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ORIGINAL RESEARCH

A retrospective study of oral and maxillofacial pathology lesions diagnosed at the Faculty of Dentistry, King Abdulaziz University

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Background: Oral and maxillofacial lesions (OMFL) comprise a broad spectrum of benign and malignant lesions that affect the oral cavity. However, few epidemiological studies have evaluated oral cavity lesions, and very few have focused on oral soft tissue pathology. The purpose of this study was to identify the prevalence and distribution of OMFL that had been diagnosed histologically at the Oral Pathology Laboratory, Faculty of Dentistry, King Abdulaziz University.
Materials and methods: A retrospective study was conducted to assess the distribution of OMFL among the oral cavity biopsies submitted to the Oral Pathology Laboratory during the period from 1996 to 2016. Information on sex, age, location of the lesion, and histopathologic diagnosis was analyzed.
Results: A total of 1,218 cases were examined. Among these, reactive/adaptive lesions were the most common type (n=245; 20.1%) and cystic lesions were the second most common (n=214; 17.6%), followed by inflammatory lesions (n=152; 12.5%) and epithelial pathology (n=115; 9.4%).
Conclusion: The results of the present study provide valuable information on the prevalence of OMFL in Jeddah, Saudi Arabia. Reactive conditions were the most frequently diagnosed pathologies. Most oral and maxillofacial biopsies were soft tissue lesions, benign in nature, and inflammatory in origin. Further studies are necessary to provide more information on head and neck diseases in the general population to develop better future oral health policies.
Keywords: oral and maxillofacial pathology, Saudi Arabia, Jeddah, oral lesions

Background

Histopathologic analysis of biopsied specimens is an important essential diagnostic tool that is generally influenced by clinical data and other diagnostic tests. Assessing the distribution of oral and maxillofacial lesions (OMFL) is important for evaluating their prevalence in the population, and thus identifying high-risk subpopulations and optimizing health care service allocation.[1] Also, knowledge of the site, age, and sex predilections of different diseases of the oral cavity is useful with regard to determining their demographics.[2] Only few epidemiological studies on the frequency of histologically confirmed oral lesions have been conducted, primarily in the USA, India, some Asian nations, and Europe.[2–7] With regard to epidemiological data on oral lesions in the western region of Saudi Arabia, studies are limited, and the only published study is associated with the epidemiological outline of adolescent and pediatric lesions in the head and neck region among the population of the city of Jeddah.[8] Andreasen et al[9] reported that oral mucosal disease affects between 25% and 50% of individuals,

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depending on the population studied. This indicates the relatively high incidence of oral diseases in societies and necessitates intervention by local authorities to target these diseases in their communities. Therefore, the incidence and demographic characteristics of oral diseases and the oral health care needs of the population in our community should be investigated in order to develop a coherent oral health policy. In addition, such information could be useful for epidemiological and teaching purposes. The present retrospective study was conducted to describe oral lesions among 1,218 biopsies and to assess their demographic distribution in regards of age and sex. These biopsies were processed by the Oral Pathology Laboratory, Faculty of Dentistry, King Abdulaziz University, over a 20-year period.

Materials and methods

This was a retrospective study analyzing the archives of the Oral Pathology Laboratory, Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia. Data from 1,218 specimens recorded between 1996 and 2016 were retrieved from the laboratory's files, and information on sex, age, location of the lesion, and the histopathologic diagnosis were collated into a dataset and analyzed. Slides were reviewed in a blinded manner, without the reviewers knowing the original diagnoses, by two American board-certified oral and maxillofacial pathologists (NB and WE). Cases with discrepancies in diagnosis were re-examined and a consensus diagnosis was achieved. The Research Ethics Committee of the Faculty of Dentistry at King Abudulaziz University approved the study (Proposal No. 107-12-17).

Based on histologic findings obtained from the records, lesions were classified as adaptive/reactive lesions, cysts of the head and neck, bone lesions, odontogenic tumors, epithelial disorders, oral inflammation/infections, benign mesenchymal tumors, malignant tumors, immune-mediated diseases, tooth abnormalities, and salivary gland diseases. The classifications were adapted from Barnes[10] and Bezroukov.[11] Cases with inconclusive pathologic diagnoses were classified as miscellaneous.

Statistical data analysis was carried out using SPSS version 22 software. Descriptive statistics were used to outline the characteristics of the study categorical and nominal variables in the form of counts and percentages, whereas mean and SDs were determined for continuous variables.

Results

A total of 1,218 histologic diagnoses over a 20-year period were analyzed in this retrospective study, with 643 (52.8%) derived from female subjects and 515 (42.3%) derived from male subjects (a female to male ratio of about 1.3). Sex was not recorded in 60 (4.9%) cases. The age of the patients ranged from 5 months to 85 years, and the mean age was 35.9 (SD ±17.9 years). Table 1 shows the occurrence of oral lesions according to demographic factors.

Of the 1,218 diagnosed cases, 765 (62.8%) were soft tissue lesions and 453 (37.2%) were hard tissue lesions. Reactive/adaptive lesions were the most common (245; 20.1%), followed by cystic lesions (214; 17.6%), inflammatory/infectious lesions (152; 12.5%), epithelial lesions (115; 9.4%), benign mesenchymal tumors (106; 8.7%), malignant tumors (70; 5.7%), both immune-mediated diseases and salivary gland diseases and tumors (60; 4.9%), odontogenic tumors (45; 3.7%), bone lesions (30; 2.5%), pigmented lesions (16; 1.3%), and tooth abnormalities (12; 1%). Ninety-three (7.6%) miscellaneous cases had inconclusive pathologic diagnoses or were without recorded pathologic alterations. Figure 1 shows the percentage distribution of all OMFL by categories, while Table 2 shows the distribution of all categories by number, age mean, and range.

In all categories, prevalence of oral and maxillofacial pathology lesion (OMFPL) in female was higher than that in male, except malignant tumors (n=39/70), epithelial lesions (n=62/115), odontogenic tumors (n=25/45), and teeth abnormalities (n=8/12), as illustrated in Figure 2.

Fibroepithelial polyp was the most common lesion in the reactive group (n=65; 26.5%). Inflammatory odontogenic cyst (radicular cyst) was the most common diagnosis among all cystic types in the oral and maxillofacial area (n=134; 62.6%), while periapical granuloma was the most common inflammatory condition (n=115; 75.7%). In the benign tumor category, fibroma was the most frequently diagnosed condition (n=75; 70.8%). On the other hand, malignant lesions constituted 70/1,218 (5.8%) cases, of which squamous cell carcinoma (SCC) was the most frequent malignancy (n=46; 65.7%). The frequencies of other histopathologic diagnoses and their age and sex distributions are shown in Table 3.

Table 1 Demographic patient data

Variables	Number	Minimum	Maximum	Mean	SD
Age	1,218	5 months	85 years	35.9 years	17.9 years
		Count		%	
	Total	1,218		100.0	
Sex	Male	515		42.3	
	Female	643		52.8	
	Unidentified	60		4.9	

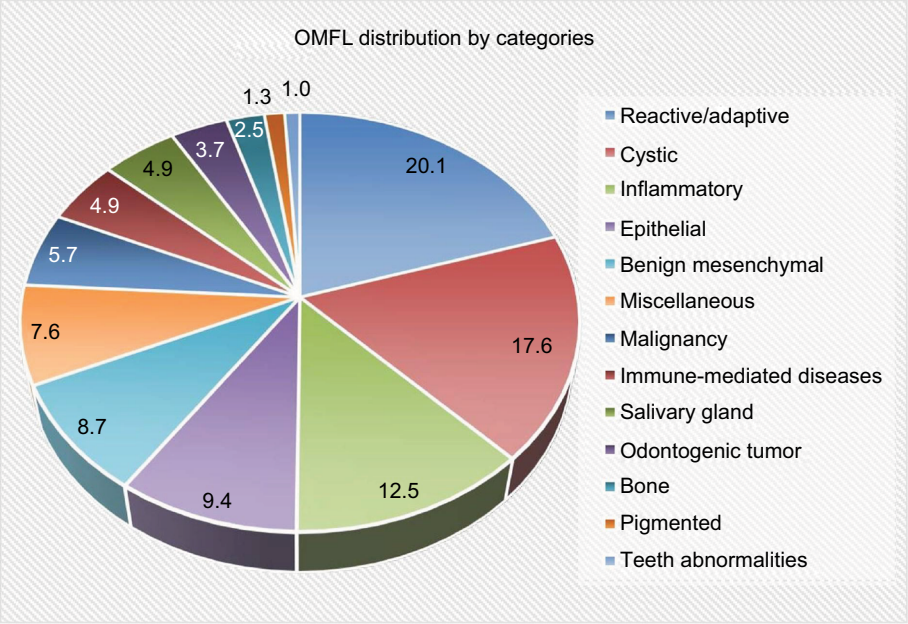

Figure 1 The categories of OMFL and their percentage distribution.
Abbreviation: OMFL, oral and maxillofacial lesions.

Table 2 Number of diagnoses by category (1996–2016)

Diagnostic category	Number of cases	Mean age	SD	Age range (years)
Reactive/adaptive[a]	245	37.16	17.4	5–85
Cystic[a]	214	31.83	15.4	5–85
Inflammatory[a]	152	31.48	15.6	6–75
Epithelial lesions[a]	115	44.08	17.4	5–84
Benign mesenchymal tumors[a]	106	41.35	19.1	5 months–77 years
Miscellaneous[a]	93	30.6	22.0	4–72
Malignant tumors	70	49.52	20.7	2–85
Immune-mediated diseases[a]	60	44.38	13.0	16–62
Salivary gland diseases and tumors	60	27.30	16.2	5–65
Odontogenic tumors[a]	45	25.46	14.8	9–68
Bone[a]	30	31.25	19.9	2.5–81
Pigmented[a]	16	37.13	13.6	19–65
Tooth abnormalities	12	23.25	11.4	9–41
Total	1,218			

Note: [a]Sex of some patients was unknown.

Discussion

Over 20 years, the overall number of OMFPL recorded was 1,218. The reasons for the low number of biopsies from the oral and maxillofacial region may include high dependence on clinical diagnosis and the fact that the laboratory was at an academic teaching center whereas most of the cases were referred to hospitals due to logistic considerations that restricted the reception of several cases. Also, governmental hospitals were the only external sources of cases.[3,12] Previous studies performed in Saudi Arabia were limited and either focused on a specific age group such as children[8] or geriatric patients[13] or on specific entities such as odontogenic tumors.[14] Only two published studies have investigated the prevalence of OMFPLs in both northern and south western regions of Saudi Arabia.[15,16]

Our data demonstrated a higher prevalence of OMFPL in female subjects (52.8%), and this trend has been reported in other studies. The possible explanation of this pertains to women utilizing health care more than men.[3,17–19] However, our data differ from those of other studies reporting a high

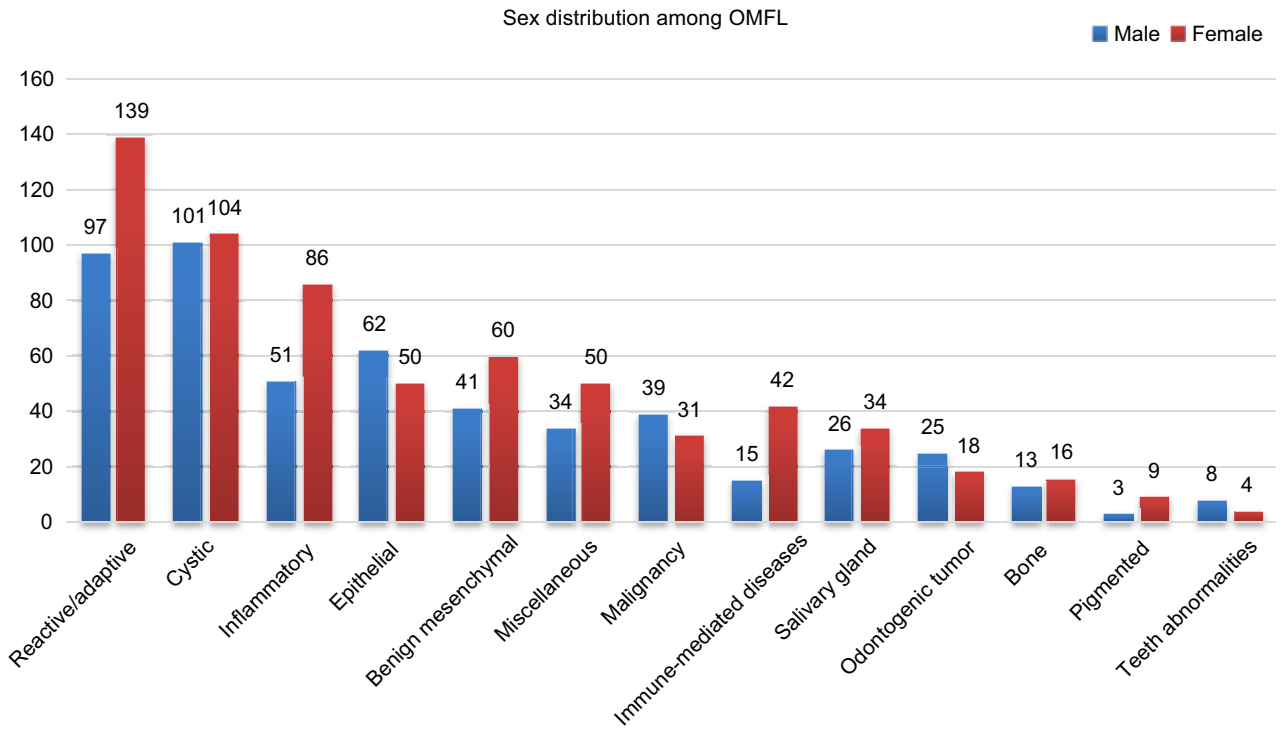

Figure 2 The distribution of gender among OMFL.
Abbreviation: OMFL, oral and maxillofacial lesions.

Table 3 Histopathologic diagnoses in each category

Diagnosis	Number	Male	Female	M:F ratio	Mean age (years)	SD
Reactive/adaptive	**245**					
Fibroepithelial polyp[a]	65	19	42	0.45	41.70	16.93
Pyogenic granuloma[a]	63	29	33	0.88	34.45	16.91
Nonspecific inflammation[a]	58	29	26	1.12	37.49	17.78
Scar and fibrosis[a]	26	9	16	0.56	35.88	16.00
Inflammatory fibrous hyperplasia[a]	14	5	8	0.57	43.21	21.93
Peripheral ossifying fibroma	5	3	4	0.75	34.20	14.92
Plasma cell gingivitis[a]	5	0	4	0	33.50	9.26
Gingival polyp	3	0	3	0	14.33	2.52
Peripheral giant cell granuloma	3	1	2	0.50	47.00	19.80
Hamartoma	1	1	0		49	0
Xanthogranuloma	1	1	0		27	0
Submucous fibrosis	1	0	1	0	45	0
Cystic	**214**					
Inflammatory odontogenic cyst						
Radicular and residual cysts	134	65	62	1.0	32.1	14.6
Developmental odontogenic cyst						
Dentigerous cyst	38	19	17	1.1	28.2	13.5
Odontogenic keratocyst	17	9	8	1.1	35.8	16.4
Gorlin cyst	2	0	2	0.0	20.5	7.8
Glandular odontogenic cyst	3	1	2	0.5	71.5	19.1
Lateral periodontal cyst	1	0	1	0	35.0	0
Non-odontogenic cyst						
Traumatic bone cyst	7	2	5	0.4	38.4	16.41
Antral cyst	3	1	2	0.5	34	1.73
Nasolabial cyst	2	0	2	0	41	11.31

(*Continued*)

Table 3 (*Continued*)

Diagnosis	Number	Male	Female	M:F ratio	Mean age (years)	SD
Oral lymphoepithelial cyst	2	1	1	1	49	2.83
Median palatal cyst	1	1	0		24	0
Sebaceous cyst	1	1	0		52	0
Thyroglossal tract cyst	1	0	1	0	13	0
Dermoid cyst	1	0	1	0	25	0
Nasopalatine duct cyst	1	1	0		55	0
Inflammatory	**152**					
Periapical granuloma or abscess[a]	115	37	63	0.59	31.10	14.56
Pulp diseases	14	4	10	0.40	22	14.43
Osteomyelitis	10	4	6	0.67	47.22	21.05
Infectious conditions	7	2	5	0.40	35.67	9.93
Sinus conditions	6	4	2	2.00	31.83	14.08
Epithelial	**115**					
Hyperkeratosis and acanthosis[a]	66	36	27	1.33	45.09	15.62
Epithelial dysplasia	31	16	15	1.07	53.71	15.05
Papilloma	14	7	7	1	19.50	14.54
Smokeless tobacco lesion	3	3	0		42	12.17
Verruca vulgaris	1	0	1	0	14	0
Benign mesenchymal	**106**					
Fibroma	75	27	43	0.63	44.97	16.33
Vascular tumor	7	5	2	2.50	35.67	26.85
Lipoma	6	1	5	0.20	50.50	13.20
Leiomyoma	3	1	2	0.50	11.33	8.39
Neurofibroma	4	1	3	0.33	31.75	20.84
Fibrous histiocytoma	3	1	2	0.50	28.33	10.12
Teratoma	1	0	1	0	5 months	0
Myofibroma	1	1	0		4	0
Osteoma	1	1	0		20	0
Inflammatory myofibroblastic tumor	1	0	1	0	10	0
Traumatic neuroma	1	0	1	0		
Plasma cell myeloma	1	1	0		66	0
Granular cell tumor	1	1	0		48	0
Myxoma	1	1	0		42	0
Malignancies	**70**					
Squamous cell carcinoma	46	27	19	1.42	56.65	16.62
Langerhans cell histiocytosis	10	7	3	2.33	32.60	17
Verrucous carcinoma	4	2	2	1	67.75	8.99
Lymphoma	3	0	3	0	41.67	21.50
Nasopharyngeal carcinoma	1	0	1	0	76	0
Fibrosarcoma	1	1	0		17	0
Round blue cell sarcoma	1	0	1	0	19	0
Osteosarcoma	1	0	1	0	20	0
Pigmented neuroectodermal tumor of infancy	1	1	0		2	0
Rhabdomyosarcoma	1	0	1	0	51	0
Undifferentiated neoplasm	1	1	0		40	0
Immune-mediated disease	**60**					
Lichen planus[a]	54	12	39	0.31	44.70	12.96
Pemphigus	6	3	3	1	42	14.28
Salivary gland	**60**					
Malignant						
Adenoid cystic adenocarcinoma	3	2	1	2	48.67	8.49
Mucoepidermoid carcinoma	2	0	2	0	45	14.14
Polymorphous low-grade adenocarcinoma	1	1	0		19	0
Carcinoma ex pleomorphic adenoma	1	0	1	0	42	0
Adenocarcinoma not otherwise specified	1	0	1	0	27	0
Basal cell adenocarcinoma	1	0	1	0		

(*Continued*)

Table 3 (*Continued*)

Diagnosis	Number	Male	Female	M:F ratio	Mean age (years)	SD
Benign						
Pleomorphic adenoma	5	3	2	1.5	36.5	13.48
Warthin's tumor	1	1	0		53	0
Salivary gland diseases						
Mucocele[a]	34	16	19	0.84	18.59	10.88
Retention cyst[a]	3	0	2	0	56.67	34.21
Necrotizing sialometaplasia	3	2	1	2	49.67	16.04
Ranula	2	0	2	0	9	2.83
Sialolithiasis	1	0	1	0	47	0
Chronic sialadenitis	1	0	1	0	35	0
Chronic sclerosing polycystic adenosis	1	1	0		12	0
Odontogenic tumor	**45**					
Ameloblastoma[a]	21	13	7	1.86	24.50	12.15
Odontoma[a]	17	9	7	1.29	23.07	15.06
Adenomatoid odontogenic tumor	2	1	1	1	22.5	7.78
Ameloblastic fibroma	2	1	1	1	22	7.07
Calcifying epithelial odontogenic tumor	2	0	2	0	47	0
Ameloblastic carcinoma	1	1	0	0	68	0
Bone	**30**					
Benign fibro-osseous lesions[a]	24	10	13	0.77	27.58	17.91
Giant cell lesions	4	3	1	3	30	8.12
Osteonecrosis	2	0	2	0	70.5	14.85
Pigmented	**16**					
Nevus (intradermal/intercostal)	7	2	2	1	32.14	7.88
Melanotic macule	4	0	4	0	51.75	11.30
Racial pigmentation[a]	2	0	1	0	19	0.00
Amalgam tattoo	2	1	1	1	43	11.31
Melanoacanthoma	1	0	1	0	20	0
Teeth abnormalities	12	8	4	2	23.25	11.41
Miscellaneous	93	34	50	31.85	22.01	24.5

Note: [a]Undetermined sex in some cases.

prevalence of OMFPL in male subjects in Saudi Arabia[12,13] and other countries such as Kuwait and India.[2,5] Specific lesions seemed to have a strong predilection for either sex. Male subjects exhibited greater incidences of malignant tumors (SCC), epithelial lesions (papilloma and epithelial dysplasia), and odontogenic tumors (ameloblastoma and odontoma), as shown in Figure 2, which is consistent with a study reported by Guedes et al[7] in 2015.

The age of oral lesion patients in the current study ranged from 5 months to 85 years, and most were in their third, fourth, or fifth decade of life, which is consistent with previous prevalence studies.[15,18] Only malignant lesions were more common in more advanced age (mean age 49.5 years), with the highest peak in verrucous and SCCs (mean age 65.33 and 56.65 years, respectively), as has been previously reported with regard to oral cancers.[2,12] On the other hand, patients with the lowest age were a 5-month-old infant with a teratoma and a 2-year-old boy with pigmented neuroectodermal tumor of infancy, which were classified as benign mesenchymal and malignant lesions, respectively. Teratomas presenting in the oropharyngeal region are usually diagnosed at birth or prenatally.[20,21] Furthermore, the pigmented or melanotic neuroectodermal tumor of infancy are diagnosed mostly within the first year of life.[22] Most of the OMFPLs were soft tissue lesions (n=765; 62.8%), as was also reported by Gambhir et al.[2] This may reflect the preference of general practitioners, residents, and specialists to perform biopsies of extraosseous oral lesions by themselves and refer intraosseous oral lesion cases to oral maxillofacial surgeons.

The frequencies and types of OMFPL varied, but reactive/adaptive lesions were the most common in the present study and several previous studies.[3,5,13,18] Fibroepithelial polyp was the most common diagnosis in this category (26.5%), with a mean patient age of 41.7 years. A similar study showed the highest prevalence of traumatic fibroma (fibroepithelial polyp) among reactive lesions (37.4%) mainly in patients

in their third to fourth decade.[23] Cystic lesions were the second most common, and the most prevalent inflammatory odontogenic cysts were radicular cysts in the current study, followed by dentigerous cysts as developmental odontogenic cysts, and this is concordant with Fierro-Garibay et al.[24] In a study conducted in Saudi Arabia by Luqman and Al Shabab[12] investigating inflammatory lesions – which were the third most common lesions diagnosed in our study – the majority of their 267 specimens were diagnosed as periapical granuloma. However, periapical granulomas were the second most common lesions diagnosed in our study, with 115 cases (9.4% of all specimens), and radicular cysts were the most commonly diagnosed inflammatory condition (n=134; 11%), which was classified as cyst in our study.

Fibroma was the most common benign mesenchymal tumor, which is concordant with other studies.[5,18] Lesions related to immune-mediated diseases were observed in 60 (4.9%) specimens and were more common in female subjects (70%), and the mean age of patients with these conditions was 44.4 years. In the present study, salivary gland lesions were grouped into salivary gland disease, benign and malignant tumors. Mucocele, pleomorphic adenoma, and adenoid cystic carcinoma were the most common diagnoses in each respective subgroup. The overall prevalences of immune-mediated diseases and salivary gland lesions in this study were comparable to that of previous studies.[4,15,17]

The rate of malignant lesions in this study (5.8%) was lower than the previously reported prevalence in Kuwait which reported only 6.5% of SCC.[5] Surprisingly, studies from the south western region of Saudi Arabia reported a much higher incidence of malignant (38.8%) compared to benign (10.9%) neoplasms.[16,25] This rise in malignancy was due to a major increase in SCC incidence (36.1%) with a strong female predilection (F:M ratio =1:2.2). Smokeless tobacco, specifically Shamma, was held accountable for this rise in SCC incidence in that region, as >45% of SCC patients were Shamma users.[16] In the current study, SCC was the most common of all malignancies of the head and neck area; it was more common in male subjects, and the mean age of patients with this condition was 56.7 years, which is in agreement with most other retrospective studies.[3,5,13,19] On the other hand, the frequency of malignant lesions in the current study was higher than that reported in studies by Jones and Franklin,[3] Moridani et al,[18] and Mendez et al,[19] in which they accounted for 5.4%, 2.4%, and 1.9% of cases, respectively. The frequency of diagnosis of SCC (n=46; 3.7%) was higher than the frequency of diagnosis of epithelial dysplasia (n=31; 2.5%) in the oral cavity. This was also the case in other regions of Saudi Arabia, as only 3.6% and 2.7% of OMFPLs were dysplastic in comparison to 4.7% and 38.8% of SCC cases in both northern and south western regions, respectively.[15,16] This suggests failure of early detection of suspicious oral lesions by oral health care providers, delay of case referral from general dental practitioners to biopsy the lesions, or patients being unaware of oral cancer lesions and not seeking treatment in the absence of pain. Demographic data such as socioeconomic status, location, occupation, and oral habits that can help to identify risk groups were not comprehensively recorded in the pathology reports or requisition forms. Thus, unfortunately, we were unable to evaluate these parameters in the present study. The potential value of such information with regard to understanding the characteristics of OMFL in our population should be emphasized to oral health care providers.

Conclusion

The present study yielded data on the frequency of OMFPL observed in a Saudi population presenting at an academic center in the western region of Saudi Arabia. The data constitute baseline information pertaining to epidemiologic aspects of OMFPLs that may be useful in further studies. The most commonly diagnosed OMFPLs were benign. Even when the difficulties in comparing prevalence rates from other studies are taken into account, the results of the present study are in substantial agreement with reported data in previous studies.[5,18]

Ethics approval and consent to participate

The study was approved by the Research Ethics Committee of the Faculty of Dentistry at King Abdulaziz University. The patient consent was waived by the Research Ethics Committee of King Abdulaziz University Hospital's Faculty of Dentistry, and all the patient data were anonymized and maintained with confidentiality.

Data sharing statement

The datasets used and/or analyzed in the current study are available from the corresponding author on reasonable request.

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Author contributions

All authors contributed to data analysis, drafting and revising the article, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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