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Epidemiological Survey on Jawbone Lesions Leading to Hospitalization in Southeastern Iran

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Background and objectives: The aim of this study was to determine the epidemiological profile of patients hospitalized due to the treatment of an intraosseous lesion of the jaw.

Materials and methods: This descriptive-analytical cross-sectional study of 186 patients was conducted from January 2017 to February 2022 at Khatam al-Anbia Hospital in Zahedan. All data, including gender, age, lesion location, and participants' histopathological reports, were obtained from the medical records of all patients hospitalized for treatment of a jaw intraosseous lesion. To examine the association between the study variables, a chi-square test was performed.

Results: Among the 186 medical records, there were 76 male patients (41%) and 110 female patients (59%). 101 lesions (54.3%) were detected in individuals under 40 years of age and 85 lesions (45.7%) in individuals with age over 40 years. Bone lesions were found more frequently in the mandible (69.4%) than in the maxilla (30.6%). Primary intraosseous carcinoma (25.8%) was the most common lesion, followed by odontogenic keratocysts (18.3%) and radicular cysts (14.0%). Age and lesion location were significantly correlated with bone lesions ($P < 0.05$), whereas there was no significant association between gender and bone lesions ($P > 0.05$).

Conclusion: The prevalence of oral and maxillofacial bone lesions leading to hospitalization is therefore different from the prevalence of oral and maxillofacial bone lesions in routine practice. In particular, in this study, malignant bone lesions (primary intraosseous carcinoma) were more common than benign and inflammatory bone lesions.

Keywords: Bone lesions, Jaw lesions, Hospitalization, Epidemiology.

1. Introduction

Oral and maxillofacial lesions can be classified into soft or hard tissue lesions, which may be benign or malignant and require immediate diagnosis (1). Timely diagnosis of bone lesions is challenging due to their hidden nature. In a majority of patients, the diagnosis would only be made when the lesion occupies a certain space or would only be diagnosed during screening examinations. In addition, they have low prevalence in comparison to other lesions of oral and maxillofacial area (1). The epidemiology of these lesions varies by region and can be influenced by genetic, environmental, cultural, and health factors (2, 3).

In view of the relative frequency of diagnosed bone lesions in the oral and jaw region and the most recent World Health Organization classification of odontogenic and maxillofacial bone tumors, radicular cysts, dental cysts and odontomas are the most common bone lesions of the jaw discovered in routine practice (4, 5). Jamshidi et al. (2015) found that cystic lesions were the most common, followed by manifestations of systemic conditions, benign tumors, malignant lesions, and inflammatory lesions (6). Dehghanzadeh et al. (2022) reported a higher prevalence of intraosseous lesions in the right lower jaw of male patients, with odontogenic cysts being the most prevalent (7). Jaafari-Ashkavandi and Akbari (2017) also identified odontogenic cysts as the most common intra-osseous lesions, with a higher prevalence in the posterior mandible (8). Naini et al. (2017) found that non-odontogenic jaw lesions were more common in the mandible, with a higher prevalence in females. The most frequent lesion was central giant cell granuloma (9). Razavi et al. (2019) found that inflammatory periapical lesions, odontogenic cysts, and tumors were the most common jaw

lesions in Isfahan (10). Taghavi et al. (2010) reported a male predominance in malignant jaw tumors, with osteosarcoma being the most common (11).

We expect a difference between the frequency of diagnosed bone lesions in the jaw and the frequency of lesions requiring hospitalization. For example, a large number of radicular cysts are diagnosed by a dentist in the office and cured by root canal treatment (RCT), and the patient does not need to be hospitalized. With this concept in mind, the aim of the present study was to examine the relative frequency of oral and maxillofacial bone lesions leading to hospitalization.

2. Materials and methods

This descriptive-analytical cross-sectional study of 186 patients was conducted from January 2017 to February 2022 at Khatam al-Anbia Hospital in Zahedan. This study was performed according to the STROBE guideline (12). All data, including participants' gender, age, lesion location, and histopathological reports, were obtained from the medical records of all patients hospitalized for oral and maxillofacial bone lesion treatment. Ethical approval was obtained from the Institutional Review Board of Zahedan University of Medical Sciences (Approval No. IR.ZAUMS.REC.1400.362). Inclusion criteria were informed consent and eligible medical records. Patients admitted for treatment of a systemic disease in which jawbone lesions were a manifestation of the disease were excluded from the study. Statistical analyses were performed using SPSS 24. A chi-square test was performed to examine the association between the study variables. Multiple logistic regression model with a backward elimination method was also performed to assess the effects of all factors simultaneously. All statistical analyses were performed at a significance level of < 0.05.

3. Results

Among the 186 medical records, there were 76 male patients (41%) and 110 female patients (59%), and participants had a mean age of 38.83 ± 20.68 years (range: 4–90 years). 101 lesions (54.3%) were found in individuals younger than 40 years and 85 lesions (45.7%) were found in individuals older than 40 years. Bone lesions were more commonly observed in the mandible (69.4%) than in the maxilla (30.6%).

Figure 1 shows that primary intraosseous carcinoma (25.8%) was the most common lesion, followed by odontogenic keratocysts (18.3%) and radicular cysts (14.0%). However, odontogenic adenomatoid tumor (0.5%) and cement osseous dysplasia (0.5%) were the least frequent bone lesions in the maxillofacial area.

Due to the limited number of some lesions with respect to gender, similar lesions were merged in Table 1 to assess the association between the type of bone lesions and gender.

There was no significant correlation between lesion type and gender ($P > 0.05$). However, age was significantly associated with the type of bone lesions ($P < 0.05$) (Table 2). With the exception of primary intraosseous carcinoma and cement osseous dysplasia, the prevalence of other lesions was higher in subjects younger than 40 years.

Table 3 shows that a significant correlation was found between lesion type and its location ($P < 0.05$). Lesions such as odontogenic adenomatoid tumor, fibrous dysplasia, odontoma, cementifying fibroma, and calcified cystic odontogenic tumor were less frequent in the mandible than in the maxilla. In contrast, lesions such as primary intraosseous carcinoma, odontogenic keratocyst, central giant cell, ameloblastoma, radicular cyst, dentigerous cyst, and cement osseous dysplasia were more common in the mandible.

Logistic regression model also revealed that the odds of having primary intraosseous carcinoma and odontogenic keratocyst in the mandible were 2.56 (CI: 1.12-3.45) and 2.19 (CI: 1.21-3.18) times higher, respectively, than the odds of having them in the maxilla. In addition, patients over 40 years of age were 2.71 (CI: 1.32-3.89) times more likely to develop primary intraosseous carcinoma than those under 40 years of age.

4. Discussion

A total of 186 medical records were examined in the present study. The majority of participants were female. This is consistent with the study by Farias et al. (13). However, in the study of Razavi et al. (10) male patients were the majority of participants, which is not consistent with our study. The different study populations could account for this discrepancy. Environmental and lifestyle factors play a crucial role in the occurrence of oral lesions (6, 13). These factors encompass place of residence, financial standing, regional location, and hygiene as socioeconomic status is influenced by various elements including income, education, employment status, and the overall health of the community, which can directly affect health outcomes and access to resources. Additionally, social determinants such as socioeconomic status and community infrastructure significantly impact oral health behaviors (14).

As mentioned above, with the exception of primary intraosseous carcinoma and cement osseous dysplasia, other lesions were more common in individuals younger than 40 years, and age was significantly correlated with oral and maxillofacial bone lesions. This is in agreement with the literature (5, 15, 16, 17).

With regard to the gender-specific distribution of lesions, no significant relationship between gender and lesion types could be found in this study. Similar results were observed in the previous studies (13, 18).

A similar study at the same hospital conducted in 2012 examined medical records of patients diagnosed with odontogenic tumors between 2000 and 2010. Kadeh et al. reported that odontogenic

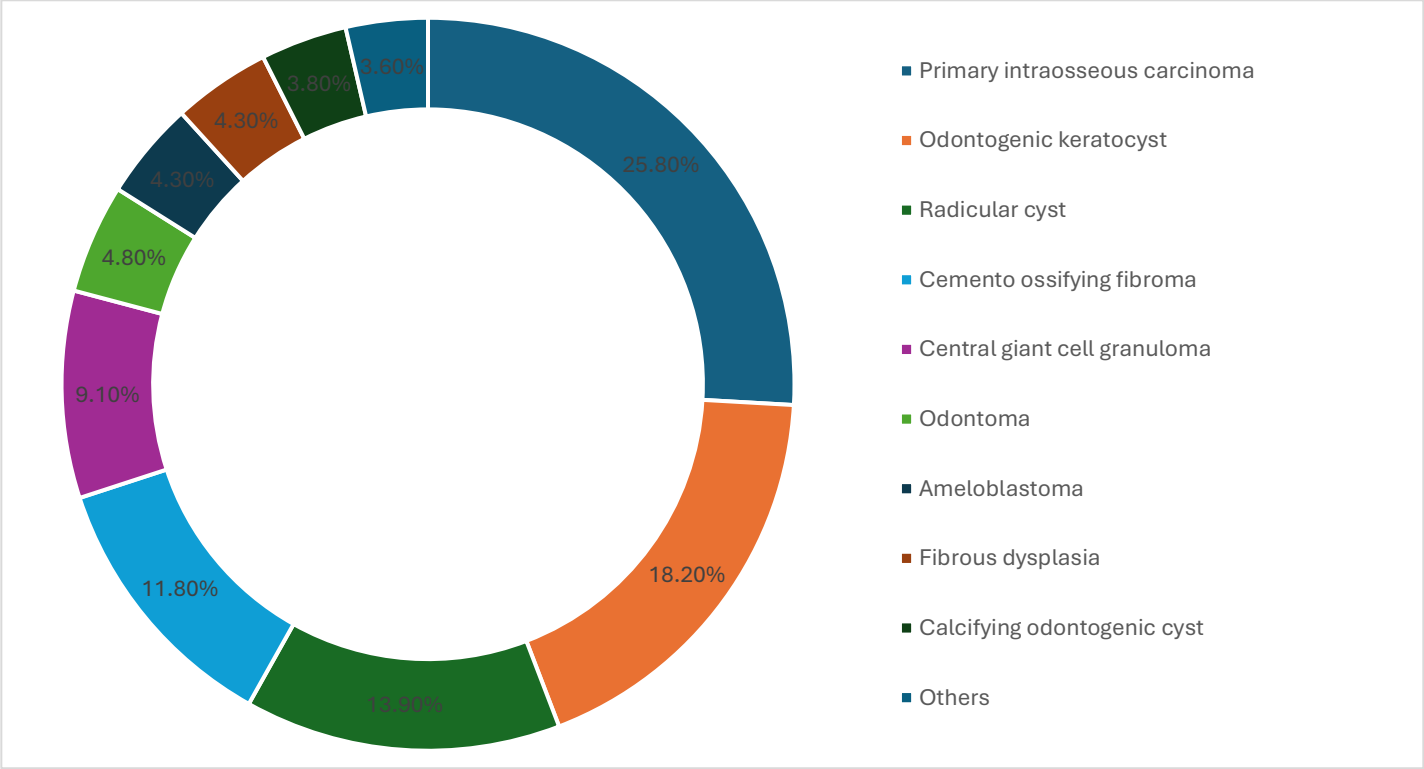

Figure 1. Percentage of different types of oral and maxillofacial bone lesions.

Table 1 Percentage of different types of oral and maxillofacial bone lesions with respect to gender.

Gender / Lesions	Male N (%)	Female N (%)	p-value
Malignant	23 (30.2%)	25 (22.7%)	0.057
Benign	20 (26.3%)	37 (33.6%)	
Cyst	30 (39.5%)	42 (38.2%)	
Osseous dysplasia	3 (4%)	6 (5.5%)	

Table 2. Percentage of different types of oral and maxillofacial bone lesions with respect to gender.

Age / Lesion	Under 40 years old N (%)	Over 40 years old N (%)	P-value
Primary intraosseous carcinoma	4 (4%)	44 (51.8%)	P < 0.001
Adenomatoid odontogenic tumor	1 (1%)	0 (0%)	
Fibrous dysplasia	6 (5.9%)	2 (2.4%)	
Odontogenic keratocyst	19 (18.9%)	15 (17.6%)	
Central giant cell granuloma	13 (12.9%)	4 (4.7%)	

Ameloblastoma	5 (5%)	3 (3.5%)	P < 0.001
Radicular cyst	19 (18.8%)	7 (8.2%)	
Odontoma	7 (6.9%)	2 (2.4%)	
Dentigerous cyst	5 (5%)	0 (0%)	
Cemento ossifying fibroma	17 (16.8%)	5 (5.9%)	
Calcifying odontogenic cyst	5 (5%)	2 (2.4%)	
Cemento osseous dysplasia	0 (0%)	1 (1.2%)	

Table 3. Frequencies of different types of oral and maxillofacial bone lesions with respect to lesion's location.

Location / Lesion	Mandible N (%)	Maxilla N (%)	P-value
Primary intraosseous carcinoma	47 (36.4%)	1 (1.8%)	P <0.001
Adenomatoid odontogenic tumor	0 (0%)	1 (1.8%)	
Fibrous dysplasia	3 (2.3%)	5 (8.8%)	
Odontogenic keratocyst	25 (19.4%)	9 (15.8%)	
Central giant cell granuloma	10 (7.8%)	7 (12.3%)	
Ameloblastoma	8 (6.2%)	0 (0%)	
Radicular cyst	17 (13.2%)	9 (15.8%)	
Odontoma	2 (1.6%)	7 (12.3%)	
Dentigerous cyst	3 (2.3%)	2 (3.5%)	
Cemento ossifying fibroma	10 (7.8%)	12 (21.1%)	
Calcifying odontogenic cyst	3 (2.3%)	4 (7%)	
Cemento osseous dysplasia	1 (0.8%)	0 (0%)	

keratocyst (48%), ameloblastoma (24%), and odontoma (12%) were the most common tumors (19). The present results suggested that primary intraosseous carcinoma (25.8%), odontogenic keratocyst (18.3%), and radicular cyst (14%) were the most common bone lesions in the jaw and face. In another study conducted by Chen et al. at Massachusetts General Hospital on benign pediatric jaw lesions revealed that odontoma was the most common odontogenic tumor and Odontogenic Keratocyst (OKC) was the most common odontogenic cyst (20). Furthermore, in the study of Johnson et al. radicular cyst was the most frequently diagnosed lesion (21). These results align with other studies that have reported a high incidence of odontogenic and inflammatory cysts such as OKC and radicular cyst (6, 10). However, when comparing the results of our study with these studies, a higher prevalence of bone malignancies was found in our study population. This may be associated with a more aggressive nature of malignant lesions that result in hospitalization and require more advanced treatment, which should be provided by a team in a hospital setting. Therefore, more patients diagnosed with malignant lesions are hospitalized for treatment. Nevertheless, the present findings should be interpreted with caution since based on the socioeconomic status of our study population, high-risk behaviors such as tobacco use disorder are more commonly observed and these increase the likelihood of malignant lesions (22). Carcinogenic components and chronic inflammation are two features of tobacco that contribute to the malignancies (23). In addition, the importance of obtaining vitamins and micronutrients from the daily diet for the prevention of cancer should be taken into account. Southeast Iran has one of the highest levels of food insecurity in the country, and this can be considered one of the main factors responsible for the higher incidence of malignancies (24).

This study revealed that mandibular lesions were more common. Additionally, the location of the lesion was significantly correlated with the type of oral and maxillofacial bone lesions. This is consistent with the findings of Razavi et al. (10). However, Farias et al. reported no significant relationship between bone lesions and their location (13).

These insights will enable oral and maxillofacial surgeons to advance their strategies, modify curricula, and prepare more precisely for their future prospects as they work in a hospital setting and deal with these hospital patients, unlike other dentists.

5. Limitations

The study analyzed 186 medical records from a single hospital in Zahedan, limiting the generalizability of the results to other regions or populations. As a retrospective analysis, it relied on existing records, which may contain inconsistencies or missing data, potentially affecting the accuracy of the findings. Additionally, the use of medical records may introduce bias due to incomplete clinical details or variations in diagnostic practices across healthcare providers. A larger, multicenter study would offer more comprehensive and reliable data. It is recommended to conduct studies with larger sample sizes across diverse locations to enhance the generalizability of the findings.

6. Conclusion

The prevalence of oral and maxillofacial bone lesions that lead to hospitalization is therefore different from the prevalence of diagnosed bone oral and maxillofacial lesions in routine dentistry. In particular, in this study, malignant bone lesions (primary intraosseous carcinoma) were more common than benign and inflammatory bone lesions. Early-career surgeons can use this data to improve their skills in dealing with these conditions in the future. A multicenter study design must be employed for future studies.

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Authors' contribution

Mohammad Amir Alizadeh Tabrizi: Conceptualization, Methodology, Investigation
Amir Hossein Khazaei: Writing Original Draft, Methodology
Fatemeh Rezaei: Formal analysis, Visualization, Investigation
Sadra Amirpour Hardasht: Review & Editing, Supervision, Project administration

Conflict of Interest

The authors declare no conflict of interest.

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