RESEARCH ARTICLE

# First comprehensive report on distribution of histologically confirmed oral and maxillofacial pathologies; a nine-year retrospective study

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## Abstract

**Objective:** To report the distribution of oral and maxillofacial pathologies diagnosed histologically in laboratory.

**Methods:** The retrospective descriptive cross-sectional study was conducted at Rehman Medical Institute, Peshawar, Pakistan, and comprised biopsied lesions submitted to the institutional laboratory from 2010 to 2019. Data on gender, age, site of the lesion and histopathological diagnosis was retrieved from the records. Data was analysed using Microsoft Excel.

**Results:** Of the 986 histologically confirmed cases, 545(55.27%) related to males and 441(44.72%) to females. The overall mean age of the patients was 43.20±19.85. Tongue was the most affected site 159(16.1%). The most common diagnostic category was malignant tumours 338(34%), followed by salivary gland pathology 162(16%), and cysts and odontogenic tumours 138(14%). The most common histopathological finding was oral squamous cell carcinoma 249(25.2%), and pleomorphic adenoma was the most common benign tumour 103(10.4%).

**Conclusion:** Oral squamous cell carcinoma was the most common malignancy, while pleomorphic adenoma was the most common benign tumour.

**Keywords:** Oral and maxillofacial lesions, Prevalence, Histopathology, Benign lesions, Malignant lesions.

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## Introduction

The oral and maxillofacial (OMF) region comprises a wide anatomic area containing many vital structures and a variety of tissue types. Since the region contains diverse tissue types, a range of lesions can occur, ranging from inflammatory to malignant pathologies.[1,2] These pathologies are classified according to various criteria. However, most commonly they are classified into epithelial, bone and salivary gland pathologies, odontogenic cysts and tumours, reactive, immunological disorders, benign and malignant tumours.[3,4]

In literature, estimated frequencies of oral and maxillofacial pathologies (OMFPs) are quite variable, and it is recognised that gender, age, habits as well as cultural and ethnic factors affect the prevalence of these lesions.[5] Therefore, distribution of OMFPs has shown substantial geographic variations, ranging from 9.7% in Malaysia to as high as 81.3% in Italy.[6] Another study reported global prevalence ranging from 4.9% to 64.7%.[7] These wide variations are also the result of different types of lesions being investigated, and whether the lesion was diagnosed clinically or histopathologically.[4]

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In Pakistan, epidemiological data on oral and maxillofacial lesions (OMFLs) is scarce and often inconclusive. Most of the studies done are focussed on individual pathologies. Moreover, most prevalence studies are based on clinical diagnosis of the lesions. There is very little data available in literature on histopathologically confirmed head and neck pathologies in Pakistan.[6,8,9] Histopathological OMF evaluation is considered the gold standard to establish a definitive diagnosis. Also, studies dependent on histopathological diagnosis are more consistent and reliable.[10] Evaluating OMFP distribution is significant for estimating their prevalence in the population, and thus recognising high-risk subpopulations and optimising healthcare service provision. The current study was planned to report the distribution of OMFPs diagnosed histologically in a laboratory.

## Material and Methods

The retrospective descriptive cross-sectional study was conducted at Rehman Medical Institute (RMI), Peshawar, Pakistan, and comprised biopsied lesions submitted to the institutional laboratory from 2010 to 2019. In order to collect data, convenience sampling technique was used. Data included site, age, gender and histopathological diagnosis which was retrieved from the institutional database. Their histopathological haematoxylin and eosin (H&E) slides were also retrieved to reconfirm the diagnosis. The cases retrieved from the database along with their H&E slides were independently reviewed by two pathologists to check for complete data availability

and deficient tissue in the slides to reconfirm the diagnosis. Cases with differences in diagnosis were reviewed and a consensus diagnosis was attained. The study was approved by the institutional ethics review committee.

According to histopathological findings obtained from the records, lesions were divided into reactive and inflammatory lesions, cysts and Odontogenic tumours, Bone pathologies, epithelial disorders, infections, benign tumours, malignant tumours, Immune mediated disorders and Salivary gland tumours. This classification is adapted from publications by Alhindi et al. and Leorik et al.[3,11]

The data was analyzed using Microsoft Excel. Frequencies and percentages were determined for categorical variables and mean and standard deviations for continuous variables.

## Results

Of the 1100 cases retrieved, 114(10.4%) were excluded owing to incomplete data. The final sample, as such, stood at 986(89.6%) histologically diagnosed OMFPs. Of them, 545(55.27%) related to males and 441(44.72%) to females. The overall mean age of the patients was 43.20±19.85 (range: 1 week to 99 years). The highest number of cases were in individuals aged 51-60 years 185(19%), followed by those aged 41-50 years 175(18%).

Tongue was the most commonly affected site 159(16.1%), followed by mandible 338(13.4%) and parotid salivary gland 88(8.92%). The most common diagnostic category was malignant tumours 338(34%), followed by salivary gland pathology 162(16%), and cysts and odontogenic tumours 138(14%). The most common histopathological finding was oral squamous cell carcinoma (OSCC) 249(25.2%), and pleomorphic adenoma was the most common benign tumour 103(10.4%) (Table-1).

In all categories, OMFPs were higher in males than females except salivary gland pathologies, infections, reactive/inflammatory lesions and immunological disorders (Figure).

Distribution of main diagnostic categories by number, mean age, most common site and gender were separately noted (Table-2).

Histopathological diagnosis was divided into 9 categories: benign tumours, bone pathology, salivary gland pathology, cysts and odontogenic tumours, malignant tumours, infections, epithelial lesions, immunological disorders, and reactive and inflammatory disorders for each category, various diagnoses and their age and gender distributions were worked out (Table-3).

**Table-1:** Site-wise distribution of oral and maxillofacial lesions (OMFLs).

| Site | Count (n) | Percentage (%) |
|---|---|---|
| Buccal mucosa | 62 | 6.28 |
| Cervical LN | 29 | 2.94 |
| Cheek mucosa | 26 | 2.94 |
| Floor of mouth | 14 | 1.41 |
| Gingival mucosa | 23 | 2.33 |
| LN neck | 9 | .91 |
| Tongue | 159 | 16.1 |
| Lower lip | 66 | 6.69 |
| Mandible | 137 | 13.89 |
| Maxilla | 72 | 7.30 |
| Maxillary sinus | 11 | 1.11 |
| Nasal cavity | 13 | 1.31 |
| Neck mass | 43 | 4.36 |
| Oral cavity | 20 | 2.02 |
| Palate | 62 | 6.28 |
| Parotid salivary gland | 88 | 8.92 |
| Skin face | 24 | 2.43 |
| Submandibular salivary gland | 52 | 5.27 |
| Tonsillar mass | 10 | 1.01 |
| Upper lip | 17 | 1.72 |
| Others* | 49 | 4.96 |

*alveolar mucosa, labial mucosa, scalp, eyelid growth, oropharynx, paranasal sinus, epiglottis and vocal cord. LN: Lymph node.

**Table-2:** Number of diagnosis by category/most common site.

| Diagnostic category | Mean age (Years) | +SD* | Male (n) | Female (n) | Common site (n) | Count (n) | Percentage (%) |
|---|---|---|---|---|---|---|---|
| Benign tumours | 28.9 | 18.17 | 19 | 11 | Tongue (n=9) | 30 | 3% |
| Bone pathology | 29.5 | 13.6 | 26 | 18 | Mandible (n=20) | 44 | 5% |
| Salivary gland pathology | 39.56 | 16.33 | 76 | 86 | Parotid salivary gland (n=79) | 162 | 16% |
| Cyst and Odontogenic tumours | 31.6 | 17.3 | 85 | 53 | Mandible (n=70) | 138 | 14% |
| Malignant tumours | 52.3 | 17.6 | 202 | 136 | Tongue (n=94) | 338 | 34% |
| Infections | 47.0 | 23.1 | 5 | 9 | Maxillary sinus (n=4) | 14 | 1% |
| Epithelial disorders | 50.97 | 19.3 | 75 | 43 | Tongue (n=27) | 118 | 12% |
| Immunological disorders | 40.45 | 16.2 | 2 | 9 | Buccal mucosa (n=6) | 11 | 1% |
| Reactive and Inflammatory | 36.35 | 19.42 | 63 | 68 | Tongue (n=26) | 131 | 13% |

*Standard deviation.

**Table-3:** Histopathological diagnosis by each category.

| Histopathological diagnosis | Male (n) | Female (n) | Mean age (Years) | + SD* | Total count (n) |
|---|---|---|---|---|---|
| **1. Benign tumours** | | | | | |
| Haemangioma | 10 | 8 | 28.78 | 17.39 | 18 |
| Angiofibroma | 2 | 0 | 21 | 4 | 2 |
| Lipoma | 3 | 0 | 26.27 | 13.21 | 3 |
| Lymphangioma | 1 | 1 | 17 | 5.6 | 2 |
| Neurofibroma | 1 | 1 | 22 | 15.3 | 2 |
| Schwanoma | 2 | 1 | 39 | 21.4 | 3 |
| **2. Bone Pathology** | | | | | |
| Ewing's sarcoma | 2 | 0 | 16.5 | 14.8 | 2 |
| Fibro-osseous lesions | 7 | 12 | 27.3 | 11.7 | 19 |
| Osteoid osteoma | 0 | 1 | 18 | --- | 1 |
| Osteosarcoma | 1 | 1 | 36.5 | 2.1 | 2 |
| Giant cell lesions | 8 | 12 | 32.8 | 15.3 | 20 |
| **3. Salivary gland pathology** | | | | | |
| Malignant tumours | | | | | |
| Acinic cell carcinoma | 1 | 0 | 55 | --- | 1 |
| Adenocarcinoma | 2 | 1 | 55 | 5 | 3 |
| Adenoid cystic carcinoma | 7 | 17 | 19 | 14.3 | 24 |
| Carcinoma ex pleomorphic adenoma | 3 | 1 | 52.5 | 6.4 | 4 |
| Malignant myoepithelioma | 1 | 1 | 45 | 7 | 2 |
| Mucoepidermoid carcinoma | 7 | 7 | 42 | 22.5 | 14 |
| Benign tumours | | | | | |
| Myoepethelioma | 0 | 2 | 65 | 21.2 | 2 |
| Pleomorphic adenoma | 49 | 54 | 35 | 13.8 | 103 |
| Warthin's tumour | 2 | 0 | 64.5 | 6.3 | 2 |
| Inflammatory disorders | | | | | |
| Sialadenitis | 3 | 3 | 34 | 19.9 | 6 |
| Sialolithiasis | 1 | 0 | 29 | --- | 1 |
| **4. Cysts and Odontogenic tumours** | | | | | |
| Inflammatory Odontogenic cyst | | | | | |
| Radicular cyst | 22 | 8 | 28.8 | 16 | 30 |
| Developmental Odontogenic cysts | | | | | |
| Dentigerous cyst | 13 | 2 | 32.8 | 12.6 | 15 |
| Odontogenic keratocyst | 10 | 9 | 38 | 14.5 | 19 |
| Globulomaxillary cyst | 2 | 0 | 17 | 21.9 | 2 |
| Non-odontogenic cysts | | | | | |
| Nasopalatine duct cyst | 0 | 1 | 47 | --- | 1 |
| Soft tissue cysts | | | | | |
| Salivary mucocele | 4 | 2 | 19.2 | 12.5 | 6 |
| Ranula | 0 | 1 | 15 | --- | 1 |
| Dermoid cyst | 3 | 0 | 13 | 10.1 | 3 |
| Epidermoid cyst | 4 | 2 | 43.6 | 25 | 6 |
| Lymphoepithelial cyst | 0 | 1 | 32 | --- | 1 |
| Thyroglossal duct cyst | 2 | 1 | 21 | 33.7 | 3 |
| Odontogenic tumours | | | | | |
| Ameloblastoma | 14 | 17 | 34 | 17.3 | 31 |
| Calcifying epithelial Odontogenic tumour | 0 | 1 | 25 | --- | 1 |
| Adenomatoid Odontogenic tumour | 0 | 1 | 14 | --- | 1 |
| Ameloblastic fibroma | 0 | 2 | 15 | --- | 2 |
| Ameloblastoma arising in dentigerous cyst | 3 | 2 | 44.2 | 20 | 5 |
| Developmental cyst | | | | | |
| Sebaceous cyst | 1 | 0 | 32 | --- | 1 |
| Branchial cleft cyst | 6 | 1 | 23 | 15.3 | 7 |

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| Histopathological diagnosis | Male (n) | Female (n) | Mean age (Years) | + SD* | Total count (n) |
|---|---|---|---|---|---|
| **5. Malignant tumours** | | | | | |
| Squamous cell carcinoma (well differentiated) | 126 | 77 | 55 | 16.2 | 203 |
| Squamous cell carcinoma (moderately differentiated) | 19 | 17 | 52 | 14.3 | 36 |
| Squamous cell carcinoma (poorly differentiated) | 4 | 6 | 51 | 20.9 | 10 |
| Variants of SCC | 11 | 8 | 52 | 17.5 | 19 |
| Basal cell carcinoma | 14 | 14 | 56 | 16.5 | 28 |
| Malignant melanoma | 0 | 1 | 50 | --- | 1 |
| Hodgkin lymphoma | 5 | 3 | 28 | 15.1 | 8 |
| Non-Hodgkin lymphoma | 20 | 9 | 38 | 20 | 29 |
| Burkitt lymphoma | 1 | 1 | 31 | 35.5 | 2 |
| Langerhan's cell histocytosis | 1 | 0 | 4 months | --- | 1 |
| Recurrent metastatic carcinoma | 1 | 0 | 45 | --- | 1 |
| **6. Infections** | | | | | |
| Actinomycosis | 2 | 1 | 36 | 26.4 | 3 |
| Aspergillosis | 1 | 3 | 58 | 19.2 | 4 |
| Candidiasis | 2 | 1 | 56 | 7.6 | 3 |
| Leshmaniasis | 1 | 0 | 38 | --- | 1 |
| Mucormycosis | 0 | 3 | 34 | 33 | 3 |
| **7. Epithelial lesions** | | | | | |
| Epithelial hyperplasia | 16 | 13 | 40.2 | 21.1 | 29 |
| Hyperkeratosis | 5 | 5 | 55 | 16.9 | 10 |
| Condyloma acuminatum | 1 | 0 | 32 | --- | 1 |
| Intradermal nevus | 1 | 0 | 43 | --- | 1 |
| Keratoacanthoma | 1 | 0 | 40 | --- | 1 |
| Molluscum contagiosum | 1 | 0 | 1 | --- | 1 |
| seborrheic keratosis | 1 | 0 | 1 | --- | 1 |
| Verruca vulgaris | 0 | 1 | 70 | --- | 1 |
| Xanthoma | 1 | 1 | 55 | --- | 2 |
| Acanthotic epithelium | 1 | 4 | 56 | 18 | 5 |
| Benign hyperkeratotic warty lesions | 2 | 3 | 51 | 22 | 5 |
| Epithelial ulcerations | 2 | 1 | 61 | 2.8 | 3 |
| Oral epithelial dysplasia (low grade) | 24 | 9 | 57 | 16.4 | 33 |
| Oral epithelial dysplasia (high grade) | 13 | 4 | 56 | 12 | 17 |
| Verrucous dysplasia | 0 | 3 | 45 | 15 | 3 |
| Verrucous hyperplasia | 1 | 1 | 50 | 14 | 2 |
| **8. Immunological disorders** | | | | | |
| Lichen planus | 2 | 4 | 48 | 15.2 | 6 |
| Pemphigus vulgaris | 0 | 3 | 37.6 | 8.7 | 3 |
| Lymphoproliferative disorder | 0 | 2 | 22 | 18.3 | 2 |
| **9. Reactive and inflammatory disorders** | | | | | |
| Acute on chronic inflammation | 5 | 1 | 60 | 18.36 | 6 |
| Chronic caseating granulomatous inflammation | 6 | 7 | 34.7 | 13.1 | 13 |
| Chronic glossitis | 1 | 0 | 8 | --- | 1 |
| Chronic inflammation with lymphoid hyperplasia | 1 | 0 | 47 | --- | 1 |
| Congenital epulis | 0 | 1 | 1 week | --- | 1 |
| Fibro-epithelial polyp | 3 | 7 | 28.8 | 13.7 | 10 |
| Fibrosis with non-specific inflammation | 4 | 1 | 25.2 | 19.6 | 5 |
| Fibrous epulis | 1 | 2 | 39.3 | 4.04 | 3 |
| Peripheral giant cell granuloma | 4 | 6 | 27.3 | 16.7 | 10 |
| Granulation tissue with non-specific inflammation | 6 | 1 | 40.5 | 16.6 | 7 |
| Lichenoid lesions | 0 | 1 | 48 | --- | 1 |
| Non-specific inflammation | 28 | 29 | 40.8 | 19.8 | 57 |
| Pyogenic granuloma | 2 | 9 | 35.6 | 15.1 | 11 |
| Reactive follicular hyperplasia | 2 | 2 | 28 | 26.1 | 4 |

SD: Standard deviation.

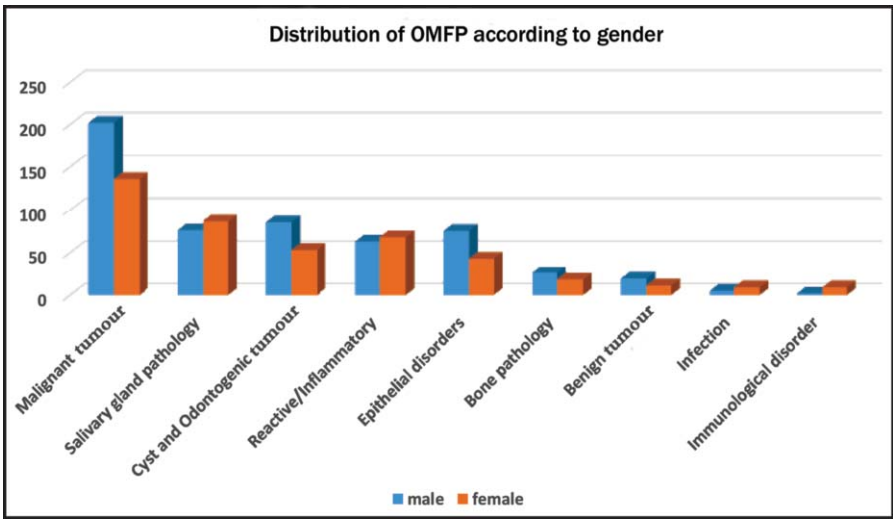


**Figure:** Gender-wise distribution of oral and maxillofacial pathologies (OMFPs).

## Discussion

OMFPs are diverse and diagnostically challenging.[12] These pathologies comprise a variety of differential diagnosis, extending from inflammatory to neoplastic.[13] In the present study these lesions were reported over a wide age range, from 1 week to 99 years. Maximum number of lesions were reported in the age group 51-60 years followed by the age group 41-50 years. These findings are in agreement with a study conducted in Taiwan.[14] However, some studies have reported majority of cases in subjects aged <40 years which might be due to the inclusion of a relatively younger population. In addition, geographical and sample size variations may also explain the reported age differences.[4,15]

The current study showed a high prevalence of OMFPs in males (55%) compared to females. This trend has also been shown in a previous studies.[2,12] However, other studies reported a high prevalence of OMFPs in females.[3,16] These variations might result from the different population biases and exposure variables. Malignant/benign tumours, bone pathologies, cysts/odontogenic tumours, and epithelial disorders showed a male predominance while salivary gland disorders, inflammatory/reactive, immunological disorders and infections showed a female predominance. This observation is supported by previous studies.[3,17]

In the present study, the lesions were topographically divided into 20 sites. Tongue was the most affected site in the present study. This finding correlates with higher frequency of malignant tumours, especially squamous cell carcinoma (SCC). Tongue is one of the most common site affected by SCC.[18] Our results were close to those of previous studies.[16,19]

The frequency and types of OMFPs were divided into nine main diagnostic categories. Malignant tumours were the most common diagnostic category in which OSCC was the most common histopathological finding. This finding is supported by previous reports.[14,19] However, other studies have found benign and reactive/inflammatory lesions more common than malignant tumours.[3,20] This difference can be due to histopathological under-reporting of benign lesions in the current study. In addition, prevalent use of smoked and smokeless tobacco might also play an important role in the higher prevalence of OSCC in our region.

Salivary gland disorders were the second most common diagnostic category and pleomorphic adenoma was the commonest benign tumour in the current study. These results are comparable with studies conducted on other populations.[14,16] We found a lower frequency of mucocele compared to previous studies.[3,20] Among malignant salivary gland tumours, adenoid cystic carcinoma was the most prevalent, followed by mucoepidermoid carcinoma which is in agreement with previous reports.[3,19]

Cyst and odontogenic tumours were the third most common diagnostic group in the present study. In this category, inflamed radicular cyst was the most frequent cystic lesion. Similar results have been reported in studies conducted by Alhindi et al and Monteiro et al., although, the frequency of radicular cyst was comparatively higher in these studies.[3,16] This may be due to geographical variations. Similarly, the current study found ameloblastoma to be the most common odontogenic tumour which is supported by previous studies.[3,11]

Interestingly, the current study found a lower percentage of reactive and inflammatory lesions compared to previous studies.[3,20,21] These variations might result from differences in classification criteria used for OMFPs. In addition, most dental practitioners prefer clinical diagnosis of benign conditions rather than directly opting for biopsy which might account for their lower percentage in the current study.[22]

Among epithelial disorders, oral epithelial dysplasia (OED) was the most common histopathological finding, which is in agreement with an earlier study.[20] However, Alhindi et al. reported more cases of benign hyperkeratosis compared to OED.[3] These disparities in various studies

could be due to differences in sample size, use of different classification criteria and different exposure variables.

Among bone pathologies, central giant cell lesions were the most prevalent, followed by fibro osseous lesions. The results were close to the results of previous studies, but fibro osseous lesions were more common than giant cell lesions in these studies.[3,20] Very few cases were reported in categories of immunological disorders and infections.

In terms of limitations, data in the current study was collected from a single centre, and detailed history of patients and data about exposure variables were not available. Multi-centre, prospective cohort studies are needed to focus on the correlation between exposure variables and oral pathological lesions.

## Conclusion

OSCC was the most common malignancy in the local population, followed by basal cell carcinoma and lymphomas. Pleomorphic adenoma was the most common benign tumour. There was a male predominance in most of the diagnostic categories except salivary gland pathologies, infections, immunological disorders and inflammatory/reactive lesions.

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