

## The incidence of oral and maxillofacial lesions in children over a 10-year period (2010–2020) in East Azerbaijan

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This study aimed to investigate pediatric patients aged <12 years who had oral and maxillofacial lesions and were referred to the Tabriz Pediatric Hospital during the 10-year period of 2010–2020. In this prospective, cross-sectional study, documents with final diagnosis were separated, and the demographic data of the patients, including age, sex, and location of lesions, were collected from the records. Microscopic slides of each case were reviewed by two pathologists. The lesions were classified into the following five categories: developmental lesion, benign tumors, malignant tumors, infectious lesions, and inflammatory lesions. One-way ANOVA was applied to compare the frequency of the lesions using SPSS Statistics for Windows, Version 17.0 (SPSS Inc., Chicago, IL, USA). Overall, 9,314 biopsy records of pediatric patients aged ≤12 years were studied. We identified and analyzed 8,993 cases with inflammatory lesions, 171 with developmental lesions, 71 with reactive lesions, 64 with benign tumors, and 15 with malignant tumors. Furthermore, the most common lesion site was the neck (>98.5%), and the most uncommon site was the nasal area, accounting for only two lesions. Moreover, among inflammatory lesions, follicular hyperplasia and tonsillitis were the most common with a frequency of 99.1% (8,916 cases) observed in 3,656 (40.7%) female and 5,337 (59.3%) male. Sixty-nine (40.4%) female and 102 (59.6%) male had developmental lesions. The present results showed that the most common type was inflammatory lesion whereas the least common type was malignant lesion.

**Key Words:** Inflammation, Mouth diseases, Neoplasms, Pathology

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### Introduction

Identification of oral lesions plays a major role to achieve better treatment plans for patients with a wide age range including pediatrics [1]. Various factors such as local factors, systemic disease, neoplasms, physical and chemical injuries and inflammatory conditions influence oral lesions [2,3].

Diagnosis and rapid treatment of these oral lesions are so important for pedodontists. Lesions that mostly manifest in pediatrics are developmental, benign, and malignant tumors as well as reactive, inflammatory, and traumatic lesions [4].

Despite scientific papers reporting epidemiological data of these lesions, there is scarce research on all oral and maxillofacial lesions in pediatrics and most of these studies

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are limited to certain lesions such as jaw cysts and malignant tumors [5]. Failure to consider the possibility of malignancy may lead to delayed diagnosis and treatment, more aggressive treatments, and probably death [6]. The final diagnosis of malignant lesions of the mouth, jaw, and faces is based on the clinical and histopathological characteristics [7].

Reactive lesions, which are non-neoplastic, are considered to increase the local volume of the gingiva or oral mucosa [8]. Several factors contribute to the formation of reactive lesions including trauma or local stimuli such as dental plaque, microorganisms, trauma from occlusion, inappropriate dentures, and restorations. Hormonal factors such as estrogen and progesterone are also considered as predisposing factors [9].

The infectious agents that can affect the oral cavity are very diverse and can be found in viruses, bacteria, mycobacteria, fungi, and so on. Some of these infectious agents are self-limiting and patients are recovered without any treatment. However, some of them need treatment and if they are not recognized and treated duly can result in irreparable lesions. Among the most common bacterial infections in children, one can name acute necrotizing ulcerative gingivitis that can be due to increased spirochetes and *Prevotella* in the oral cavity, with symptoms including painful ulcers in gingiva, focal necrosis in the papillary region of Teeth, and bleeding [10].

Detection of oral lesions may be much more difficult than skin lesions because they are less visible and, on the other hand, often do not make a difference in color with the surrounding mucosa. Since the treatment and prognosis of cases may considerably differ from one another, a proper diagnosis is necessary. Although developmental disorders are not specific diseases, they account for a part of oral mucosal lesions [11].

Siadati et al. [12] have reported the incidence of oral and maxillofacial lesions in the northern part of Iran. Considering that the incidence of oral and maxillofacial lesions is different in various regions, the present study was conducted to determine the prevalence and incidence of oral and maxillofacial lesions in pediatrics 12 and under who received treatment services in Tabriz pediatric hospital, Iran. It should be noted that this study was conducted for the

first time in East Azerbaijan province with a high number of samples.

## Materials and Methods

### Research process and data collection

In this prospective cross-sectional study, we investigate the documents of pediatric patients under the age of 12 with oral and maxillofacial lesions who referred to Tabriz Pediatric Hospital. Documents with net diagnosis were separated and patients' demographic data including age, gender, and location of lesions were reported from the records. Microscopic slides of each report were reviewed by two pathologists. All the lesions were classified into 5 categories: developmental, benign, and malignant tumors, as well as traumatic and inflammatory lesions [13]. Reports concerning patients aged 12 and under were included in this study; all specimens from older patients were excluded. Each diagnosis was entered accompanied by the patient's age and gender. The data were sorted by pathology category, diagnosis, age and gender, which facilitated the calculation of the frequency of disease, male to female ratio, location and the percentage of particular pathologies. The study was approved by Ethical Committee of Tabriz Medical University, Iran (IR.TBZMED.REC.1396.1089). The research was conducted in full adherence to the World Medical Association Declaration of Helsinki. The study was conducted without the consent of the patients and by reviewing their files under the responsibility of the Ethics Committee and the pathologist responsible for the hospital. The patients' data were anonymized prior to analysis.

### Statistical analysis

In this cross-sectional study, the type of oral and maxillofacial lesions and their frequency were investigated from the year 2010 to 2020. Demographic data including age and sex, the location of the lesions, and their types were reported. One-way ANOVA test was applied to compare lesions frequency using SPSS Statistics for Windows, Version 17.0 (SPSS Inc., Chicago, IL, USA).

## Results

In this study, a total of 9,314 patients were studied of which 8,993 had inflammatory lesions, 171 had developmental lesions, 71 had reactive lesions, 64 had benign lesions, and 15 had malignant lesions. Among these subjects, 3,810 were (40.9%) female and 5,503 were (59.1%) male. The mean age of patients was  $7.54 \pm 0.79$  ( $6.96 \pm 0.67$  for females and  $7.9 \pm 0.95$  for males).

The most frequent location for pediatric lesions was neck (98.5%) and the lowest incidence was in the nose (which was observed just in 2 patients). No lesion was observed on the face of the patients. The frequency of different locations is presented in Table 1.

Lesions were investigated and reported separately for each location. In inflammatory lesions, the most commonly detected lesions were follicular hyperplasia and tonsillitis with a frequency of 8,916 cases (99.1%). Subsequently, the abscess was found with a frequency of 31 patients (0.3%) and chronic inflammation with 15 ones (0.2%). The classification of inflammatory lesions and their frequency are presented in Table 2. In this type of lesion, 3,656 were (40.7%) female and 5,337 were (59.3%) male. The most frequent site of involvement in this type of lesion was neck with a frequency of 8,950 people (99.5%). The mean age of the patients was  $58.8 \pm 0.56$  for inflammatory lesions.

In developmental lesions, the most commonly detected one was thyroglossal duct cyst with a frequency of 143

(83.6%). In the next orders, branchial cleft cyst with a frequency of 13 patients (7.6%) and a dermoid cyst with a frequency of 7 (4.1%) were the most common lesions, respectively. The frequency of developmental lesions is presented in Table 3. In this type of lesions, 69 were female (40.4%) and 102 were male (59.6%). The most frequent site of involvement was neck with a frequency of 163 (95.3%). The mean age in this type of lesion was  $7.7 \pm 2.29$ .

In reactive lesions, the highest incidence was for salivary cysts (Ranula, Bartholin cyst, mucocele) with a frequency of 46 (64.8%). Subsequently, fibroepithelial polyps and epidermal cysts were found to be 6 (8.5%). The incidence of reactive lesions is presented in Table 4. In this type of lesion, 39 (54.5%) were female and 32 (45.1%) were male. The most frequent site of involvement in this type of lesion was tongue with a frequency of 22 (59.5%). The mean age of subjects in this type of lesion was  $6.53 \pm 3.19$ .

In benign lesions, the most commonly detected lesions were lymphangioma and hemangioma with the frequency of 29 (45.3%) and 8 (12.5%), respectively. The classification and incidence of benign lesions are presented in Table 5. In this type of lesion, 44 (68.8%) were female and 20 (31.3%)

**Table 1.** Frequency of lesions in different locations

Location of lesion	Incidence	Percent
Neck	9,179	98.51
Tongue	37	0.40
Gingiva	4	0.01
Sinus	9	0.10
Tooth	3	0.01
Adenoid tissue	4	0.01
Buccal mucosa	7	0.10
Mouth floor	7	0.10
Face skin	0	0
Submandibular glands	11	0.10
Lip	32	0.30
Palate	7	0.10
Salivary glands	12	0.10
Nose	2	0.01

**Table 2.** Classification and incidence of inflammatory lesions

Lesion type	Incidence	Percent
Follicular hyperplasia and tonsillitis	8,916	99.10
Reactive lymph node	5	0.10
Chronic inflammation	15	0.20
Sialadenitis	9	0.10
Inflammatory polyp	5	0.10
Abscess	31	0.30
Inflammatory connective tissue	1	0.01
Adenoid	10	0.10
Dermatitis	1	0.01

**Table 3.** Frequency of developmental lesions

Lesion type	Incidence	Percent
Dermoid cyst	7	4.1
Keratinous cyst	1	0.6
Thyroglossal duct cyst	143	83.6
Lymphangiectasis	2	1.2
Arteriovenous malformation	1	0.6
Macroglossia	1	0.6
Lip nevus	3	1.8
Branchial cleft cyst	13	7.6

**Table 4.** The classification and incidence of reactive lesions

Lesion type	Incidence	Percent
Fibroepithelial polyp	6	8.5
Salivary gland cyst	46	64.8
Preauricular cyst	1	1.4
Pyogenic granuloma	3	4.2
Focal epithelium hyperplasia	2	2.8
Epidermal cyst	6	8.5
Skin tag	1	1.4
Benign epithelial cyst	3	4.2
Thrombosis of blood vessels	1	1.4
Benign neck cyst	1	1.4
Cholesterol granuloma	1	1.4

**Table 5.** The classification and incidence of benign lesions

Lesion type	Incidence	Percent
Lymphangioma	29	45.3
Fibroanthoma	1	1.6
Rhabdomyoma	1	1.6
Giant cell tumor	2	3.1
Papilloma	3	4.7
Hamartoma	8	12.5
Choristoma	1	1.6
Neurofibroma	2	3.1
Hemangioma	7	10.9
Congenital epulis	1	1.6
Schwannoma	1	1.6
Higroma	1	1.6
Sialadenoma	1	1.6
Teratoma	2	3.1
Fibro lipoma	0	0
Neuroblastoma	2	3.1
Fibroma	2	3.1

were male. The most common location of involvement was also the neck with a frequency of 41 (64.1%). The mean age in this type of lesion was  $5.34 \pm 3.11$ .

In malignant lesions, the most commonly detected lesion was lymphoma with the frequency of 8 (53.3%). Thereafter, the malignant round cell tumor and Rhabdomyosarcoma were both seen in 2 (13.3%) patients separately. The frequency and classification of malignant lesions are presented in Table 6. In this type of lesion, 3 (20.0%) were female and 12 (80.0%) were male. This type of lesion was observed in the neck and submandibular region. The mean age in this type of lesion was  $5.86 \pm 2.41$ .

The frequency of lesions in different locations is pre-

**Table 6.** The frequency and classification of malignant lesions

Lesion type	Incidence	Percent
Lymphoma	8	53.3
Malignant sarcoma	1	6.7
Malignant peripheral nerve sheath tumor	1	6.7
Malignant round cell tumor	2	13.3
Rhabdomyosarcoma	2	13.3
Soft tissue giant cell tumor malignant potential	1	6.7

sented in Table 7. In the neck, sinus, and buccal mucosa, inflammatory lesions were common with the frequency of 8,909 cases (97.1%), 6 (66.7%), and 4 (57.1%), respectively. In tongue, reactive lesions with a frequency of 22 cases (59.5%) were common. Reactive and benign lesions were observed in the floor of the mouth, of which 5 (74.1%) were reactive. No lesions were observed in the face skin. In the submandibular area, the most common type of the lesion was inflammatory one with a frequency of 7 cases (63.6%), in the lip the reactive lesion with a frequency of 16 cases (50.0%), and in the palate benign lesion with a frequency of 4 cases (57.1%). In the salivary glands, 12 patients had reactive lesions. Two lesions were found in the nasal area, one of which was inflammatory and the other was reactive.

## Discussion

Detection of oral lesions in individuals is of great importance. Determining the characteristics of these lesions in children and adolescents provides the basis for proper diagnosis and treatment. The prevalence of these lesions in various societies can be different based on the race and geographical differences. Conducting epidemiological studies can help understand the at-risk groups. Early diagnosis of pre-malignant and malignant lesions of oral mucosa plays a decisive role in improving prognosis and patient's survival rate [14]. The study of the prevalence of lesions in different ages provides more insights and knowledge about these specific lesions. These information may be valuable for both epidemiology and teaching. Furthermore, with training clinicians based on more prevalent diseases, their performance on these patients will be improved. This will lead to training based operation on more common lesions

**Table 7.** The frequency of lesions in different locations

Location	Diagnosis	Incidence	Percent
Neck	Inflammatory	8,950	97.5
	Developmental	163	1.8
	Reactive	8	0.1
	Benign	41	0.4
	Malignant	14	0.2
Tongue	Inflammatory	5	13.5
	Developmental	3	8.1
	Reactive	22	59.5
	Benign	7	18.9
Gingiva	Inflammatory	1	25.0
	Developmental	1	25.0
	Benign	2	50.0
Sinus	Inflammatory	6	66.7
	Developmental	2	22.2
	Reactive	1	11.1
Tonsil	Inflammatory	3	100.0
Jaws	Inflammatory	3	100.0
Pharyngeal tonsil	Inflammatory	4	100.0
Buccal mucosa	Inflammatory	4	57.1
	Reactive	2	28.6
	Benign	1	14.3
	Malignant	1	14.3
Mouth floor	Reactive	5	71.4
	Benign	2	28.6
Submandibular area	Inflammatory	7	63.6
	Reactive	1	9.1
	Benign	2	18.2
	Malignant	1	9.1
Lip	Inflammatory	8	25.0
	Developmental	3	9.4
	Reactive	16	50.0
	Benign	5	15.6
Palate	Inflammatory	1	14.3
	Reactive	2	28.6
	Benign	4	57.1
Salivary glands	Reactive	12	100.0
Nose	Inflammatory	1	50.0
	Reactive	1	50.0

and also leads to early detection of lesions and more effective treatments. In addition, in developing countries, this helps to allocate more human and financial resources and equipment to treat more common lesions.

The results of this study demonstrated that the most common types of lesions were inflammatory lesions with more than 96% of all cases and the least were malignant lesions that accounted for about 15 cases. Furthermore, the most frequent site of the lesions was the neck with more than 98.5% and the lowest was the nasal area accounting for just

two lesions. In addition, in the inflammatory lesions, follicular hyperplasia and tonsillitis with a frequency of 8,916 cases (99.1%) were the most common lesion. In this type of lesion, 3,656 (40.7%) were female and 5,337 (59.3%) were male. In developmental lesions, 69 (40.4%) were female and 102 (59.6%) were male. In addition, in this type of lesion, the most commonly detected lesion was thyroglossal duct cyst with the frequency of 143 patients (83.6%). In another retrospective study in an Australian pediatric population, a total of 1,305 oral pathology specimens were assessed. All

specimens from pediatric patients aged 16 and under were included in the analysis. The most common lesion in that study was related to dental pathology (24.4%), followed by odontogenic cysts (18.5%) and mucosal lesions (17.0%). The most frequently encountered lesion was a dentigerous cyst (9.4%), followed by fibrous hyperplasia (8.3%), radicular cyst (5.2%), and chronic periapical granuloma (5.2%) [15].

Results from different countries in this regard are affected by the genetic, geographical area, the period of the study, and even the type of medical center. Also, age range and location are important inclusion criteria for general differences between studies. In the present study, the classification of lesions is based on their frequency. It should be noted that our prediction for low odontogenic lesions is that they will not be reported to medical centers for registration, rather than their actual low. In our view, the most common causes of inflammatory lesions can be the presence of bacteria, the lack of visits to patients for periodic examinations and the possible absence of acute inflammatory symptoms in these individuals.

In this study, the most common lesions were inflammatory lesions with more than 96% which was similar to some other studies [12,16-18] while in studies conducted Thailand and Nigeria [14,19], these lesions were the second most prevalent. In inflammatory lesions 3,656 (40.7%) were female and 5,337 (59.3%) were male. Thus, the majority of inflammatory lesions occurred in males; which is consistent with the results of Saravani et al. [13]. In contrast, in some other studies, the lesions often occurred in females [12,14,17]. The most prevalent lesion in this category was follicular hyperplasia and tonsillitis, while some of the studies reported other lesions [12,16-18]. In some studies, Mucocele was the most common oral lesion [16,20], but in our study mucocele was the second prevalent lesion in the reactive category. This finding is similar to the results of a study in Thailand [14] and Pacific Dentistry School [21]. Our report showed the lips of the common site of Mucocele similar to other studies [12,16,17]. The geographical tongue has not been found in our study, while in other studies it was the second most commonly found lesion [22]. In our study, the least common lesion was malignant lesions accounting for about 15 cases, which is in line with similar studies [16,20,21] except two reports in Africa [23,24]. In

the present work, the mean age in neoplastic lesions was  $5.86 \pm 2.4$ , while the age range in the majority of studies was 13-18 for malignant lesions [25,26].

In our study lymphangioma was the most common benign tumor however in some other studies hemangioma and odontoma was the most prevalent benign tumor in children [14,27,28].

In the present research, we tried to investigate all types of inflammatory, reactive, developmental, benign, and malignant lesions in terms of prevalence and involved regions. According to our findings, no study has been conducted on the extent of this study for pediatric lesions in Asia and most of the studies have focused on some specific types of lesions.

The results of the present work showed that the most types of lesions were related to inflammatory lesions and the least were malignant lesions. However, in the inflammatory lesions, the most commonly detected lesions were follicular hyperplasia and tonsillitis. In developmental lesions, the most commonly detected lesions were thyroglossal duct cysts. In reactive lesions, the most commonly detected lesions were salivary cysts.

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## Conflicts of Interest

The authors declare that they have no competing interests.

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