

## A retrospective study of children and adolescents oral and maxillofacial lesions over a 20-year period in Kerman, Iran

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### Original Article

#### Abstract

**BACKGROUND AND AIM:** Oral and maxillofacial lesions vary in different geographic regions based on their clinical features. Until now, few investigations have studied these lesions in children and adolescents in Iran. The aim of this research was to study the clinicopathological manifestations of biopsied oral and maxillofacial lesions among children and adolescents in the south of Iran.

**METHODS:** In this retrospective cross-sectional study, all the cases referred to the Department of Pathology, Kerman faculty of Dentistry, and two treatment centers of Kerman University of Medical Sciences, Kerman, Iran during 1996-2015 were included. All demographic information including age, gender, anatomic location and histopathologic diagnosis of the oral and maxillofacial biopsies in patients under 18 years was extracted from patients' chart fields. SPSS was used for the data analysis.

**RESULTS:** Of 3196 oral and maxillofacial lesions, 326 cases (10.2%) occurred in the age group under 18 years. The most common group was inflammatory/reactive lesions (36.8%). The most common lesions were pyogenic granuloma (9.20%), peripheral giant cell granuloma (8.89%), and dentigerous cyst (8.28%). Gingiva was the main involved area and the female to male ratio was 1.1 to 1.

**CONCLUSION:** Our study revealed that almost 10.2% of oral and maxillofacial lesions occurred in children and adolescents. The majority of lesions were benign, and malignant lesions were rarely observed in the sample. The most prevalent biopsied lesions were inflammatory/reactive lesions. Unlike other studies, lower rates of mucocele were observed in this study. These findings can improve patient's management among dentists and surgeons.

**KEYWORDS:** Adolescent; Child; Oral Pathology; Biopsy; Prevalence

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Children and adolescents may show different oral lesions with different clinical features, signs and symptoms, behavior and prevalence compared to the adults.<sup>1-4</sup> Although few investigations have been performed on the prevalence of these lesions among children and adolescents but these studies are mostly limited to epidemiological surveys on dental and

periodontal diseases like dental caries, periodontal disease, malocclusion, and dental traumas.<sup>3,5,6</sup> In addition, there are some studies that only have identified and reported certain groups of diseases such as odontogenic lesions, bone diseases, and salivary gland lesions.<sup>1-3</sup>

Because of environmental and racial characteristics and lifestyle of the population, there are significant differences between

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prevalence of oral and maxillofacial lesions in different populations. In addition, the other important factor is lack of age range classification standards for classifying patients in children and adolescents group.<sup>1-7</sup>

The main aim of the study on the prevalence of oral and maxillofacial lesions in this age group is to determine the most common lesions in this population. In addition, the age ranges, signs and symptoms, and the sites more affected by these lesions in this population are different from common lesions in adults.<sup>7</sup> There are few studies with large sample that have analyzed the results of oral and maxillofacial biopsies in children and adolescents.<sup>8</sup> In Iran, few studies have investigated oral lesions of this age range.<sup>9-11</sup> Therefore, the aim of this retrospective study was to evaluate the clinicopathologic features of oral and maxillofacial lesions diagnosed in children and adolescents (0-18 years).

### Methods

In this retrospective cross-sectional study, of 134722 cases diagnosed during 1996-2015 in pathology laboratory of Kerman faculty of Dentistry and two treatment centers of Kerman University of Medical Sciences, Kerman, Iran including Bahonar and Shafa hospitals, about 3196 cases were diagnosed in oral and maxillofacial region. Among these cases, 326 cases (10.2%) were diagnosed in patients less than 18 years. Clinical data such as age, gender, site of involvement, and clinical diagnosis were extracted from patients' chart fields. The study was confirmed by the Ethics Committee of Kerman University of Medical Sciences (Ethics code: IR.KMU.REC.1394.51). All slides were reviewed by an oral pathologist for definitive diagnosis. Since there were some cases that were not properly stained due to long-term filing or were not definitely diagnosed, new slides were prepared from paraffin-embedded tissue blocks and examined. Immunohistochemical staining reaction in cases where it was necessary to

reach a final diagnosis was performed.

The histopathological diagnoses were categorized in 9 groups as follows:

Inflammatory/reactive lesions, odontogenic cysts and tumors, pulp and periapical inflammatory lesions, salivary gland pathology, benign soft tissue lesions, benign epithelial lesions, non-odontogenic cysts, benign bone lesions, and premalignant and malignant lesions.

Data were analyzed using SPSS software (version 20, IBM Corporation, Armonk, NY, USA) and chi-square and t-test ( $P$ -value  $< 0.05$  was considered statistical significant).

### Results

The results of this study showed that in 20-year period (1996-2015), 3262 cases of oral and maxillofacial lesions were diagnosed in children and adolescents with 0-18 years of age. Of 326 cases, 154 cases (47.2%) were male with the average age of  $12.5 \pm 4.3$  and 172 (52.8%) were female with the average age of  $13.1 \pm 4.7$ . The female to male ratio was 1.1 to 1 and was not statistically significant ( $P > 0.05$ ). Chi-square test showed no significant statistical relationship between genders in the 9 lesion categories ( $P = 0.20$ ). The overall incidence of lesions in the permanent dentition was significantly higher than primary and mixed dentitions ( $P = 0.01$ ). The frequency of lesions considering their group is demonstrated in table 1.

The most prevalent group was Inflammatory/reactive lesions, and then, odontogenic cysts and tumors, and pulp and periapical inflammatory lesions were the most prevalent ones. The most prevalent lesion in this study was pyogenic granuloma (9.20%), and then peripheral giant cell granuloma (8.89%), dentigerous cyst (8.28%), and mucocele (7.97%). The frequency of lesions in inflammatory/reactive lesions and odontogenic cysts and tumors categories are listed in tables 2 and 3, respectively.

The frequency of pulp and periapical inflammatory lesions and salivary gland pathology are shown in table 4.

**Table 1.** Distribution of the lesions according to diagnosis categories

Categories	Gender		Age (year) (mean $\pm$ SD)	n (%)
	Female	Male		
Inflammatory/reactive lesions	68	52	14.34 $\pm$ 3.62	120 (36.80)
Odontogenic cysts and tumors	30	31	13.07 $\pm$ 3.88	61 (18.71)
Pulp and periapical inflammatory lesions	15	22	13.44 $\pm$ 3.37	37 (11.34)
Salivary gland pathology	21	15	11.85 $\pm$ 4.72	36 (11.04)
Benign soft tissue lesions	8	11	13.90 $\pm$ 3.58	19 (5.82)
Benign epithelial lesions	10	7	12.29 $\pm$ 3.61	17 (5.21)
Non-odontogenic cysts	8	5	12.54 $\pm$ 3.81	13 (3.98)
Malignant lesions	6	6	11.51 $\pm$ 2.27	12 (3.68)
Bone lesions	6	5	10.27 $\pm$ 2.18	11 (3.37)

SD: Standard deviation

The most common lesions in these two groups were radicular cyst (6.74%) and mucocele (7.97%), respectively.

Benign soft tissue lesions were the fifth common category in this study. Hemangioma with 8 cases (2.45%) was the most prevalent lesion in this category followed by lipoma with 4 cases and granular cell tumor and vascular malformation each with 2 cases. Neuroma, chondromyxoid fibroma and neurofibroma each were diagnosed in 1 case.

In this study, benign epithelial lesions were found in 17 cases. Among them, squamous papilloma diagnosed in 10 cases (3.06%) was the most common lesion and then verruca vulgaris and multifocal epithelial hyperplasia (Heck disease), each with 2 cases and, compound nevus, blue nevus and white sponge nevus each with 1 case were the most common lesions.

Non-odontogenic cysts (3.98%) were the next common group in this study. Thyroglossal duct cyst (n = 7), epidermoid cyst (n = 3), dermoid cyst (n = 2), and traumatic bone cyst (n = 1) were the most

prevalent lesions in this category.

Bone lesions were diagnosed in 3.37% and central giant cell granuloma and fibrous dysplasia were diagnosed in 5 and 6 cases, respectively.

In this study, 3.68% of lesions (n = 12) were malignant tumors that burkitt lymphoma (n = 4), rhabdomyosarcoma, mucoepidermoid carcinoma, and Langerhans cell histiocytosis (n = 2) and esthesioneuroblastoma and fibrosarcoma (n = 1) were observed.

## Discussion

Most studies on the prevalence of oral and maxillofacial lesions in children and adolescents have shown that 5.5% to 24.8% of all cases referred to the histopathology services were in patients under 18 years old.<sup>1-3,5,7-13</sup> In this study, 10.2% of oral and maxillofacial lesions were observed in ages 0-18 years and the prevalence of these lesions was less than similar studies in other parts of Iran (13.9% and 19.3%)<sup>9,10</sup> and Thailand (15%),<sup>13</sup> and higher than Taiwan (6% and 6.6%).<sup>3,14</sup>

**Table 2.** Number of cases and the most common location of the inflammatory/reactive lesions

Inflammatory/reactive lesions	Number of cases	Percentage in relation to the group	Percentage in relation to the total	Most common location
Pyogenic granuloma	30	25.00	9.20	Gingiva
Peripheral giant cell granuloma	29	24.16	8.89	Gingiva
Irritation fibroma	22	18.33	6.74	Buccal mucosa
Peripheral ossifying fibroma	18	15.00	5.52	Gingiva
Acute and chronic inflammatory process	8	6.66	2.45	Gingiva
Unspecific ulcer	5	4.16	1.53	Tongue
Inflammatory gingival hyperplasia	4	3.33	1.22	Gingiva
Foreign body reaction	2	1.66	0.61	Gingiva
Idiopathic gingival fibromatosis	1	0.83	0.30	Gingiva
Fibro-epithelial hyperplasia	1	0.83	0.30	Buccal mucosa

**Table 3.** Number of cases and the most common location of the odontogenic cysts and tumors

Odontogenic cysts and tumors	Number of cases	Percentage in relation to the group	Percentage in relation to the total	Most common location
Dentigerous cyst	27	44.26	8.28	Mandible
Follicular hyperplasia	9	14.75	2.76	Mandible
Keratocystic odontogenic tumor	7	11.47	2.14	Mandible
Odontoma	5	8.19	1.53	Maxilla
Ameloblastoma	4	6.54	1.22	Mandible
Ameloblastic fibroma	3	4.91	0.92	Mandible
Ameloblastic fibro-odontoma	2	3.27	0.61	Mandible
Adenomatoid odontogenic tumor	2	3.27	0.61	Maxilla
Orthokeratinized odontogenic cyst	1	1.63	0.30	Mandible
Calcifying odontogenic cyst	1	1.63	0.30	Maxilla

Other studies have reported that the prevalence of these lesions in other countries were 6.6% and 13% in Brazil,<sup>5,7,8</sup> 8.2% in the United Kingdom,<sup>1</sup> 25% in Nigeria,<sup>2</sup> and 12% in America.<sup>15,16</sup> The observed differences in the results of various studies may be due to using different inclusion criteria. For example, several studies have been performed on children with different age ranges (under 15, 16, 18 and 19 years old). In addition, study period, location of lesions (oral/oral and maxillofacial), geographical region, genetic background of population, and the institute in which the study was performed could have affected the results of the studies.<sup>1,7,8,15,16</sup>

In current study, the prevalence of the lesions was a little more in girls than boys (ratio 1.1 to 1) that is similar to the results of the studies of Vale et al.,<sup>7</sup> Melo Mouchrek et al.,<sup>17</sup> and Krishnan et al.<sup>18</sup> Some studies have reported no sex predilection<sup>1,3,9,10,12,13</sup> while others reported more prevalence in boys.<sup>2,5,9,14,19</sup>

Most of the lesions in this study were found in the permanent dentition period. Studies that examined oral and maxillofacial lesions in long-term, suggested that by increasing the age, the frequency of lesions increases as well.<sup>1,18-20</sup> In similar studies in Thailand<sup>13</sup> and Turkey,<sup>19</sup> the highest prevalence of the lesions was found in mixed dentition period. Although the prevalence of these lesions in children and adolescents in some studies was approximately equal and it was 52% and 48%, respectively in the study of Jones and Franklin<sup>1</sup> and 48.2% and 51.8%, respectively in the study of Chen et al.<sup>14</sup>

Similar to the most studies, inflammatory/reactive lesions (36.8 %) were the most common category in this study.<sup>3,7,9,10,14,16,19</sup> However, similar studies conducted in oral pathology laboratories in the UK<sup>1</sup> and Thailand<sup>13</sup> have reported that dental pathologies (22%) and cystic lesions (35%) were the most prevalent ones in children and adolescents, respectively.

**Table 4.** Number of cases and the most common location of the pulp and periapical inflammatory lesions and salivary gland pathology

Lesion	Number of cases	Percentage in relation to the group	Percentage in relation to the total	Most common location
Radicular cyst	22	59.45	6.74	Maxilla
Periapical granuloma	12	32.43	3.68	Mandible
Osteomyelitis	2	5.40	0.61	Mandible
Residual cyst	1	2.70	0.30	Maxilla
Mucocele	26	72.22	7.97	Lower lip
Sialadenitis	6	16.66	1.84	Parotid
Pleomorphic adenoma	3	8.33	0.92	Parotid
Warthin tumor	1	2.77	0.30	Parotid

On the other hand, as most of the neoplasms can be treated in medical hospital, a study in a surgical pathology service in Africa showed that benign neoplasms were the most prevalent lesions in this age range.<sup>2</sup> Other studies in Thailand,<sup>13</sup> Nigeria,<sup>2</sup> and Uganda<sup>21</sup> have reported inflammatory/reactive lesions as the second most common category.

Similar to the study of Saravani et al.<sup>9</sup> and Kamulegeya and Lakor,<sup>21</sup> we observed most of the inflammatory/reactive lesions in the permanent dentition period; while Dhanuthai et al.<sup>13</sup> Gultelkin et al.,<sup>19</sup> and Wang et al.,<sup>3</sup> reported these lesions more often in mixed dentition period. In this study, these lesions were more frequent in female while some studies have reported higher prevalence in male.<sup>3,7,9,13,19</sup>

In most studies on the occurrence of oral lesions in pediatric, mucocele have been reported as the most prevalent oral lesion.<sup>1,3,5,7,9,14</sup> In this study, pyogenic granuloma was reported as the most prevalent oral lesion (9.20%). Pyogenic granuloma was mostly observed in maxilla and more frequent in female. After that, peripheral giant cell granuloma (8.89%), dentigerous cyst (8.28%), and mucocele (7.97%) were the next more frequent lesions in this study. In the studies of Jaafari-Ashkavandi and Ashraf<sup>10</sup> and Saravani et al.<sup>9</sup> in Iran, peripheral giant cell granuloma and pyogenic granuloma were reported as the most prevalent lesions, respectively. Poor oral hygiene, abnormal tooth development, and taking certain medications have been reported as the etiologic factors of pyogenic granuloma. In addition, these lesions are seen more often in women and in the second decade of their life due to the increased vascular effects of female hormones.<sup>22</sup> Dhanuthai et al.<sup>13</sup> In their study in Thailand reported dentigerous cyst, mucocele, and pyogenic granuloma as the most prevalent lesions. Maia et al.<sup>23</sup> in Brazil, reported dentigerous cyst and fibrous hyperplasia as the most common lesions. The difference between the results of this study with other

studies can be due to including 0-18 year-old children and adolescents while other studies included adolescents under 14 or 15 year-old. It also can be due to the type of institution in which the study is performed. In this study, most of the samples were obtained from the pathology laboratory of medical hospital.

Odontogenic cysts and tumors were the second most common category (18.71%) in this study. The prevalence reported in this study is lower than those reported in Africa, Thailand, and Taiwan (23%-25%),<sup>2,13,14</sup> but more than those reported in Turkey (12%).<sup>19</sup> Similar to most studies, dentigerous cyst was the most prevalent lesion in this category.<sup>18,24,25</sup> However, studies in the UK, Turkey, and North of Iran reported radicular cyst as the most cystic lesion in children.<sup>1,11,19</sup> In the study of Lei et al.<sup>26</sup> that was performed in 2014 in Taiwan on head and neck lesions, of 298 cases with dentigerous cyst, 28 cases were observed in 0-10 year-old children and 65 cases in 10-19 year-old adolescents and dentigerous cyst was most common in ages 0-19 years. Similar to the study of Saravani et al.,<sup>9</sup> Al Yamani et al.,<sup>27</sup> Kamulegeya and Lakor,<sup>21</sup> and Wang et al.,<sup>3</sup> most of these lesions were observed in permanent dentition period but Dhanuthai et al.<sup>13</sup> and Gultelkin et al.<sup>19</sup> reported higher prevalence of cystic lesions in mixed dentition period.

Several studies have reported sexual predominance for cystic lesions<sup>18,19,25</sup> but the present study showed equal prevalence in both genders which is consistent with the study of Saravani et al.<sup>9</sup> and Bodner<sup>24</sup> Similar to the other studies, mandible was the most involved area in this study.<sup>7,9,19,25</sup>

Among odontogenic tumors, odontoma and ameloblastoma were the most prevalent lesions involving the maxilla and mandible, respectively. Consistent with other studies, these lesions have been reported as the first and second most common odontogenic tumors.<sup>1,5,10,13,23</sup>

In this study, pulp and periapical inflammatory lesions (11.34%) were the third most prevalent category, and similar to the



study of Jaafari-Ashkavandi and Ashraf<sup>10</sup> and Maia et al.,<sup>23</sup> radicular cyst was the most prevalent lesion in this group which occurred more frequently in the maxilla. Lima et al.<sup>5</sup> also reported radicular cyst (6.88%) as the most common cyst after dentigerous cyst. In the study of Siadati et al.<sup>11</sup> in Iran, radicular cyst was the most prevalent cystic lesion and the third most prevalent lesion in this study after mucocele and central giant cell granuloma. Many studies have classified radicular cyst in odontogenic cysts category, and have identified it as the second most prevalent cyst after dentigerous cyst.<sup>24</sup>

In salivary gland pathology, mucocele was the most prevalent lesion which involved more frequently the lower lip and female gender. Nico et al.<sup>28</sup> and Jaafari-Ashkavandi and Ashraf<sup>10</sup>, also found a female predominance for this lesion. Most studies have classified mucocele in the inflammatory/reactive group and have reported it as the most prevalent lesion in pediatrics but its prevalence was lower in this study. Lima et al.<sup>5</sup> reported that of 128 salivary lesions, 108 cases were mucocele but Shulman<sup>29</sup> in a study on patients under 17 years of age reported only 5 cases of mucocele.

In this study, hemangioma was the most prevalent soft tissue tumor (2.45%). In studies done by Wang et al.,<sup>3</sup> Dhanuthai et al.,<sup>13</sup> and Lima et al.<sup>5</sup> the prevalence rates of 0.08%, 0.72%, and 0.96% were reported for hemangioma, respectively. Despite different classifications, hemangioma has been reported as the most common soft tissue tumor in most studies.<sup>3,5,12</sup>

In this study, only 17 cases of benign epithelial lesions were found. Although verruca vulgaris is known as a lesion that mostly occurs in children but the prevalence of this lesion was only 0.61%. Other studies have also revealed the prevalence of 0.19-2.04%.<sup>1,8,26</sup> Consistent with the study of Jaafari-Ashkavandi and Ashraf<sup>10</sup> squamous papilloma was the most prevalent benign epithelial lesion in this study and gingiva was reported as the most frequently affected site. Lima et al.<sup>5</sup> and Vale et al.<sup>7</sup> reported the

prevalence rate of 1.44% and 3.81% for this lesion, respectively which is consistent with the results of our study. Consistent with the study of Jaafari-Ashkavandi and Ashraf<sup>10</sup> and Jones and Franklin<sup>1</sup>, the present study showed female predilection for these lesions. In contrast, Wang et al.<sup>3</sup> reported higher prevalence in male. However, due to the small sample size, these differences are reliable.

In this study, 13 cases of non-odontogenic cysts (3.98%) were observed. The occurrence of odontogenic cysts in this study was almost 3.6 times higher than non-odontogenic cysts. Most of the studies have reported that the prevalence of odontogenic cysts was higher than non-odontogenic cysts;<sup>1,13,19,25</sup> however, Kamulegeya and Lakor<sup>21</sup> have reported similar prevalence of these lesions in their study.

In this study, the prevalence of bone lesions was 3.37%. The prevalence of these lesions have been reported from 3.2% to 4.8% in other studies.<sup>1,5</sup> In the study of Jaafari-Ashkavandi and Ashraf<sup>10</sup> this category constituted 10.3% of all lesions. Similar to many studies, this study also reported central giant cell granuloma and fibrous dysplasia as the most prevalent lesions of this category, and mandible and maxilla were the most involved areas.<sup>2,10</sup> However, Maia et al. reported that both of these lesions mostly occurred in the mandible.<sup>23</sup>

In this study, most of the diagnosed lesions were benign and only 3.68% were malignant. Albright et al.<sup>30</sup> showed that in a 23-year period, the prevalence of head and neck cancer in children under 15 years was increased. Sousa et al.<sup>12</sup> and Lima et al.<sup>5</sup> in their studies on 0-14 year-old children in Brazil found malignancy in 1.3% and 1.2% of all studied cases, respectively. Jones and Franklin<sup>1</sup> and Wang et al.<sup>3</sup> reported that the frequency of these lesions were 1% and 5%, respectively.

## Conclusion

The results revealed that about 10.2% of oral and maxillofacial lesions involved patients under 18 years. Inflammatory/reactive lesions were the most prevalent ones. Similar

to other studies, most of the diagnosed lesions were benign. However, comparing to the other studies, there were some differences and the frequency of mucocele in this study was lower than those reported in other studies. These findings can help dentists and surgeons for better management of their patients. However, similar studies in different patient groups should be designed to determine the exact prevalence and to get more accurate demographic information for

oral lesions.

### Conflict of Interests

Authors have no conflict of interest.

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