

Original Article

Orofacial Pathological Lesions in Children and Adolescents: A 25-year survey in Iran

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KEY WORDS

Oral Pathology;
Epidemiology;
Child;
Adolescents;
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ABSTRACT

Statement of the Problem: Oral pathological conditions presented in children are various and often different from those of adults. There is considerable variation in the prevalence of these lesions among different regions of the world.

Purpose: The aim of this study was to assess the frequency and clinical-pathological features of oral lesions diagnosed in children and adolescents throughout 25 years in an oral pathology department.

Materials and Method: This cross-sectional study was conducted in the Department of Oral and Maxillofacial Pathology at Dental School of Isfahan University of Medical Sciences. All the medical reports and biopsy files of the patients aged <18 years that were diagnosed during January 1990 and December 2015 were retrieved. The data regarding histopathologic diagnosis, site of lesions, and date of diagnosis and demographic characteristics of patients were elicited. The lesions were categorized based on their origin and age group of the patients. Descriptive statistics were used as appropriate. The critical level of significance was set at $p < 0.05$.

Results: 1267 lesions were recorded. The mean age of the samples was 12.5 ± 3.9 . Of lesions, (408, 49.3%) were in posterior area. The most common lesions were odontogenic cysts (416, 32.9%) and reactive lesions (317, 25.1%) and the least common lesions were allergic and immunologic disorders (2, 0.2%). In age groups of 7-12 and 13-18 years, odontogenic cysts [(208, 38.1%), (198, 31.4%)] and reactive lesions [(143, 26.3%), (147, 23.3%)] were the most common lesions, respectively. During the 25 years of survey, the prevalence of pulp and periapical disease increased ($p < 0.001$), that of bone pathology decreased ($p < 0.05$) and trend of other lesions did not significantly change over this time.

Conclusion: The most frequent lesions were odontogenic cysts and reactive lesions. The prevalence of lesions was not changed dramatically during the 25 year. The frequency of oral lesions in Isfahan province (in Iran) is different from other regions in the world and even, to some extent, different from other regions in Iran, which is in agreement with the hypothesis of geographical distribution of these lesions.

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Introduction

There are many oral lesions and soft tissue anomalies detected in children and adolescents, whose frequency is

low and makes diagnosis a challenge. Each oral lesion differs from the others in distribution of age, sex, most common location in oral cavity and lesion origin. [1]

Oral pathological conditions presented in children are various and often different from those of adults. The nature of many pediatric lesions changes with growth and development of the body. There is considerable variation in the prevalence of these lesions among different regions of the world as racial and environmental specificities, and the lifestyle of each population may influence the prevalence of these diseases. In spite of the World Health Organization (WHO) suggestions regarding the epidemiologic assessment of oral lesions, the majority of studies on oral conditions in children have been limited to investigation of caries, periodontal disease, malocclusion, and dental trauma. [2]

In a study conducted by Iatrou *et al.* in 2013 [3] in Greece, tumors and tumor-like lesions in children and adolescents, with age range of 14 to 15 years old, were evaluated over 11 years. The findings showed 90.5% of lesions were benign and 9.95% were malignant. The total conclusion was that tumoral and tumor-like lesions in Greek children were common. [3] Arotiba *et al.* [4] in 1996 in Nigeria reported that 20% of all orofacial tumors belonged to children (11-15 years old). Benign tumors (59.8%) were more common than malignant ones (40.2%). The differences in distribution of lesions in this study, compared with previous studies, were attributed to the geographic and genetic characteristics of the studied populations. [4] In a study performed in Thailand in 2007, from 8314 biopsies, 1251 cases belonged to the pediatric population (15.05%). Most of the lesions were cystic lesions followed closely by inflammatory/reactive lesions and tumor/tumor-like lesions, respectively. In general, this study showed similar results to other studies, with the exception of classification of lesions. [5]

Currently, there is very little information in the literature about the prevalence of oral disease in children, especially in Iranian population. In a study conducted by Jafari Ashkavandi *et al.* in 2014 [6] in south of Iran (1991-2009), from 576 under 18 years old cases, most of the orofacial lesions were soft tissue lesions, and from this category, the most common lesions were peripheral giant cell granuloma (PGCG) (15.6%) followed by dentigerous cyst (14.2%). The result was that 20% of all orofacial lesions occurred in children and there was no gender predilection. Most of the lesions were soft tissue lesions with a reactionary process. [6]

It has been hypothesized that the oral pathologic lesions in children and adolescents are affected by genetic factors and life style. Therefore, given the importance of this subject and the limited available and comprehensive studies about the prevalence of oral lesions in patients under 18 years old in Iran, the present study compared all oral-pathologic lesions in patients under 18 years old in Isfahan province based on demographic and lesion-related characteristics over 25 years. The result of this study can be helpful for better diagnosis of lesions and can be a guide for sufficient and early treatment of patients.

Materials and Method

This cross-sectional study was conducted in the Department of Oral and Maxillofacial Pathology at the Dental School of Isfahan University of Medical Sciences. All the medical reports and biopsy files of patients aged <18 years undergoing biopsy in oral cavity during January 1990 and December 2015 were retrieved.

Data about lesions including histopathologic diagnosis, site of lesions and date of diagnosis as well as demographic characteristics of patients including age and gender were recorded in checklists. Reports with incomplete clinical data or doubtful diagnosis and histologic reports without clinical diagnosis were excluded. In case of different diagnoses, the first diagnosis was recorded. In patients with double biopsy, diagnosis of the second biopsy was recorded.

Lesions were categorized based on their origin, [7] as follows: epithelial, lesions of salivary gland, mesenchymal soft tissue, hematologic, bone pathology, odontogenic, and lesions with unknown origin. The patients were divided into three age groups including 1–6, 7–12, and 13–18 years.

Data were analyzed by SPSS for Microsoft Windows (version 22) statistical software package. Descriptive statistics and test of significance were used as appropriate. The critical level of significance was set at $p < 0.05$.

This study was approved by the Ethics Committee of Isfahan University of Medical Sciences and was performed in accordance with the ethical standards as laid down in the 1964 *Declaration of Helsinki* and its later amendments. This research did not include any studies with human participants performed by any of the au-

thors, and the data from the patients' medical reports were retrieved without recording their names or addresses.

Results

In this study, from 9536 biopsies registered during 1990-2015, 1267 cases were in less than 18 years old (13.2%). Distribution of lesions based on gender, age, date of diagnosis and location are shown in Table 1.

Table 1: Distribution of lesions based on gender, age, date of diagnosis and location

	Frequency	Percentage
Gender		
Male	638	50.4
female	627	49.6
Age groups		
1-6	87	6.9
7-12	544	43.1
13-18	631	50
Date of diagnosis		
1991-1995	211	20.5
1996-2000	219	21.3
2001-2005	285	27.7
2006-2010	176	17.1
2011-2015	139	13.5
Location of lesions		
Upper jaw	280	23.3
Lower jaw	412	34.2
Tongue	31	2.6
Lip	78	6.5
Buccal	24	2
Floor of the mouth	8	0.7
Upper gingiva	150	12.5
Lower gingiva	158	13.1
Palate	41	3.4
Vestibule	22	1.8
Hard/soft tissue origin		
Upper Jaw	280	22.1
Lower Jaw	412	32.5
Soft tissue	575	45.4

The patients were divided into three categories of 1-6 years old, 7-12 years old, and 13-18 years old (adolescents). Accordingly, 50% of samples were children and 50% of them were adolescents. The mean age of samples was 12.5±3.9. Date of diagnosis was divided based on a 5-year interval. Among all the lesions, 359 cases (32.6%) had neoplastic (benign and malignant) lesions.

The most common location was lower jaw followed by upper jaw and the least common location was floor of the mouth (Table 1). The prevalence of lesions based on the origin of the lesions (soft/hard), are summarized in Table 1; 4.6% of lesions were in hard tissue

(upper and lower jaw). The most common lesions in upper jaw were odontogenic cysts (162, 57.9%) and bone pathology (28, 10%). The most common lesions in lower jaw were odontogenic cysts (201, 48.9%) and bone pathology (79, 19.2%). The most common lesions in the soft tissue of oral mucosa were reactive lesions (290, 50.4%) and salivary gland lesions (70, 12.4%).

Distribution of lesions based on location (anterior, posterior) showed that 408 (49.3%) lesions were in posterior region of the mouth, 338 (40.8%) lesions were in anterior region, and 82 (9.9%) lesions were in both anterior and posterior areas.

The frequencies of lesions based on pathologic diagnostic category are shown in Table 2. The most common lesions were odontogenic cysts (416, 32.9%) and reactive lesions (217, 17.2%). The least common lesions were allergic and immunologic disorders (2, 0.2%). In the category of odontogenic cysts, the most prevalent lesions were radicular and dentigerous cysts. In addition, in reactive lesions, the most prevalent lesions were PGCG and peripheral ossifying fibroma.

According to comparison of frequency of lesions by 5 year intervals (Figure 1), the prevalence of pulpal and periapical diseases increased significantly ($p < 0.001$), the prevalence of bone pathology decreased significantly ($p < 0.05$) and trend of other lesions did not significantly change over time.

The frequencies of lesions based on the most common locations and most common age groups are shown in Table 2. The male/female ratio was more than one (more prevalence in males) in developmental lesions, epithelial lesions, reactive lesions, hematologic disorders, and odontogenic cysts. In odontogenic cysts, the most common location was mandible (50.5%) and they were mostly seen in the age group 7-12 years (49.9%). In reactive lesions, the most common location was gingiva of lower jaw (41.1%) and was mostly prevalent in the age group 7-12 years.

In addition, the distribution of lesions based on age groups (Table 3) showed that in the age group of 1-6 years, the most common lesions were reactive lesions (26, 29.9%) and bone pathology (12, 13.8%). In the age group of 7-12 years, the most common lesions were odontogenic cysts (208, 38.1%) and reactive lesions (143, 26.3%). In the age group 13-18 years, the most common lesions were odontogenic cysts (198, 31.4%)

Table 2: Frequency (percentage), most common age group and most common location of lesions

Most important lesions of each category	Frequency (Percentage)	Most common age group	Most common location
1. Developmental cyst	12(0.9)	13-18(75)	Upper jaw (77.8)
Incisive canal cyst	7(58.3)	13-18(71.4)	Upper jaw (80)
2.Pulpal and periapical disease	66(5.2)	13-18(63.6)	Lower jaw (46.8)
Residual cyst	9(13.6)	13-18(66.7)	Lower jaw (55.6)
Periapical granuloma	55(83.8)	13-18(61.8)	Lower jaw (44.2)
3.Periodontal disease	9(0.7)	13-18(55.6)	Lower gingiva (44.4)
Gingival fibromatosis	1(11.1)	7-12(100.0)	Lower gingiva (100)
4.Epithelial pathology	15(1.2)	13-18(53.3)	Lip (35.7)
Papilloma	4(26.7)	13-18(50.0)	Lip (50)
Compound nevus	3(20)	13-18(66.7)	Upper and lower gingiva (100)
Heck disease	1(6.7)	7-12(100.0)	Lip (100)
5.Salivary gland pathology	77(6.1)	7-12(47.7)	Lip (70.1)
Mucocele	66(85.7)	7-12(49.2)	Lip (71.2)
6.Reactive lesions	317(25.1)	13-18(50)	Lower gingiva (37.6))
Pyogenic granuloma	72(22.7)	13-18(58.3)	Upper gingiva (39.1)
Irritation fibroma	32(10)	13-18(68.8)	Lower gingiva (35.5)
Peripheral giant cell granuloma (PGCG)	97(30.5)	7-12(75.0)	Lower gingiva (57.4)
Peripheral ossifying fibroma	100(31.5)	13-18(59)	Upper gingiva (45.4)
7.Hematologic disorder	14(1.1)	13-18(50)	Lower jaw (54.5)
Capillary hemangioma	2(14.3)	13-18(100.0)	Lower jaw (100)
8.Bone pathology	139(11)	13-18(52.5)	Lower jaw (61.2)
Simple bone cyst	18(12.9)	13-18(83.3)	Lower jaw (87.5)
Langerhans cell disease	6(4.3)	1-6, 13-18(100.0)	Lower jaw (66.7)
9.Odontogenic cyst	416(32.9)	7-12(49.9)	Lower jaw (50.5)
Radicular cyst	126(30.2)	13-18(66.7)	Upper jaw (50)
Odontogenic keratocyst (OKC)	63(15.1)	13-18(77.4)	Lower jaw (59.3)
Dentigerous cyst	199(47.8)	7-12(69.3)	Lower jaw (57.1)
Gingival cyst	2(0.4)	7-12, 13-18(100.0)	Lower jaw & lower gingiva(100)
10.Odontogenic tumor	82(6.3)	13-18(53.8)	Lower jaw (53.4)
Adenomatoid odontogenic tumor	12(14.6)	13-18(83.3)	Upper jaw (50)
Ameloblastic fibro-odontoma	8(9.8)	7-12(62.5)	Lower jaw (71.4)
Peripheral odontogenic fibroma	4(4.9)	7-12(50.0)	Lower jaw & lip & lower gingiva & palate(100)
Complex odontoma	13(15.9)	13-18(46.2)	Upper & lower jaw (83.4)
Ameloblastic fibroma	2(2.4)	7-12, 13-18(100.0)	Lower jaw (100)
Compound odontoma	7(8.5)	7-12(57.1)	Upper jaw (100)
11.Dermatologic disorder	10(0.8)	13-18(60.0)	Lip (30.0)
Erythema multiform	1(10)	13-18(100.0)	Buccal (100)
Epidermal cyst	1(10)	7-12(100.0)	Lower jaw (100)
12.Physical and chemical injuries	8(0.6)	13-18(75.0)	Tongue, lower and upper gingiva (25.0)
Traumatic ulcer	4(50)	13-18(100.0)	Tongue (50)
13.Allergic and immunologic disease	2(0.2)	13-18,1-6(50)	Buccal, upper jaw (50)
14.Other	100(7.9)	13-18(55.6)	Lower jaw (37.9)
Total	1267		

and reactive lesions (147, 23.3%).

Discussion

Over 25 years, about 13% of all cases presented for histopathological report in the oral and maxillofacial department of Isfahan Dental School were children aged 0–18 years, which is similar to 10%, and 12.8% reported by previous studies. [8-9] In some other studies, the prevalence has been reported to be 5.5%-24.8% of all cases referred to the histopathology services. [9-10] The variation in number might be explained by differences in study design, including the period of the study and the age range studied. In our study, the patients were

categorized into three age groups: 0-6 years, 7-12 years, and 13-18 years. In most of the other studies, age groups were similar. [9, 11-14]

Some studies such as those conducted in Taiwan and UK reported that the prevalence of orofacial lesions increased with age, especially after the age of 6 years. [9, 13] In our study, most of the lesions (50%) were also in the age group of 13-18 years, and just salivary gland lesions and odontogenic cysts were the most prevalent lesions in the age group of 7-12 years which is in agreement with the studies carried out by Vale *et al.* (in Brazil) [15] and by Saravani *et al.* in Zahedan-Iran [16] and some other studies. [17- 18]

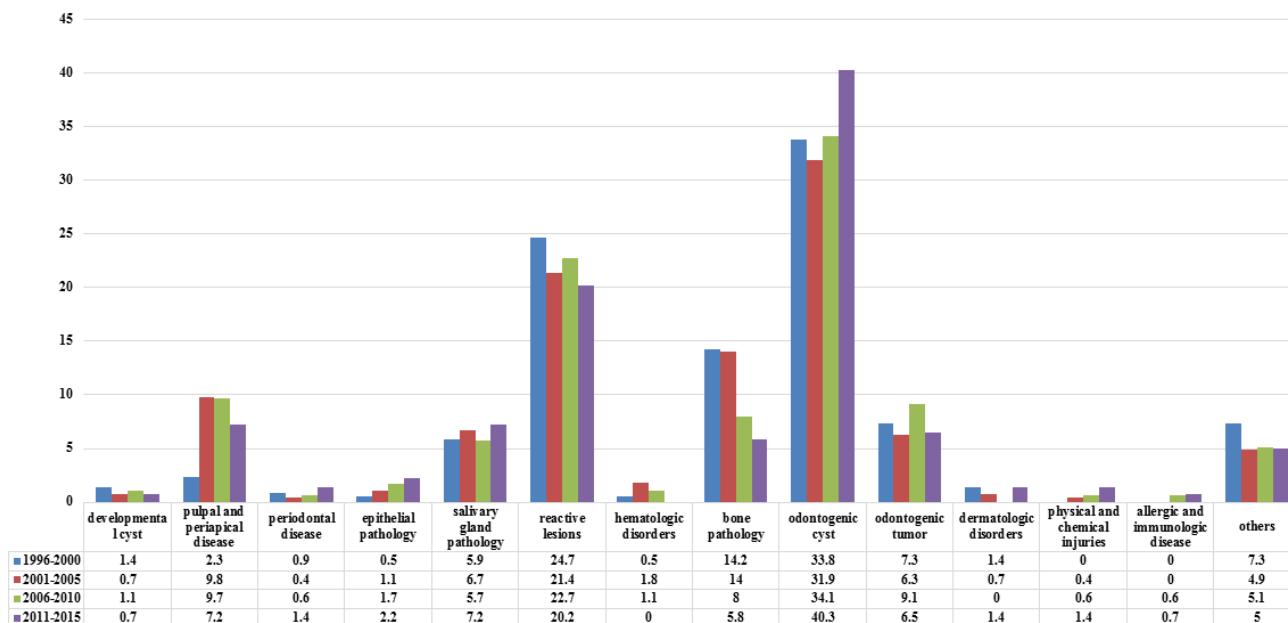


Figure 1: Frequency of lesions in intervals of 5 years. Note- different colors show different intervals. The vertical axis indicates the percentage of lesion frequency

In our study, the male/female ratio was almost 1 for most of the lesions; this is in agreement with results yielded by the study of Siadat *et al.* (in Babol, Iran) [2] and the study of Jones and Franklin. [9] Moreover, the study conducted by Torabi-Parizi *et al.* [19] showed the female/male ratio was 1.1 to 1 for different lesions and was not statistically significant ($p > 0.05$).

In our study, mandible was the most common site of lesions in children (34.2%). In a study in Brazil, maxilla was the most common site. [12] In another study in Turkey, gingiva was the most common site. [8] In study enrolled in Zahedan, gingiva was reported as the most

common site, and in a study conducted in Brazil, lip mucosa was described as the most common site. [15-16] In our study, we categorized the lesions into fifteen categories based on credible scientific references. [7] Some other studies have classified lesions into three major groups, including inflammatory/reactive lesions, cystic lesions and neoplastic lesions. [8, 10, 12] In studies in Brazil and England, lesions were classified into twelve and thirteen categories, respectively. [9-10]

Therefore, it is difficult to make direct comparisons in some cases. In the study conducted by Ghasemi Moridani *et al.* [20] in Iran, a similar classification was

Table 3: Frequency (percentage) of lesions in each age group of children

Lesions	Age groups Frequency (percentage)			Total
	1-6 years	7-12 years	13-18 years	
1 Developmental cyst	1(1.1%)	2(.4%)	9(1.4%)	12(0.9%)
2 Pulpal and periapical disease	2(2.3%)	22(4.1%)	42(6.7%)	66(5.2%)
3. Periodontal disease	0(0.0%)	4(.7%)	5(.8%)	9(.7%)
4. Epithelial pathology	2(2.3%)	5(.9%)	8(1.3%)	15(1.2.0%)
5. Salivary gland pathology	9(10.3%)	36(6.6%)	32(4.8%)	77(6.1%)
6. Reactive lesions	26(29.9%)	143(26.3%)	147(23.3%)	317(25.1%)
7.Hematologic disorders	4(4.6%)	3(0.6%)	7(1.1%)	14(1.1%)
8.Bone pathology	12(13.8%)	54(9.9%)	73(11.6%)	139(11.0%)
9.Odontogenic Cyst	10(11.5%)	208(38.1%)	198(31.4%)	416(32.9%)
10.Odontogenic tumor	7(8.0%)	31(5.5%)	44(6.8%)	82(6.3%)
11.Dermatologic disorder	1(1.1%)	3(0.6%)	6(1.0%)	10(0.8%)
12.Physical and chemical injuries	0(0.0%)	2(0.4%)	6(1.0%)	8(0.6%)
13.Allergic and immunologic disease	1(1.1%)	0(0.0%)	1(0.2%)	2(0.2%)
14. Other	12(13.8%)	33(5.9%)	55(8.7%)	100(7.9%)
Total	87	544	636	1267

used, but the mean age of their participants was 38 years.

In studies undertaken in Taiwan and Turkey, it was shown that reactive lesions were the most common lesions. [8, 11] In Thailand [13] and Jeddah, [14] cystic lesions were the most common lesions. In a study conducted in England, dental lesions such as chronic periapical granuloma and enlarged dental follicle were the most common lesions, followed by salivary gland lesions. [9] However, it is noticeable that in the present study, enlarged dental follicle was not considered a pathologic lesion. In addition, some of the variations might be justified by differences in the age of children and the period of study.

Torabi-Parizi *et al.* [19] reported in their study that of 326 cases in Iran (Kerman), the most prevalent lesions were inflammatory/reactive lesions (36.8%), followed by odontogenic cysts and tumors. Although in some other studies [9, 15-16, 21] reactive lesions were the most frequent lesions, in our study odontogenic cysts were the most common lesions (32.9%). In addition, in a study in Thailand, cystic lesions were the most common lesions (51.14%), which occurred mostly during mixed dentition period with 1.5:1 male/female ratio. [13]

In our study, the most common age group for the presence of odontogenic lesions was 7-12 years, and mandible was the most common site of lesions. The male/female ratio of these lesions was 1.1. In this category, dentigerous cyst had the highest frequency (48.1%), followed by radicular cyst and odontogenic keratocyst (OKC). Both radicular cyst and OKC were more frequent in the age group 13-18 years; however, dentigerous cysts were mostly seen in the age group 7-12 years. Both OKC and dentigerous cysts were common in mandible, but radicular cysts were mostly seen in maxilla.

In a study conducted in Taiwan, the prevalence of cystic lesions was located in the third rank. Dentigerous cysts (48.1%) were the most common lesions, followed by radicular cyst, OKC and calcifying odontogenic cyst, respectively. Dentigerous cysts were mostly seen in men and patients older than 6 years. Radicular cysts were mostly found in the age group 11-14 years. [11] In a study performed in China on odontogenic cysts, patients with OKC (7-14 years) were older compared to

patients with dentigerous cyst (8-11 years). [22]

In the study performed in Jeddah, dentigerous cyst was mostly presented in the age group 11-15 years. This study explained that the lesions that occurred in the age group 0-5 years were mostly cystic and non-odontogenic. [14] In a study in Brazil, [12] and a study in England, [9] the dentigerous cysts were the third and fourth largest category in children, respectively.

The second most common lesions in the present study were reactive lesions (25.1%). In our study, pyogenic granuloma (22.7%), irritation fibroma (10%), PGCG (30.5%) and peripheral ossifying fibroma (31.5%) were evaluated. In addition, in Thailand, reactive lesions were the second most common lesions. However, mucocele was included in this category. Mucocele most frequently affected the patients between the ages 2 and 16 years and predominantly involved the lower lip. [13] In Taiwan, reactive lesions were the most common lesions. It was also reported that the prevalence of reactive/inflammatory lesions was associated with oral hygiene in children. However, again this study included mucocele in reactive lesions, and the highest frequency belonged to mucocele. [11]

The high frequency of odontogenic and reactive lesions in most of the studies might be due to the chronic infection resulting from poor dental cares in primary dentition, which is highly prevalent in children. In addition, in the age group < 18 years, growth and development rates of odontogenic and non-odontogenic tissues are high in jaws, which can be correlated with the prevalence of these lesions.

Among all the lesions, 359 cases (32.6%) had neoplastic (benign and malignant) lesions. This result is in agreement with the prevalence rate of 36% reported in the study of Gultelkin *et al.* [8] and is higher than that reported by Wang *et al.* [11]

Conclusion

This study revealed that the frequency of oral lesions in Isfahan is different from other regions in the world and even, to some extent, different from other regions in Iran, which is in agreement with the hypothesis of geographical distribution of these lesions. In our study, odontogenic cysts and reactive lesions were the most common lesions. The characteristics of lesions determined in this study could provide the dentists with a firm

groundwork to carry out accurate diagnosis.

On the other hand, comparison of different studies revealed a point that a common system for categorization of oral lesions is not available, which makes a proper comparison difficult and therefore necessitates the introduction of such system.

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Conflict of Interest

The authors of this manuscript declare that they have no conflict of interest.

References

- [1] Flaitz CM. Differential Diagnosis of Oral Lesions and Developmental Anomalies. In: cosamassimo. PS, fiells. Hw, Mctigne. DJ, Nowak. AJ. Pediatric Dentistry Infancy through Adolescence. 5th ed. St. Louis: Missouri 63043: Elsevier Inc.; 2013. p. 11.
- [2] Siadati S, Seyedmajidi M, Sharbatdaran M. Frequency of different oral lesions in children and adolescents in Babol, Northern Iran. *Caspian J Intern Med.* 2013; 4: 773-776.
- [3] Iatrou I, Theologie-Lygidakis N, Tzerbos F, Schoinohoriti OK. Oro-facial tumours and tumour-like lesions in Greek children and adolescents: an 11-year retrospective study. *J Craniomaxillofac Surg.* 2013; 41: 437-443.
- [4] Arotiba GT. A study of orofacial tumors in Nigerian children. *J Oral Maxillofac Surg.* 1996; 54: 34-38.
- [5] Dhanutha k, Banrai M, Limpanaputtajak S. A retrospective study of pediatric oral lesions from Thailand. *Int J Paediatr Dent.* 2007; 17: 248-253.
- [6] Jaafari Ashkavandi Z, Ahmadi Sheshdeh Z, Kamali F. Orofacial pathologic lesions in children and adolescents: a clinicopathological study in southern iran. *Iran J Pediatr.* 2014; 24: 307-312.
- [7] Neville BW, Damm DD, Chi AC, Allen CM. Oral and maxillofacial pathology. 4th ed. Elsevier Health Sciences: St.Louis Missouri; 2016. p. 473-515, 632-674.
- [8] Gültelkin SE, Tokman B, Türkseven MR. A review of paediatric oral biopsies in Turkey. *Int Dent J.* 2003; 53: 26-32.
- [9] Jones AV, Franklin CD. An analysis of oral and maxillofacial pathology found in children over a 30-year period. *Int J Paediatr Dent.* 2006; 16: 19-30.
- [10] Lawoyin JO. Paediatric oral surgical pathology service in an African population group: a 10 year review. *Odontostomatol Trop.* 2000; 23: 27-30.
- [11] Wang YL, Chang HH, Chang JY, Huang GF, Guo MK. Retrospective survey of biopsied oral lesions in pediatric patients. *J Formos Med Assoc.* 2009; 108: 862-871.
- [12] Lima Gda S, Fontes ST, de Araújo LM, Etges A, Tarquinio SB, Gomes AP. A survey of oral and maxillofacial biopsies in children: a single-center retrospective study of 20 years in Pelotas-Brazil. *J Appl Oral Sci.* 2008; 16: 397-402.
- [13] Dhanuthai K, Banrai M, Limpanaputtajak S. A retrospective study of paediatric oral lesions from Thailand. *Int J Paediatr Dent.* 2007; 17: 248-253.
- [14] Al Yamani AO, Al Sebaei MO, Bassyoni LJ, Badghaish AJ, Shawly HH. Variation of pediatric and adolescents head and neck pathology in the city of Jeddah: A retrospective analysis over 10 years. *Saudi Dent J.* 2011; 23: 197-200.
- [15] Vale EB, Ramos-Perez FM, Rodrigues GL, Carvalho EJ, Castro JF, Perez DE. A review of oral biopsies in children and adolescents: a clinic-pathological study of a case series. *J Clin Exp Dent.* 2013; 5: e144-e149.
- [16] Saravani S, Kadeh H, Amirabadi F, Keramati N. Clinical and Histopathological Profiles of Pediatric and Adolescent Oral and Maxillofacial Biopsies in a Persian Population. *Int J Pediatr.* 2015; 3: 381-390.
- [17] Krishnan R, Ramesh M, Paul G. Retrospective evaluation of pediatric oral biopsies from a dental and maxillofacial surgery centre in salem, Tamil Nadu, India. *J Clin Diagn Res.* 2014; 8: 221-223.
- [18] Shah SK, Le MC, Carpenter WM. Retrospective review of pediatric oral lesions from a dental school biopsy service. *Pediatr Dent.* 2009; 31: 14-19.
- [19] Torabi-Parizi M, Poureslami H, Torabi-Parizi S, Kalantari M. A retrospective study of children and adolescents oral and maxillofacial lesions over a 20-year period in Kerman, Iran. *J Oral Health. Oral Epidemiol.* 2017; 6: 203-210.
- [20] Ghasemi Moridani S, Shahsavari F, Adeli M. A 7-year retrospective study of biopsied oral lesions in 460 Iranian patients. *R.S.B.O.* 2014; 11: 118-124.
- [21] Chen YK, Lin LM, Huang HC, Lin CC, Yan YH. A retrospective study of oral and maxillofacial biopsy lesions in a pediatric population from southern Taiwan. *Pediatr*

- Dent. 1998; 20: 404-410.
- [22] Li N, Gao X, Xu Z, Chen Z, Zhu L, Wang J, Liu W. Prevalence of developmental odontogenic cysts in children and adolescents with emphasis on dentigerous cyst and odontogenic keratocyst (kerato-cystic odontogenic tumor). *Acta Odontol Scand.* 2014; 72: 795-800.