

Oral and Maxillofacial Lesions Algorithm in Nineveh Province, a Clinicopathological Study

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ABSTRACT

Background: Oral and maxillofacial lesions include a wide variety of lesions. They could be either neoplastic or non-neoplastic, furthermore; the non-neoplastic lesions can be cystic, inflammatory, or they can also represent a reaction to some kind of irritation or mild injury.

Objective: To analyze the frequency and distribution of the various types of oral and maxillofacial lesions in Nineveh province. **Patients and methods:** This retrospective study was conducted on 763 cases from May 2021 to April 2022. Data was retrieved from the Oral Pathology Department at Al-Jumhori Teaching Hospital, Al-Salam Teaching Hospital and some private laboratories in Nineveh province (Iraq). Lesions were classified into four categories: Inflammatory and reactive benign lesions, cystic lesions, benign and malignant lesions. Statistical analysis was done using chi-square test and F test, with p-value ≤ 0.05 a significant level.

Results: The most commonly affected age was between 11 and 20 years. There were four diagnostic groups; (46.79%) inflammatory and reactive benign lesions, (16.77%) cystic lesions, (22.81%) benign tumors and tumor-like lesions, and (13.63%) malignant tumors. The most frequently encountered inflammatory and reactive benign lesion was non-specific inflammation (11.27%). The most frequently encountered cystic lesion was epidermoid cyst (7.34%). On the other hand, the most frequently encountered benign tumor and tumor-like lesion was nevi (4.33%).

Conclusions: Non-specific inflammation is the most common oral and maxillofacial lesions, followed by fibroepithelial polyp.

Keywords: Oral lesions, maxillofacial lesions, benign tumors, malignant lesion, retrospective study, Iraq.

INTRODUCTION

Oral and maxillofacial lesions (OMLs) include a wide variety of lesions ⁽¹⁾.

They could be either neoplastic or non-neoplastic, furthermore; the non-neoplastic lesions can be cystic, inflammatory, or they can also represent a reaction to some kind of irritation or mild injury ⁽²⁾. The diagnoses of oral and maxillofacial pathologies are established by some clinical and radiological features, but the final diagnosis is based mainly on histopathological examination of the lesion ⁽³⁻⁶⁾.

Although oral neoplasms can be either benign or malignant, most of them have a benign nature, clinical differential diagnosis of oral lesions is often dependent on some clinical features like obvious changes in color, size, consistency, and relation to neighboring structures, knowledge of the frequency and distribution of such lesions is also essential when establishing a diagnosis and putting forward a proper treatment plan ⁽⁷⁾.

It is also important to find out the distribution of each lesion in the countries in order to link their occurrence with the habits, foods type, and genetic background of populations with these lesions in order to decrease them ⁽⁸⁾.

Despite a considerable volume of literature written about benign and malignant oral soft tissue masses in people from different countries, there is very little documentation of the prevalence of such lesions

among Iraqi population and none of them was conducted in Nineveh province ⁽⁹⁾.

The aim of this study is to analyze the frequency and distribution of the various types of OMLs found in biopsy specimens in Nineveh province (north of Iraq), and to correlate the results with different age groups and gender of population and with the anatomical location of the lesion.

PATIENTS AND METHODS

Study setting and design:

This retrospective study was conducted in Nineveh province from May 2021 to November 2021, Clinical data and histopathological information were sequentially submitted for 763 cases. Clinical data included endodontic status, age and sex of patient, frequency and location of lesion, and submitting clinician.

Data collection:

Data was obtained from the histopathological reports that accompanied biopsy request forms, which were retrieved from the files of the Oral Pathology Department at Al-Jumhori Teaching Hospital, Al-Salam Teaching Hospital and some private laboratories in Nineveh province for the last decade (2010-2020). The records of patients with biopsied oral soft tissue

masses were retrieved, reviewed and analyzed by the authors. Lesions were classified into four categories: Inflammatory and reactive benign lesions, cystic lesions, benign and malignant lesions.

Ethical Considerations

The study ethically approved through the Scientific Research Committee College of Medicine, University of Nineveh, Iraq, with license number (143) in 13 March 2021. Every patient signed an informed written consent for acceptance of participation in the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

Data were placed on prepared Microsoft Excel spreadsheets and were evaluated using this software. The collected data were coded, processed and analyzed using the SPSS (Statistical Package for Social Sciences) version 18 for Windows® (IBM SPSS Inc,

Chicago, IL, USA). Data were tested for normal distribution using the Shapiro Walk test. Qualitative data were represented as frequencies and relative percentages. Chi square test (χ^2) to calculate difference between two or more groups of qualitative variables. Quantitative data were expressed as mean and standard deviation (SD). ANOVA (F test) to compare between more than two independent groups of normally distributed variables (parametric data). P value ≤ 0.05 was considered significant.

RESULTS

Gender and age:

There was a total of 763 cases of OMLs, 371 (48.6%) were males and 392 (51.4%) females with a male to female ration of 12:13. Age ranged from 0.1-102 years (mean age was 35.77 year). The most commonly affected age was between 11 and 20 years. The distribution of each age group as related to gender is clarified in (Figure 1).

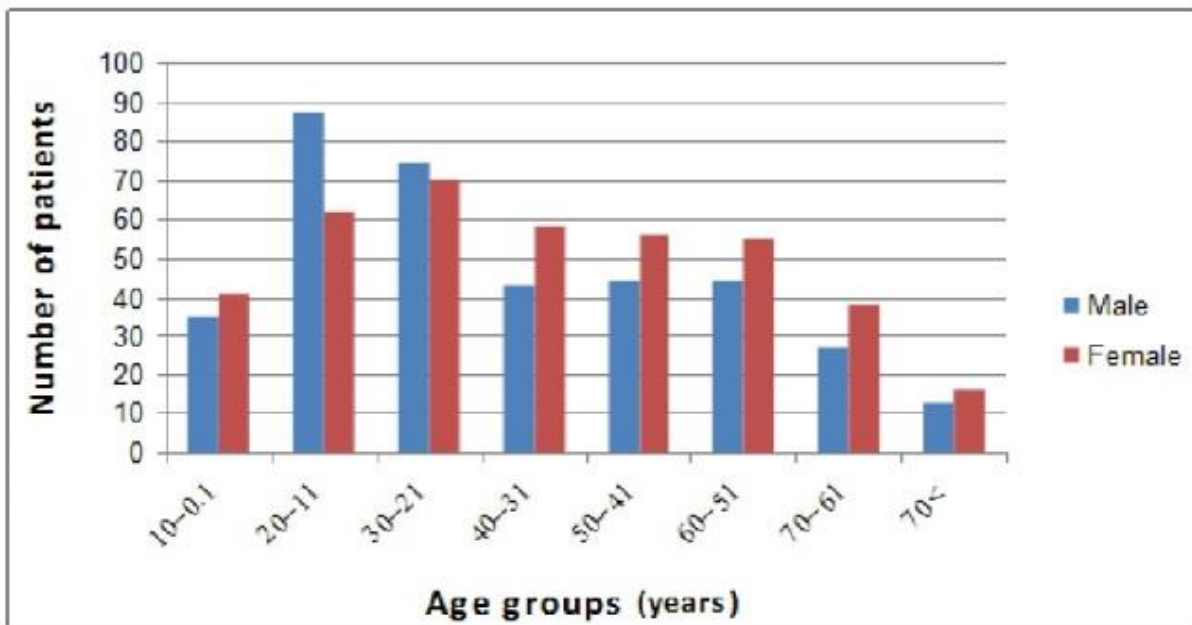


Figure 1: Distribution of age groups and sex of patients with the number of cases in OMLs.

Types of lesions:

In the current study, there were four diagnostic groups; 357 case (46.79%) inflammatory and reactive benign lesions (Table 1), 128 case (16.77%) cystic lesions (Table 2), 174 case (22.81%) benign tumors and tumor-like lesions (Table 3), and 104 case (13.63%) malignant tumors (Table 4).

Table 1. Distribution of Inflammatory and reactive benign lesions frequencies with sex and site of lesions.

| Tissue of origin | Lesion | No. | Sex | | Site of the lesions | | | | | | | | | | | | | | | | % of all | p-value | |
|--|---------------------------------|------------|------------|------------|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--------------------|----------|----------|----------|----------|----------|--------------|----------|
| | | | Male | Female | Mandible | Maxillary | Gum | Buccal | Alveolus | Tongue | Floor of | Palate | Lower lip | Upper lip | Tonsillar | Nose and nasolabia | Forehead | Face | Peri | Peri | | | Cervical |
| Inflammatory & reactive benign lesions | Non-specific inflammation | 86 | 43 | 43 | 8 | 7 | 2 | 10 | 9 | 12 | 1 | 2 | 13 | 3 | - | 3 | 1 | 1 | 3 | 5 | 6 | 11.27 | 0.342 |
| | Fibroepithelial polyp | 78 | 29 | 49 | 2 | 1 | 8 | 27 | 7 | 20 | 1 | 1 | 6 | 3 | - | 1 | - | 1 | - | - | - | 10.22 | 0.00 |
| | Pyogenic granuloma | 69 | 28 | 41 | 3 | 3 | 12 | 14 | 11 | 4 | 2 | 6 | 8 | 4 | - | - | 1 | - | - | - | 1 | 9.04 | 0.145 |
| | Reactive squamous hyperplasia | 27 | 13 | 14 | 1 | 3 | 1 | 7 | 2 | 7 | - | 1 | 5 | - | - | - | - | - | - | - | - | 3.54 | 0.016 |
| | Mucocele | 24 | 14 | 10 | - | - | - | - | - | 1 | 1 | 1 | 20 | 1 | - | - | - | - | - | - | - | 3.15 | 0.00 |
| | Peripheral giant cell granuloma | 15 | 4 | 11 | 1 | - | 1 | - | 6 | 1 | - | 5 | - | - | - | - | - | 1 | - | - | - | 1.97 | 0.00 |
| | Sialadenitis | 9 | 3 | 6 | 4 | 1 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.18 | 0.00 |
| | Seborrheic keratosis | 9 | 4 | 5 | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 5 | 1 | 1 | - | 1.18 | 0.00 |
| | Ranula | 8 | 4 | 4 | - | 1 | - | - | - | - | 5 | 1 | - | 1 | - | - | - | - | - | - | - | 1.05 | 0.00 |
| | Fibrous epulis | 8 | 3 | 5 | - | 1 | 1 | 1 | 4 | - | - | - | 1 | - | - | - | - | - | - | - | - | 1.05 | 0.00 |
| | Fibrous dysplasia | 6 | 4 | 2 | 4 | 1 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.79 | 0.00 |
| | Lichen planus | 5 | 1 | 4 | - | - | - | 4 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | 0.66 | 0.00 |
| | SLE | 3 | 1 | 2 | - | - | - | 2 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | 0.39 | 0.00 |
| | Sjogrens syndrome | 3 | 0 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | - | - | - | - | - | 0.39 | 0.00 |
| | Pemphigus vulgaris | 2 | 1 | 1 | - | - | - | - | - | - | 1 | - | 1 | - | - | - | - | - | - | - | - | 0.26 | 0.00 |
| | Histiocytosis X | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | 0.26 | 0.00 |
| | Reactive L.N. | 2 | 0 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 | 0.26 | 0.00 |
| Mucor-mycosis | 1 | 1 | 0 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.13 | 0.00 | |
| Total | | 357 | 154 | 203 | 24 | 19 | 29 | 66 | 39 | 47 | 11 | 17 | 57 | 12 | 0 | 5 | 3 | 9 | 4 | 6 | 9 | 46.79 | |

Table 2. Distribution of Cystic lesions frequencies with sex and site of lesions.

| Tissue of origin | Lesion | No. | Sex | | Site of the lesions | | | | | | | | | | | | | | | | | % of all | p-value |
|------------------|------------------------|------------|-----------|-----------|---------------------|-----------|----------|---------------|----------|----------|--------------------|----------|-----------|-----------|--------------------|--------------------------|----------|-----------|--------------|----------------|---------------|--------------|---------|
| | | | Male | Female | Mandible | Maxillary | Gum | Buccal mucosa | Alveolus | Tongue | Floor of the mouth | Palate | Lower lip | Upper lip | Tonsilar and uvula | Nose and nasolabial fold | Forehead | Face | Peri orbital | Peri auricular | Cervical L.N. | | |
| Cystic lesions | Epidermoid cyst | 56 | 40 | 16 | 1 | 2 | - | 3 | - | 1 | - | - | 1 | - | 1 | 1 | 5 | 25 | 9 | 5 | 2 | 7.34 | 0.00 |
| | Radicular cyst | 31 | 17 | 14 | 8 | 10 | 6 | - | 6 | 1 | - | - | - | - | - | - | - | - | - | - | - | 4.06 | 0.014 |
| | Dentigerous cyst | 17 | 11 | 6 | 12 | 4 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.23 | 0.00 |
| | Dermoid cyst | 11 | 9 | 2 | - | - | - | 1 | - | - | 1 | - | - | - | - | - | 1 | 2 | 6 | - | - | 1.44 | 0.00 |
| | Kerato-cyst | 9 | 5 | 4 | 6 | 2 | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | 1.18 | 0.00 |
| | Branchial cyst | 2 | 2 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 0.26 | 0.00 |
| | Benign epithelial cyst | 1 | 0 | 1 | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | 0.13 | 0.00 |
| | Naso-palatine cyst | 1 | 1 | 0 | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | 0.13 | 0.00 |
| Total | | 128 | 85 | 43 | 27 | 18 | 7 | 4 | 7 | 2 | 1 | 2 | 1 | 0 | 1 | 1 | 6 | 27 | 15 | 6 | 3 | 16.77 | |

Table 3. Distribution of Benign tumor and tumor-like lesions frequencies with sex and site of lesions.

| Tissue of origin | Lesion | No. | Sex | | Site of the lesions | | | | | | | | | | | | | | | | % of all | p-value | |
|-------------------------------------|------------------------|------------|-----------|-----------|---------------------|-----------|----------|---------------|----------|-----------|--------------|----------|-----------|-----------|--------------|--------------------------|----------|-----------|--------------|----------------|----------|--------------|---------------|
| | | | Male | female | Mandible | Maxillary | Gum | Buccal mucosa | Alveolus | Tongue | Floor of the | Palate | Lower lip | Upper lip | Tonsilar and | Nose and nasolabial fold | Forehead | Face | Peri orbital | Peri auricular | | | Cervical L.N. |
| Benign tumor and tumor-like lesions | Nevus | 33 | 14 | 19 | - | - | - | - | - | 1 | - | 1 | 2 | 1 | - | 6 | 1 | 15 | 5 | 1 | - | 4.33 | 0.00 |
| | Squamous papilloma | 28 | 16 | 12 | - | 1 | 1 | 2 | - | 11 | - | 1 | 6 | 2 | 1 | - | - | 2 | - | 1 | - | 3.67 | 0.00 |
| | Hemangioma | 28 | 16 | 12 | - | - | - | 4 | 2 | 3 | - | 2 | 2 | 2 | - | 4 | - | 2 | 4 | 3 | - | 3.67 | 0.100 |
| | Lipoma | 8 | 4 | 4 | - | - | - | - | - | 1 | 1 | - | 1 | - | - | - | 1 | 2 | 1 | 1 | - | 1.05 | 0.178 |
| | Pleomorphic adenoma | 8 | 3 | 5 | 2 | - | - | 1 | - | - | - | - | - | - | - | - | - | 5 | - | - | - | 1.05 | 0.00 |
| | Cementifying fibroma | 8 | 5 | 3 | 2 | 3 | - | - | 3 | - | - | - | - | - | - | - | - | - | - | - | - | 1.05 | 0.001 |
| | Neurofibroma | 7 | 2 | 5 | 1 | - | - | 1 | - | - | 1 | 1 | 2 | - | - | - | - | 1 | - | - | - | 0.92 | 0.051 |
| | Lymphangioma | 6 | 2 | 4 | - | - | 1 | 2 | - | 1 | - | 1 | 1 | - | - | - | - | - | - | - | - | 0.79 | 0.008 |
| | Keratoacanthoma | 6 | 4 | 2 | - | - | - | - | - | - | - | - | 1 | 1 | - | 1 | 1 | 2 | - | - | - | 0.79 | 0.008 |
| | Ameloblastoma | 6 | 4 | 2 | 5 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.79 | 0.00 |
| | Osteoma | 6 | 0 | 6 | 1 | 1 | - | - | 2 | - | - | - | - | - | - | - | 2 | - | - | - | - | 0.79 | 0.003 |
| | B. Skin adnexal tumors | 5 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 3 | - | - | - | 0.66 | 0.00 |
| | Odontomyxoma | 4 | 3 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.52 | 0.00 |
| | Ameloblastic fibroma | 4 | 2 | 2 | 1 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.52 | 0.00 |
| | Granular cell tumor | 3 | 1 | 2 | - | - | - | - | - | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 0.39 | 0.00 |
| | Pindborg | 3 | 2 | 1 | - | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.39 | 0.00 |
| | Neuroma | 3 | 0 | 3 | - | - | - | 1 | - | - | 1 | - | 1 | - | - | - | - | - | - | - | - | 0.39 | 0.003 |
| | Schawannoma | 3 | 2 | 1 | - | 1 | - | - | - | - | - | - | 1 | - | - | 1 | - | - | - | - | - | 0.39 | 0.003 |
| Calcifying fibroma | 2 | 1 | 1 | - | 1 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.26 | 0.00 | |
| Warthin's tumor | 2 | 1 | 1 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 0.26 | 0.00 | |
| Leio-myoma | 1 | 1 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | 0.13 | 0.00 | |
| Total | | 174 | 86 | 88 | 14 | 17 | 2 | 12 | 7 | 19 | 4 | 6 | 17 | 6 | 1 | 13 | 7 | 32 | 10 | 7 | 0 | 22.81 | |

Table 4. Distribution of Malignant lesions frequencies with sex and site of lesions.

| Tissue of origin | Lesion | No. | Sex | | Site of the lesions | | | | | | | | | | | | | | | | % of all | p-value | |
|-------------------|-------------------------|------------|-----------|-----------|---------------------|-----------|----------|---------------|----------|----------|--------------------|----------|-----------|-----------|---------------------|-----------|----------|-----------|--------------|----------------|----------|--------------|---------------|
| | | | Male | female | Mandible | Maxillary | Gum | Buccal mucosa | Alveolus | Tongue | Floor of the mouth | Palate | Lower lip | Upper lip | Tonsillar and uvula | Nose and | Forehead | Face | Peri orbital | Peri auricular | | | Cervical L.N. |
| Malignant lesions | Basal cell carcinoma | 46 | 17 | 29 | - | - | - | 1 | - | 1 | - | - | - | - | 13 | 5 | 17 | 9 | - | - | 6.03 | 0.00 | |
| | Squamous cell carcinoma | 34 | 13 | 21 | 4 | - | 1 | 3 | - | 7 | 2 | - | 3 | 1 | 4 | - | 5 | 2 | 2 | - | 4.46 | 0.204 | |
| | Lymphoma (NHL) | 5 | 2 | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 3 | 0.66 | 0.00 |
| | Rabdomyosarcoma | 5 | 5 | 0 | 4 | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | 0.66 | 0.00 |
| | Adenoid cystic CA | 3 | 1 | 2 | - | - | - | 2 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | 0.39 | 0.00 |
| | Adenocarcinoma | 3 | 3 | 0 | - | 2 | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | 0.39 | 0.00 |
| | Carcinoma in situ | 2 | 2 | 0 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | 1 | - | 0.26 | 0.00 |
| | Verucous CA | 2 | 1 | 1 | - | - | - | - | 1 | - | 1 | - | - | - | - | - | - | - | - | - | - | 0.26 | 0.00 |
| | Merkel cell carcinoma | 2 | 2 | 0 | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | 0.26 | 0.00 |
| | Mucoepidermoid CA | 1 | 0 | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.13 | 0.00 |
| | MFH | 1 | 0 | 1 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.13 | 0.00 |
| Total | | 104 | 46 | 58 | 10 | 3 | 1 | 7 | 1 | 9 | 3 | 2 | 3 | 1 | 0 | 17 | 6 | 22 | 12 | 4 | 3 | 13.63 | |

The most frequently encountered inflammatory and reactive benign lesion was non-specific inflammation 86 case (11.27%) followed by fibroepithelial polyp 78 cases (10.22%), with non-significant p-value (0.342) and very highly significant p-value (0.00) respectively.

The most frequently encountered cystic lesion was epidermoid cyst 56 case (7.34%), followed by radicular cyst 31 case (4.06%), with very highly significant p-value (0.00) and just significant p-value (0.01) respectively. On the other hand, the most frequently encountered benign tumor and tumor-like lesion was nevi 33 case (4.33%), followed by squamous papilloma and hemangioma 28 case (3.67%) with very highly significant p-value (0.00) for both nevi and squamous papilloma, and non-significant p-value (0.10) for hemangioma. Lastly, the most frequently encountered malignant lesion was basal cell carcinoma 46 case (6.02%), followed by squamous cell carcinoma 34 case (4.46%), with very highly significant p-value (0.00) and non-significant p-value (0.20) respectively.

Sites of the lesions: Face was the most commonly affected site (90 cases - 11.8%) in this study. While on the contrary buccal mucosa was the most common site for inflammatory and reactive lesions. Mandible and face for the cystic lesions, and face for both benign and malignant lesions were recorded.

Dentigerous cyst was the most commonly encountered pathology in the mandible; radicular cyst in the maxillary area; pyogenic granuloma in gum, alveolus, palate and upper lip; fibroepithelial polyp in the buccal mucosa and tongue; epidermoid cyst and squamous papilloma in tonsillar and uvula, basal cell carcinoma in nose and nasolabial fold; basal cell carcinoma and epidermoid cyst in forehead and periorbital area; epidermoid cyst and non-specific inflammation in periauricular area. Lastly, ranula, mucocele, epidermoid cyst and non-specific inflammation were the most frequently encountered pathologies in the floor of the mouth, lower lip, face and cervical L.N. respectively.

DISCUSSION

OMLs are many and multiple, and there are many international classifications used in different studies to classify them, and there is no consensus on one classification for several reasons, the first reason is the definition for each lesion in the oral and maxillofacial areas may overlap between the authors, secondly the definition of WHO for these lesions in each update might change from the previous one, for example odontogenic keratocyst which regarded as cyst in one WHO classification; in next updates they regarded it as a tumor, then in the updates of 2017 they back to considered it as a cyst, lastly the sites determination for OMLs is differ between the authors; for these reasons, the authors of this research decided to adopt an open classification policy by placing all diseases in broad general classifications consisting of 58 lesion types divided into four groups of lesions, and lying in 17 sites.

Most OMLs have a specific age and sex distribution and preferable locations in the oral cavity.

The number of cases affected both gender in this study is near the same, with slight more lesions occur in females 50.8%, the same in **Katarzyna et al.** study in Poland⁽¹⁰⁾ and in **Renata et al.** study in Brazil⁽¹¹⁾ in which the female patients form (53.24%), this might be due to the fact that female seek medical help more than male, while the opposite is found in **Hatice et al.** study in Turkey⁽¹²⁾ in which the male patients were forming (60.4%) of cases and in **Banaz et al.** in Erbil⁽⁹⁾ study in which the male predominate also (51%), these differences might be due to different age samples taking by the studies with their impact of hormonal variation on OMLs in different age groups, or it could be due to bias in data collection.

Mean age for total lesions was 36.15 years, which is near the result of **Hatice et al.** study⁽¹²⁾ in which the mean age was 39.78 years, while in **Katarzyna et al.** study⁽¹⁰⁾ the mean age was 52.65 years.

The most commonly affected age group was in the second decade, while in **Katarzyna et al.** study⁽¹⁰⁾ most lesions occurred in the fifth decade, this difference might be due to difference in socioeconomic status or geographical variation.

Inflammatory and reactive benign lesions form (46.79%) of all OMLs, and it is the largest group, the same in **Katarzyna et al.** study⁽¹⁰⁾, because they might reflect many systemic diseases, drugs adverse effect, dentures problems or local factors, and this result is opposite to **Renata et al.**⁽¹¹⁾ study in which it form only 9.17%, this discrepancy might be due to overlapping between the groups that follow authors categorization and absence of standard diagnostic criteria (13-16).

The most frequent lesions of this group in order of occurrence is non-specific inflammation (11.27%), fibro epithelial polyp (10.22%), and pyogenic granuloma (9.04%) of all OMLs, while in

Renata et al.⁽¹¹⁾ fibrous dysplasia, pyogenic granuloma are the most frequent lesions in this group, and in **Sanaa et al.** study⁽¹⁷⁾ in KSA; epithelial hyperplasia, non-specific inflammation are the commonest types.

All Inflammatory and reactive benign lesions had approximate occurrence in both sexes, with exception, more female predominance in fibro epithelial polyp, pyogenic granuloma, and peripheral giant cell granuloma.

Most Inflammatory and reactive benign lesions found in buccal mucosa, lower lip and tongue, while in **Renata et al.**⁽¹¹⁾ study, gingiva is the main site for this group of lesions, and in **Sanaa et al.** study⁽¹⁷⁾ mandible, tongue and buccal mucosa are the commonest sites for this group.

Cystic lesions formed 16.77% of all OMLs, near the result of **Renata et al.**⁽¹¹⁾ in which cystic lesions form 13.57%.

Epidermoid cyst (7.34%), radicular cyst (4.06%) and dentigerous cyst (2.23%) account the highest three types in this study, while in **Renata et al.**⁽¹¹⁾ study, unclassified cyst is the most frequent one, followed also by radicular cyst and dentigerous cyst, whereas in **Hatice et al.** study⁽¹²⁾, **Demirkol et al.**⁽¹⁸⁾ in Turkey and in **Sanaa et al.** study⁽¹⁷⁾ radicular cyst is the most frequent type followed by dentigerous cyst.

Epidermoid cyst, Dentigerous cyst and dermoid cyst had more obvious male predominance, and in general cysts are more common in males than females in this study in about double figure, this is near the same in many studies^(12,19,20). Most cystic lesions lie in mandible, face and maxillary area.

Benign tumors and tumor-like lesions account for 22.81% of OMLs, nevi (4.33%), squamous papilloma (3.67%) and hemangioma (3.67%) are the three most frequent lesions in this group, while in **Katarzyna et al.** study⁽¹⁰⁾ and **Renata et al.**⁽¹¹⁾ fibroma is the most frequent lesion, followed by papilloma.

Neurofibroma and osteoma had a more obvious female predominance in this study. Face and tongue are the frequent site for these lesions occurrence, while in **Sanaa et al.** study⁽¹⁷⁾ lip is frequent site for this group of lesions and buccal mucosa is the frequent site in **Katarzyna et al.** study⁽¹⁰⁾.

Malignant tumors formed 13.63% of OMLs, the smallest group of lesions, the same in **Hatice et al.** study⁽¹²⁾ in which it form only 1.7% of all pathologies; in opposite to **Sanaa et al.** study⁽¹⁷⁾ in which it form the largest group of lesions; the authors believe that the reason for this low percentage is that many patients with OMLs they seek medical help from ENT hospitals, so their data are not included in such studies and also due to paucity of doing a biopsy to masses removed from body in many medical centers.

Basal cell carcinoma (6.03%) and squamous cell carcinoma (4.46%) are the commonest lesions in this group; both of them had a female predominance, while rhabdomyosarcoma, adenocarcinoma and Merkel

cell carcinoma occur only in males in this study, in **Hatice et al.** study ⁽¹²⁾ and in **Sanaa et al.** study ⁽¹⁷⁾ squamous cell carcinoma is the most frequent type in this group of lesions, the difference in the types has been proposed to be related to ethnic, racial, smoking habit, alcohol drinking amount and general health status differences between the populations .

Face, nose and nasolabial fold and periorbital are the commonest areas for finding the malignant lesions, while in **Sanaa et al.** study ⁽¹⁷⁾ the tongue is the commonest site.

In conclusion, non-specific inflammation, epidermoid cyst, nevus and basal cell carcinoma are the most common OMLs according to the classification of groups into: Inflammatory and reactive benign lesions, cystic lesions, benign and malignant lesions respectively. Face is the commonest site to be involved by OMLs.

Conflict of Interest: All authors have no COI.

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