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The Spectrum of Oral Pathology Specimens: A Histopathologic Analysis of 442 Specimens

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Abstract

Background Aims: Diseases of the oral cavity are heterogenous regarding their etiology, pathogenesis, histogenesis and clinical outcomes. The aim of this study was to examine the frequency of oral diseases encountered in our experience.

Methods: The archives of pathology at Jordan University Hospital were retrospectively searched for oral cavity specimens from 2013–2020. Fisher's exact test was performed to examine the statistical difference between the pathologic diagnosis and clinical variables. One-way ANOVA was used to analyze the differences in the mean of age between the different pathologic groups.

Results: A total of four-hundred and forty-two cases were retrieved. There were 232 (52%) females and 210 (48%) males, ranging in age from 3–87 years (mean 43). Inflammatory and reactive diseases were the most common, constituting 147 (33%) of all specimens, followed by 139 (31%) benign neoplasms, 114 (26%) cysts, and 42 (10%) malignant diseases. Lichen planus was the most common inflammatory disease (26/147, 18%) in patients older than 40 (p=0.0039). Keratocysts predominated in children and adolescents more than adults (p=0.0015). Buccal mucosa represented the most frequent site for biopsy (76, 17%), followed by tongue and maxillary bone, respectively at 70 (16%) each.

Conclusion: Inflammatory and benign neoplasms were the most common lesions in oral diseases. Oral malignancy appeared in low to intermediate frequency compared to previous reports. The study provides a general overview of the spectrum of oral pathology specimens and points to some novel epidemiologic findings that suggest further investigation.

Keywords: Oral mass, pathology, odontogenic, oral cancer, salivary gland tumors, prevalence

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INTRODUCTION

The oral cavity is affected by numerous congenital and acquired diseases. Clinically, various lesions may mimic each other and have very similar appearances, and this is precisely why histopathology is essential in clinical practice. However, clinical and radiologic inputs remain important for correlation to reach the correct diagnosis [1].

Surgical biopsies from the oral cavity constitute a minority of examined cases in histopathology practice in general [1]. However, these lesions are heterogenous and can arise from different and unrelated anatomic structures. Unlike other areas in the body, oral pathology overlaps with other disciplines of human medicine, such as general and plastic surgeries, ENT, dentistry, and maxillofacial surgery. Thus, diseases of the oral cavity differ significantly in their histogenesis, biologic behavior and management [2].

The aim of this study is to provide a general

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epidemiologic overview of oral specimens which were referred from all specialties of medicine over a relatively long period of time. We hope this study provides better insight into, and a more comprehensive knowledge of, the frequency of oral diseases for the medical and dental communities.

MATERIALS AND METHODS

This retrospective study was conducted in the Department of Pathology at the University of Jordan. A computer-based search of pathology reports was used to filter specimens related to oral cavity between January 2014 and June 2021. Relevant clinical variables such as age, gender, and the anatomic site of the specimens were included. Cases with an inconclusive diagnosis or insufficient biopsy were excluded. The study was approved by the local Institutional Review Board and the Scientific Research Committee (IRB number: 3798-20, 16 September 2020).

All biopsy specimens were fixed in formalin and embedded in paraffin. Hematoxylin and eosin stain were routinely used to prepare slides. Based on the pathogenesis, the diseases were classified into four main categories: inflammatory (reactive), degenerative (cysts), and benign and malignant tumors. Neoplastic diseases were classified according to the WHO-classification system for head and neck tumors, 2017 [3]. Statistical analysis was performed using Fisher's exact test. We adopted a *p*-value of .05 as a cutoff for statistical significance.

RESULTS

Characteristics of patients

A total of four-hundred forty-one cases were retrieved. The patients were 232 (52%) females and 210 (48%) males, with an age range of 3–87 years (mean 43). The age distribution of patients was as follows: children and adolescents (3–16 years old): 46 (10%), 17–29 years: 68 (15%), 30–39 years: 69 (16%), 40–49 years: 83 (19%), 50–59 years: 82 (19%), 60–69 years: 58 (13%), 70 years and older: 35 (8%).

Spectrum and characteristics of diseases

Inflammatory diseases were the most common finding, constituting 147 (33%) of all specimens. They slightly outnumbered benign neoplasms, which numbered 139 (31%), then cysts at 114 (26%) and cancer at 42 (10%). Lichen planus, including lichenoid reaction, was the most commonly encountered inflammatory disease, which numbered 26 (18%) specimens. Odontogenic cysts accounted for the majority of cystic diseases (101, 89%), while the remaining cases were salivary or dermoid in origin. The predominant benign tumors were squamous papilloma, numbering 46 (33%) and capillary hemangioma at 45 (32%), followed by odontogenic at 15 (11%), salivary at 15 (11%), fibrous at 12 (9%), and other mesenchymal tumors at 5 (4%). Among malignant neoplasms, squamous cell carcinoma (SCC) was the most common with 30 (71%) specimens, followed by salivary gland cancer (8, 19%), then lymphoma (4, 10%). The most common salivary gland cancer was acinic cell carcinoma, followed by mucoepidermoid carcinoma. Only 3/19 (16%) of the leukoplakia specimens showed dysplasia. The details of the diseases in each category are presented in Table 1.

Table 1: Overview of the most common oral diseases and their clinicopathologic features

Disease	Number (percentage)	Range of age (mean: y)	Male (n)	Female (n)	Most common site: (n)
Inflammatory/reactive conditions (n=147)					
Lichen planus	26 (18%)	31–69 (51)	10 (38%)	16 (62%)	Buccal mucosa: 19 (73%)
Non-specific inflammation	24 (16%)	15–71 (46)	8 (33%)	16 (67%)	Tongue: 10 (42%)
Leukoplakia	19 (13%)	24–76 (52)	10 (53%)	9 (47%)	Tongue: 7 (37%)
Giant cell granuloma	16 (11%)	9–60 (34)	6 (38%)	10 (62%)	Gingiva: 15 (94%)
Irritation fibroma (epulis)	15 (10%)	33–66 (47)	3 (20%)	12 (80%)	Gingiva: 9 (60%)
Bullous diseases	13 (9%)	15–73 (45)	4 (31%)	9 (69%)	Buccal mucosa: 11 (85%)
Infections	13 (9%)	8–81 (44)	8 (62%)	5 (38%)	Gingiva: 4 (31%)
Benign tumors (n=139)					
Squamous papilloma	46 (33%)	6–87 (47)	15 (33%)	31 (61%)	Buccal mucosa: 23 (50%)
Hemangioma	45 (32%)	3–75 (36)	20 (44%)	25 (66%)	Lips: 18 (40%)
Pleomorphic adenoma	15 (11%)	30–65 (47)	7 (47%)	8 (53%)	Buccal mucosa: 8 (53%)
Ameloblastoma	11 (8%)	11–74 (44)	7 (64%)	4 (36%)	Mandible: 6 (55%)
Ossifying fibroma	6 (4%)	12–51 (32)	2 (33%)	4 (67%)	Mandible: 3 (50%)
Granular cell tumor	3 (2%)	47–55 (52)	3 (100%)	0	Tongue: 3 (100%)
Complex odontoma	3 (2%)	10–41 (23)	1 (33%)	2 (67%)	Maxilla: 2 (67%)
Cysts (n=114)					
Radicular cyst	55 (48%)	9–72 (38)	38 (69%)	17 (31%)	Maxilla: 34 (62%)
Dentigerous cyst	33 (29%)	8–64 (32)	18 (55%)	14 (45%)	Maxilla: 17 (52%)
Keratocyst	14 (12%)	10–68 (27)	9 (64%)	5 (35%)	Mandible: 9 (64%)
Mucocele	11 (10%)	8–50 (29)	5 (45%)	6 (55%)	Lip: 7 (64%)
Dermoid cyst	1 (0.8%)	49	1 (100%)	0	Palate: 1 (100%)
Malignant tumors (n=42)					
Squamous cell carcinoma	24 (57%)	25–78 (57)	17 (71%)	7 (29%)	Tongue: 16 (67%)
Basal cell carcinoma	6 (14%)	52–77 (66)	2 (33%)	4 (67%)	Lip: 6 (100%)
Acinic cell carcinoma	5 (12%)	35–87 (57)	1 (20%)	4 (80%)	Palate: 3 (60%)
Lymphoma	4 (10%)	12–62 (43)	1 (25%)	3 (75%)	Tonsil: 4 (100%)
Mucoepidermoid carcinoma	3 (7%)	24–57 (45)	3 (100%)	0	Palate: 1, mandible: 1 tongue: 1

Cystic diseases were the most common finding during the first three decades and declined afterward. Benign neoplasms predominated during the fourth decade and inflammatory lesions in the fifth. Malignant diseases peaked in the sixth decade and afterward. Figure 1 demonstrates the relationship between the categories of diseases and patients' age.

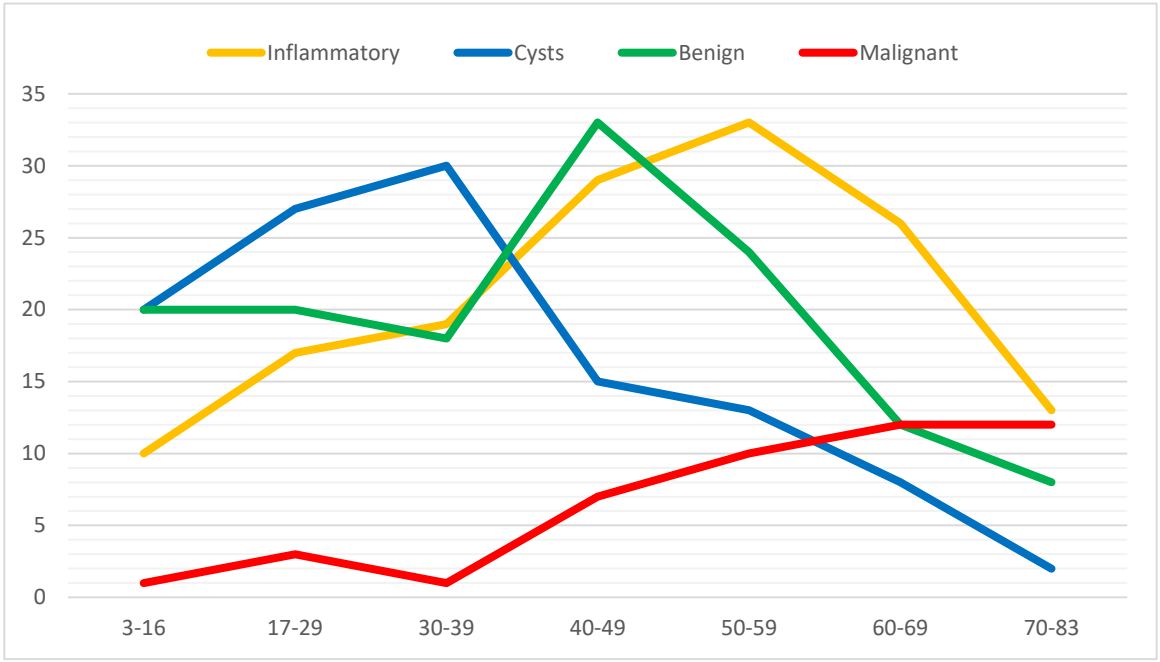

FIGURE 1: Relative distribution of the four disease categories according to patient age. X-axis: age groups, Y-axis: number of cases

Buccal mucosa represented the most frequent site for biopsy, taken in 76 (17%) cases, followed by tongue and maxillary bone at 70 (16%) each, then gingiva and inner lip at 65 (15%) each, mandible at 62 (14%), palate at 22 (5%), floor of mouth at 7 (2%) and tonsils at 5 (1%). Figure 2 shows the relative anatomic distribution of diseases.

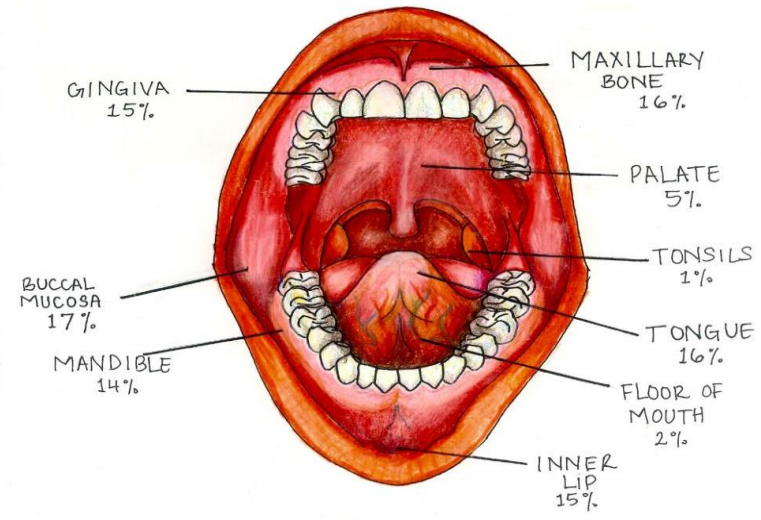

FIGURE 2: Frequency of oral biopsies according to anatomic site

Statistical Analysis

Radicular cysts were more common in teenagers (6/11, 55%) than in adults (8/76, 11%), which is statistically significant (p=.012). Lichen planus was more common above the age of 40 (22/79, 28%) than below 40 (4/42, 10%), although not statistically significant (p=.063). Leukoplakia was more common in patients above the age of 40 (14/82, 17%) than below (5/46, 11%) but was not statistically significant (p=.606). Regarding gender, the only statistically significant difference was seen in irritation fibroma, which was more common in females (p=.035).

DISCUSSION

The mucosae of the oral cavity and lips share many histological features with the skin, with inflammatory and neoplastic conditions being almost identical in both tissues. However, the oral cavity is subject to a different microenvironment and has more functions that predispose it to distinct patterns of disease [4]. In addition, odontogenic and salivary gland lesions arise in the oral cavity but not skin. They are diverse and represent a significant fraction of the pathology specimens there.

Recent advances in medical science have changed trends in clinical practices in the last decades. Once, oral lesions were often treated empirically and surgical biopsies were performed by general dentists. Currently, oral biopsies are routinely taken for diagnostic pathology, reflected in the increasing number of specimens referred annually [5]. In certain situations, the procedure is performed by more specialized practitioners such as oral pathologists, or maxillofacial, head and neck, ENT and plastic surgeons. All these factors enhance the capacity for accurate diagnoses and better patient care. Thus, the practice of oral pathology requires knowledgeable and experienced pathologists.

In this study, inflammatory diseases were the most common group, slightly outnumbering benign neoplasms. A similar finding has been reported in many studies [2, 6–9], while in others benign neoplasms were more common [10–11]. Interestingly, oral lichen planus was the most common inflammatory condition in this study (18%), exceeding what was reported in Türkiye (11.9%) and Kuwait (4.6%) [6, 12]. Lichen planus is an inflammatory mucocutaneous disease of unknown etiology, and its epidemiology varies between 1–3% among populations [13]. The disease is associated with diabetes and smoking [14–15]. A similar condition, called lichenoid reaction, occurs secondarily to an obvious factor, such as drug exposure. The high frequency of lichen planus in our study could be attributed to the high prevalence of diabetes, which affects 16% of the Jordanian population [16]. In addition, we combined both lichen planus and lichenoid reaction in the same category due to incomplete medical history in many cases. However, a more accurate explanation mandates a focused study in the future.

Odontogenic cysts are heterogenous diseases that arise from odontogenic epithelium [3]. Similar to our study, radicular cysts were the most common odontogenic cyst, followed by dentigerous and then keratocysts [17–21]. Radicular cysts typically complicate inflammatory conditions such as trauma or dental caries, while dentigerous cysts are a developmental anomaly associated with an unerupted tooth. In contrast, keratocysts are a neoplastic disorder but are still classified under the umbrella of odontogenic cysts in the World Health Organization classification system [3]. Both radicular and keratocysts can affect any age-group, but the peak incidence is in the fourth to fifth decade and the third decade, respectively [3,

22–23]. A peculiar finding in our study is that the overall incidence of odontogenic cysts peaked in younger age groups, and the frequency of radicular cysts was more common in children than adults. Similarly, the mean age of keratocysts was 27 years, which was—again—younger than what was described previously [23].

Squamous papilloma and pyogenic granuloma equally predominated benign tumors in our study and appeared in a wide range of age. Squamous papilloma, previously referred to in previous studies as fibroepithelial polyp or fibroepithelial hyperplasia, was consistently very common, while pyogenic granuloma had a variable frequency from high to low [2, 6, 9, 12]. It is worth mentioning that human papilloma virus-related proliferation, which may mimic squamous papilloma, were not encountered. Salivary gland tumors and odontogenic tumors were less common, with the vast majority of cases being pleomorphic adenoma and ameloblastoma, respectively. Benign soft tissue tumors very rarely occurred.

A few previous studies showed that cancer was the most common finding in oral specimens [1, 4, 18, 24–25]. Malignant tumors constituted 10% of the specimens in our series, which is close to what was reported in Libya (8%), the UAE (14.9%) and Iraq (14.5%) but higher than in Kuwait (3.6%), Spain (3.9%) and the UK (5.4%) [6, 24–27]. In contrast, a few studies showed that malignancy was the dominant disease among oral biopsies [28–29]. SCC represented, by far, the most common oral cancer in the current and all previous reports. It is known to be strongly associated with certain environmental factors and personal habits such as smoking, tobacco chewing and poor oral hygiene. This explains the high prevalence of SCC and thus the high frequency of malignant lesions in oral biopsy in some geographic areas such as India and southwest Saudi Arabia. According to this study, the Jordanian population has a low frequency of oral cancers, most of which is SCC; primary salivary gland carcinoma and lymphoma are uncommon.

Intraoral, minor salivary gland tumors, are relatively uncommon, accounting for 25% of all salivary gland tumors. In contrast to large salivary glands, tumors of the minor salivary glands show a higher rate of malignancy, comprising approximately half of all cases [30]. In previous reports, pleomorphic adenoma was consistently the most common benign tumor, while the most common malignancy was either mucoepidermoid or adenoid cystic carcinomas [31–33]. Our study shows a relatively lower percentage of malignancy in minor salivary glands, with the most common type being acinic cell carcinoma.

Conclusion

In short, this study provides a comprehensive overview of the prevalence of oral pathology lesions from a tertiary medical center. Several clinically significant points were revealed. The most common oral diseases were inflammatory in nature, while malignant neoplasms were the least common and aligned with the prevalence described in surrounding countries. On the other hand, the study showed a handful of novel findings. Odontogenic cysts tended to occur among younger age groups. Malignant tumors of minor salivary glands were rare and were led by acinic cell carcinoma. A larger, multi-institutional study in the future is recommended to assert these novel findings.

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Authors' contributions

TA: idea, writing and reviewing manuscript, supervision; HE: writing draft, literature

review; DD: writing draft- figures and artwork; DW: data collection and analysis; FB; data collection and analysis. All authors read and approved the final manuscript.

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Conflict of interest: none.

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نطاق عينات أمراض الفم: تحليل الأنسجة المرضية لأربعمائة واثنتين وأربعين عينة

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الملخص

الخلفية والأهداف: أمراض تجويف الفم غير متجانسة في المسببات والتسبب المرضي وتكوين الأنسجة والنتائج السريرية. تهدف هذه الدراسة إلى البحث عن مدى تنوع أمراض الفم التي تم فحصها في خبرتنا الطبية.

الطريقة: تم البحث في أرشيفات علم الأمراض في مستشفى الجامعة الأردنية بأثر رجعي عن عينات من تجويف الفم بين عامي 2013–2020. تم إجراء اختبار "فيشر" الدقيق لفحص الفرق الإحصائي بين التشخيص المرضي والمتغيرات السريرية. تم تطبيق اختبار "أنوفا" أحادي الاتجاه لتحليل الفروق في متوسط العمر بين المجموعات المرضية المختلفة.

النتائج: تم استخراج ما مجموعه أربعمائة واثنين وأربعين حالة. كان هناك مائتان واثنتين وثلاثين أنثى ومائتان وعشرة ذكور. كان مدى العمر من ثلاث إلى سبع وثمانين سنة بمتوسط ثلاثة وأربعين. وُجد أن الأمراض الالتهابية والتفاعلية هي الأكثر شيوعًا، حيث شكلت ثلاثة وثلاثون بالمائة من جميع العينات، تلتها الأورام الحميدة بنسبة واحد وثلاثين بالمئة، ثم التكيسات بنسبة ست وعشرين بالمائة، وأخيرًا الأمراض الخبيثة بنسبة عشرة بالمائة. كان الحزاز المسطح أكثر الأمراض الالتهابية شيوعًا بنسبة ثمانية عشرة بالمائة، وكان سائدًا في المرضى الذين تزيد أعمارهم عن أربعين عامًا (القيمة الاحتمالية: 0.0039)، كما ساد التكيس القرني في الأطفال والمراهقين بشكل أكبر من البالغين (القيمة الاحتمالية: 0.0015)، يمثل الغشاء المخاطي الشدق الموقع الأكثر شيوعًا في ظهور الأمراض بنسبة سبعة عشرة بالمائة من إجمالي العينات، يليه الفك العلوي واللسان بنسبة ستة عشرة بالمائة لكل منهما.

الخلاصة: الأورام الالتهابية والحميدة هي الآفات الأكثر شيوعًا في أمراض الفم. يبدو أن الورم الخبيث في الفم يظهر شيوعًا منخفضًا إلى متوسط مقارنة بالتقارير السابقة. تقدم الدراسة لمحة عامة عن مجموعة عينات أمراض الفم وتشير إلى بعض النتائج الوبائية الجديدة التي تقترح مزيدًا من التحقق.

الكلمات الدالة: تجويف الفم، علم الأمراض، سني المنشأ، سرطان الفم، أورام الغدد اللعابية، الانتشار.