are of great force on the continent and explained the discrepancy observed for all other studies [31].

The squamous cell carcinoma observed in this and the other studies probably are not associated with conventional risk factors such as smoking and alcohol due to age group included [24]. Other risk factors are more important in children and adolescents, how Human Papilloma Virus. Fortunately, the survival rate is higher in younger patients than in adult patients due better response for conventional surgical treatment [33].

Regarding the assessment of the relative degree of proximity between the studies evaluated and the present study, there was a light proximity with one [2] or more studies [3-6,12,14,15,18-21], depending on whether the values considered were absolute or percentage (respectively). The geographical distribution at the international level might be a factor of little influence on the arrangement in groups of MFC lesions in children and adolescents, and the national distribution has only limited relevance in this type of grouping. Therefore, other factors must be considered as modifiers of these numbers, and to suggest a solid hypothesis that could be associated with these variations, it is necessary to increase the number of this type of study. Additionally, more epidemiological studies at the local or regional level are necessary to establish profiles closer to the reality of each population.

However, it should be emphasized that all MFC studies in children and adolescents have limited diagnostic biopsied lesions. The exclusion of clinically diagnosed lesions modify the distribution profile of MFC lesions. Thus, it warns the importance of interaction between clinical and complementary diagnostics in future studies, in order to mitigate this bias [34].

Conclusion

The studied population had a high prevalence of lesions in the MFC. Mucoceles and lesions related to reactive inflammatory disorders (fibroepithelial hyperplasia, pyogenic granuloma and giant cell lesions) were very prevalent. Female patients were more commonly affected, and the prevalence increased with age. Despite being prevalent in only small proportions, the occurrence of malignancies in this age group should be carefully considered for early diagnosis.

The comparison between the present study and the evaluated studies demonstrated that the geographical distribution does influence the prevalence of orofacial lesions in children and adolescents at the national level. However, there is little or no influence from their distribution at the international level, which indicates the necessity for performing more local surveys to establish reliable epidemiological profiles that more accurately represent each population.

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