



ORIGINAL ARTICLE

The range of diagnoses for oral soft-tissue biopsies of geriatric patients in a Saudi Arabian teaching hospital



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KEYWORDS

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Abstract *Introduction:* The increased life expectancy being observed worldwide necessitates careful planning for future geriatric oral health care needs, which should be based on epidemiologic surveys to identify these needs. We aimed to survey the range of lesions diagnosed in soft-tissue biopsies of patients over age 60 over a 30-year period in a Saudi Arabian teaching hospital.

Methods: The histopathology records of geriatric patients with complete demographic data who were diagnosed between 1984 and 2013 at the College of Dentistry, King Saud University, were reviewed. The lesions were then classified into eight broad categories. Associations between variables were evaluated using Pearson's Chi square test.

Results: There were 231 soft-tissue biopsies obtained from geriatric patients whose complete records were available. The male to female ratio was 1.1:1, and the mean age was 66.7 years. Most lesions (69%) occurred in patents aged 60–69 years. Although reactive lesions were generally the most common, the most common lesions were squamous cell carcinoma and fibroma. Lesions were most commonly located on the buccal mucosa and the alveolar ridge/gingivae.

Conclusions: The range of lesions seen in Saudi geriatric patients were similar to those reported for other parts of the world, although the lesions were more similar to those reported from developing countries. The very high rate of oral cancer, however, is expected to take the majority of the resources allocated to geriatric oral health care, except if a strong, population-based prevention program is initiated immediately.

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1. Introduction

Life expectancy increased steadily worldwide, from 46.9 years in the 1950s to 68.7 years by 2010 (United Nations, 2012). The increase in life expectancy for Saudi Arabia was even greater for the same period (41.9 years in the 1950s to 74.3 years by 2010) (United Nations, 2012). Moreover, the percentage of the Saudi population aged 60 years and older is projected to reach 25.3% by 2050, compared to just 5.6% in 1950 (United Nations, 2012). Clearly the oral health care needs of elderly Saudi Arabians will increase in the coming years, and epidemiological surveys to identify these needs are needed. Surveys based on only clinical data need to be supplemented by those based on biopsy records, as both are necessary to adequately define oral health care needs. Additionally, records based on histological diagnosis are generally considered more accurate than those based on clinical diagnosis.

Geriatric mucosa is marked by decreased epithelial thickness, decreased synthesis of collagen by connective tissue cells, and increased vascular sclerosis, all of which are likely to result in decreased tissue regeneration, loss of elasticity, and decreased disease resistance (Breustedt, 1983; Vigild, 1987). A number of epidemiologic studies (often asymmetrical in design and presentation of results) on the oral mucosal disease of the elderly (van Wyk et al., 1977; Fleishman et al., 1985; Ekelund, 1988; Hoad-Reddick, 1989; Kaplan and Moskona, 1990; Corbet et al., 1994; Nevalainen et al., 1997; Reichart, 2000; Lin et al., 2001; Garcia-Pola Vallejo et al., 2002; Jankittivong et al., 2002; Espinoza et al., 2003) have been published in the last 3 decades. Most of these studies were based on clinical examination of institutionalized or home-based elderly people, or were done in the context of denture-related oral pathologies. There have also been a number of studies that analyzed the prevalence of oral lesions in the elderly based on oral tissue biopsies submitted for pathology (Kononen et al., 1987; Skinner and Weir, 1987; Scott and Cheah, 1989; Correa et al., 2006; Franklin and Jones, 2006; Muzyka et al., 2009; Carvalho Mde et al., 2011). Owing to the paucity of data from either clinical examinations or oral biopsies from Saudi Arabia, this study was aimed at surveying soft-tissue biopsies in patients over age 60 who were diagnosed in the biopsy service of a teaching hospital over a 30 year period, comparing these data with similar studies done in other parts of the world. Soft-tissue pathologies were chosen because these are usually the most common and the most clinically significant category of oral lesions in the elderly (Correa et al., 2006; Muzyka et al., 2009).

2. Materials and methods

The biopsies included in this study were those diagnosed between 1984 and 2013 in the College of Dentistry, King Saud University; the premier dental school in Saudi Arabia. Ethical approval for the study was obtained from the Institutional Review Board of the institution (College of Dentistry Research Center, FR 0181). All cases with incomplete data on age, sex, and location of the lesion were excluded ($n = 54$ cases). We included 231 (of 285) soft-tissue biopsies of patients aged 60 years and above with complete demographic data, in addition to their histological slides from the archives, in the analysis. The pathology reports of all cases, including the

accompanying hematoxylin-eosin-stained slides, those with special stains and/or immunohistochemical stains were re-evaluated by the two authors (who are practicing oral pathologists) to ensure that the previous diagnoses were correct. When found to be inaccurate, particularly based on current knowledge, new diagnoses were assigned. Descriptive and qualitative analyses of the data were then made using the IBM SPSS version 20 software. Data are presented as frequencies and percentages. Associations between important variables (mainly age and sex in relation to lesions) were tested by Pearson's Chi-square test or Fisher's exact test where necessary. A P value < 0.05 was considered statistically significant.

3. Results

The study comprised soft-tissue biopsy samples from 231 patients, including 122 men (52.8%) and 109 women (47.2%). There was no significant difference between the type of lesions in relation to the sex of the patients ($P = 0.11$). The age of the patients ranged from 60 to 100 years (mean age: 66.7 years). The majority of the patients were 60–69 years of age (69.3%) (Table 1). There was a significant difference in the type of lesions diagnosed ($P = 0.001$) between the two age categories (60–74 years versus ≥ 75 years). Patients aged 60–74 years had a higher rate of reactive lesions, while those aged over 75 had a higher rate of malignant tumors (Table 2).

Most lesions occurred in the buccal mucosa (25.9%), except if the gingiva and the alveolar ridge are viewed as a unit, in which case most lesions (34.2%) occurred in the latter (Table 3). The majority of the lesions were classified as reactive lesions, with irritation fibroma constituting 46% (44/95) of this group of lesions (Table 4). Malignant neoplasms were the second-most common type of soft-tissue lesion. Squamous cell carcinoma was the single most common lesion, with 44 cases, representing 84.6% of malignant lesions. There also were 44 cases of irritation fibroma, but these cases constituted only 46.3% of the reactive lesions (Table 4). The general profile of the 10 most common lesions is shown in Table 5.

4. Discussion

The World Health Organization has previously defined the elderly population for developing countries as those who are 60 years and older (WHO, 1984). The continuous increase in the proportion of elderly vs. younger people in Saudi Arabia and other parts of the world is not expected to abate in the near future. This means that more health resources will need to be shifted to caring for geriatric patients in the years to come. Effective planning through epidemiologic surveys will aid in the optimal apportioning of scarce health resources toward geriatric oral health care. The authors are not aware of a previous, well-documented study on the range of pathologic lesions commonly seen in Saudi Arabian geriatric patients, whether clinical or based on histological diagnoses. A focused study on histologically diagnosed soft-tissue lesions

Table 1 Age distribution of lesions by decades.

Age (years)	Frequency	Percentage
60–69	160	69.3
70–79	42	18.2
80–89	23	9.9
≥ 90	6	2.6
Total	231	100

Table 2 General categorization of lesions relative to gender and age grouping.

Diagnostic category	Male <i>N</i> = 122	Female <i>N</i> = 109	60–74 years <i>N</i> = 188	≥75 years <i>N</i> = 43	Percentage of total	Total <i>N</i> = 231
Epithelial alterations	20	12	25	7	13.9	32
Reactive lesions	47	48	89	6	41.1	95
Vascular lesions	0	5	3	2	2.2	5
Benign tumors	5	4	7	2	3.9	9
Malignant tumors	32	20	34	18	22.5	52
Salivary gland lesions	16	14	23	7	13.0	30
Cutaneous lesions	1	4	4	1	2.2	5
Vesiculobullous lesions	1	2	3	0	1.3	3

Table 3 Distribution of lesions relative to oral sites.

Site	Frequency (%)
Gingiva	39 (16.9)
Alveolar ridge	40 (17.3)
Lip	25 (10.8)
Buccal mucosa	60 (25.9)
Tongue	31 (13.4)
Palate	14 (6.1)
Floor of the mouth	12 (5.2)
Salivary glands	6 (2.6)
Facial skin	4 (1.7)
Total	231 (100)

in geriatric patients was undertaken, because such studies have more potential to unearth subtle epidemiological differences which would have been masked by studying all lesion types diagnosed, including hard-tissue lesions. Soft-tissue lesions are also generally the most clinically significant lesions in geriatric patients (Correa et al., 2006; Muzyka et al., 2009).

We found that most lesions are commonly diagnosed in patients aged between 60 and 69 years of age. However, the nature of diagnosed lesions changes from overwhelmingly reactive to more malignant lesions as patients age. This decrease in the frequency of lesions seen in patients over age 70 is similar to studies done in developing countries (Correa et al., 2006; Carvalho Mde et al., 2011). It is not, however, so clear-cut in some studies done in developed countries (Kononen et al., 1987). This may be a reflection of overall life expectancy, which is generally higher for developed countries compared with developing countries. In addition, very elderly patients (age > 80 years) in developed countries are more often institutionalized and have immediate access to dental care, while in Saudi Arabia they mostly live with their families and may be dependent on younger family members to get to hospitals or clinics. This implies that they may not have immediate access to oral health services, particularly those patients living in remote areas.

We found that men slightly outnumber women by a ratio of 1.1:1. This finding differs from those of several studies based on oral mucosal biopsies (Scott and Cheah, 1989; Correa et al., 2006; Muzyka et al., 2009; Carvalho Mde et al., 2011), in which women were generally more frequent than men. It is not known however, if women truly outnumber men in developing soft-tissue lesions, as these studies featured both soft and hard tissue diagnoses. It is noteworthy, however, that some lesions appear to have a strong predilection for one sex

or the other. Pyogenic granuloma and mucous extravasation cysts are far more common in elderly men, while Sjogren's syndrome appears to be an exclusive disease of elderly women, and lichenoid mucositis/lichen planus is relatively more common in women.

The majority of the lesions in this study were found in the following five sites, listed in order of frequency: the buccal mucosa, alveolar ridge, gingiva, tongue, and lips (Table 3). The buccal mucosa appears to be by far the most common site. It was the most frequent location of 4 of the 10 most common lesions (Table 5). It is obviously a more suitable niche for a variety of soft-tissue lesions than most other parts of the oral soft tissue. If the gingiva and the alveolar ridge are taken as a unit, as was done in some studies (Carvalho Mde et al., 2011), they actually account for more lesions than the buccal mucosa, mainly because of frequent epithelial alterations and malignancy, as well as mucosal reactive lesions. It is more practical, however, to separate these sites, as many other studies have done.

The single most important lesion in this study that should concern healthcare authorities in Saudi Arabia is squamous cell carcinoma (SCC), which appeared at a relatively high rate in geriatric patients. It constituted 85% of malignant, non-salivary lesions and 19% of all soft-tissue lesions. It outnumbered all other individual lesions with the exception of irritation fibroma, which had the same number of patients. In addition, the male to female (M:F) ratio (1.4:1) for SCC appears lower than the worldwide, age-standardized incidence rate of 1.97:1, estimated by the International Agency for Research in Cancer in 2012 (Ferlay et al., 2008). However, their estimate was based on cancers of the lip and oral cavity, which may contain other cancers, including cutaneous cancers of the lip. Our finding regarding the M:F ratio is probably similar to the trend found in an Argentine population of patients with oral cancer (Brandizzi et al., 2005). In that study, the M:F ratio dropped precipitously from 7.1:1 in the period from 1950 to 1970 to 1.24:1 in the period from 1992 to 2000.

There is no previous documentation of tobacco use in the earlier years (1950–70) in the Saudi population, but recent studies have shown a relatively high degree of the use of tobacco products in the adult Saudi population (Al-Turki et al., 2010). SCC is mainly a disease of geriatric patients, as the oral mucosa becomes leakier to noxious substances, as well as undergoing changes that make it more susceptible to external carcinogens (Pindborg, 1978; Jankittivong et al., 2002; De Rossi and Slaughter, 2007). Importantly, there is a corresponding increase in the prevalence of this epithelial malignancy as geriatric patients advance in age, possibly due to

Table 4 Prevalence of individual lesions relative to their location.

Lesions	Gingiva	Alveolar ridge	Buccal mucosa	Tongue	Palate	Lip	Floor of mouth	Salivary glands	Facial skin	Total (N = 231)
<i>Epithelial alterations</i>										
Hyperkeratosis ± dysplasia*	1	4	6	3	4	2	1	–	–	21
Ulceration	–	1	5	4	–	1	–	–	–	11
<i>Reactive/inflammatory lesions</i>										
Pyogenic granuloma	11	2	1	3	1	1	–	–	–	19
Epulis granulomatosa	2	–	–	–	–	–	–	–	–	2
Epulis fissuratum	4	–	–	–	–	–	–	–	–	4
PGCG	1	1	–	–	–	–	–	–	–	2
POF	3	1	–	–	–	–	–	–	–	4
Irritation fibroma	13	2	17	3	4	5	–	–	–	44
Traumatic neuroma	–	2	–	–	–	–	–	–	–	2
Lichen planus/Lichenoid mucositis	1	–	10	2	1	1	–	–	–	15
Candidiasis	–	–	–	2	–	–	–	–	–	2
Plasma cell gingivitis	1	–	–	–	–	–	–	–	–	1
<i>Vascular lesions</i>										
Lymphangioma	–	–	–	1	–	1	–	–	–	2
Hemangioma	–	–	–	1	–	1	–	–	–	2
Organizing thrombus	–	–	–	1	–	–	–	–	–	1
<i>Benign tumors</i>										
Neurofibroma	1	2	–	–	–	–	–	–	–	3
Granular cell tumor	–	–	1	–	–	–	–	–	–	1
Lipoma (± spindle cell type)	1	–	4	–	–	–	–	–	–	5
<i>Malignant tumors</i>										
Squamous cell carcinoma	3	17	10	11	1	–	2	–	–	44
Verrucous carcinoma	–	1	3	–	–	–	–	–	–	4
Non-Hodgkin's lymphoma	–	–	–	–	–	–	1	–	–	1
Kaposi's sarcoma	–	1	–	–	–	–	–	–	–	1
Metastatic carcinoma	–	2	–	–	–	–	–	–	–	2
<i>Salivary gland lesions</i>										
Mucous extravasation cyst	–	–	–	–	–	4	3	–	–	7
Sialolithiasis	–	–	–	–	–	–	2	–	–	2
Mucous retention cyst	–	–	–	–	–	1	–	–	–	1
Chronic sialadenitis	–	–	–	–	–	–	2	4	–	6
Sjogren's syndrome	–	–	–	–	–	6	–	–	–	6
Intraglandular lipoma	–	–	–	–	–	–	–	1	–	1
Canalicular adenoma	–	–	–	–	–	1	–	–	–	1
Myoepithelioma	–	–	–	–	–	–	–	1	–	1
Mucoepidermoid carcinoma	–	–	–	–	2	–	–	–	–	2
Cystadenocarcinoma	–	–	–	–	–	–	1	–	–	1
Carcinoma ex-pleomorphic adenoma	–	–	–	–	1	–	–	–	–	1
PLGA	–	–	1	–	–	–	–	–	–	1
<i>Cutaneous lesions</i>										
Pilosebaceous cyst	–	–	–	–	–	–	–	–	1	1
Intradermal nevus	–	–	–	–	–	–	–	–	1	1
Basal cell carcinoma	–	–	–	–	–	–	–	–	1	1
Epidermal cyst	–	–	–	–	–	1	–	–	1	2
<i>Vesiculobullous lesions</i>										
Pemphigus vulgaris	–	–	2	–	–	–	–	–	–	2
BMMP	1	–	–	–	–	–	–	–	–	1

Abbreviations: PGCG, peripheral giant cell granuloma; POF, peripheral ossifying fibroma; PLGA, polymorphous low grade adenocarcinoma; BMMP, benign mucous membrane pemphigoid.

* Dysplasia (mild or moderate) was found in only 6 cases.

Table 5 Profile of the 10 most common lesions.

	Total	Age (range)/years	Gender M: F (ratio)	Location (2 most common)
Squamous cell carcinoma	44	69 (60–91)	26:18 (1.4)	Alveolar ridge (39%); tongue (25%)
Irritation fibroma	44	65 (60–91)	20:24 (0.8)	Buccal mucosa (39%); gingiva (30%)
Hyperkeratosis ± dysplasia	21	69 (60–87)	13:8 (1.6)	Buccal mucosa (29%); palate (19%)
Pyogenic granuloma	19	67 (60–100)	15:4 (3.8)	Gingiva (58%); tongue (15%)
Lichenoid mucositis	15	64 (60–88)	6:9 (0.7)	Buccal mucosa (68%); tongue (13%)
Ulceration	11	68 (60–85)	7:4 (1.8)	Buccal mucosa (46%); tongue (36%)
Mucous extravasation cyst	7	74 (60–90)	5:2 (2.5)	Lip (57%); floor of mouth (43%)
Chronic sialadenitis	6	67 (60–85)	4:2 (2:0)	Salivary glands (67%); floor of mouth (33%)
Sjogren's syndrome	6	60 (60)	0:6 (~)	Lip (100%)*
Lipoma	5	12 (7–16)	3:1 (3)	Lip (50%); tongue (25%)

* Labial gland biopsy.

decreased mucosal immunity as well as cumulative genetic and epigenetic changes acquired by oral mucosal cells.

In similar studies, SCC was by far the most common malignant lesion. However, it usually lags far behind the most common benign inflammatory lesions, such as fibroma and fibrous hyperplasia (Kononen et al., 1987; Correa et al., 2006; Muzyka et al., 2009; Carvalho Mde et al., 2011). This was not the case with our study, possibly due to the relatively high number of cancer cases that are sent to a referral center. Thus our sample may not be a direct reflection of the disease incidence in the general population, as many cases of inflammatory lesions can be managed well by general dental practitioners, and the biopsies may not need to be diagnosed at referral institutions. An English study showed an extremely low level of SCC in geriatric patients, although it was still the most common malignancy, alongside non-Hodgkin's lymphoma (Franklin and Jones, 2006). It is doubtful that their finding was representative of the general English geriatric population. Moreover, as alluded to by the authors, it is understandable from the nature of that study that, since it was based on biopsies submitted directly from general dental practitioners for histological diagnosis, most of the overtly suspicious cases of malignancies would have been referred to nearby tertiary centers, where the attending oral and maxillofacial surgeons would better take the biopsies.

Like in most studies, reactive lesions were the predominant lesions in geriatric patients, with most of them in this study found in patients aged 60–75 years old. This is in consistent with virtually all studies which used diagnoses from tissue biopsies (Kononen et al., 1987; Correa et al., 2006; Franklin and Jones, 2006; Muzyka et al., 2009; Carvalho Mde et al., 2011). Reactive lesions become less common after the eighth decade, when the predominant lesion becomes SCC (Muzyka et al., 2009). Reactive lesions arise mainly from trauma or irritation, both of which are well-served by the presence of poorly-fitting dentures in the mouth. Geriatric patients are more likely to use dentures than any other age group. It is also worth noting that, in most studies, these lesions are most commonly found on the gingiva/alveolar ridge area. In our study, a significant proportion of reactive lesions were found on the buccal mucosa.

Reactive and inflammatory lesions accounted for the majority (73%) of the salivary gland lesions. This finding is similar to those of other studies, although most of them did not attempt to classify salivary gland lesions separately, except for the study by Franklin and Jones (Franklin and Jones,

2006). The most common reactive lesion is the mucous extravasation phenomenon. Inflammatory lesions are usually chronic sialadenitis and Sjogren's syndrome, as found in this study and several others (Correa et al., 2006; Muzyka et al., 2009). Generally tumors of the salivary gland (including pleomorphic adenoma) are rare in geriatric patients. The most common benign tumors are pleomorphic adenoma and canalicular adenoma (probably reported as monomorphic adenoma in some older studies) (Franklin and Jones, 2006). Although studies usually report a predominance of mucoepidermoid carcinoma and adenoid cystic carcinoma when malignant tumors are found in the salivary glands (Correa et al., 2006; Franklin and Jones, 2006; Carvalho Mde et al., 2011), some, like in our study, show that several relatively rare malignancies are sometimes encountered in the geriatric patients (Correa et al., 2006). Interestingly however, pleomorphic adenoma and adenoid cystic carcinoma were not diagnosed in our present study.

Our study and others like it have the limitation of excluding those diseases that do not require a biopsy for their diagnosis but remain clinically important in the overall health of geriatric patients. Those diseases would still need to be included in planning the allocation of resources to combat diseases that affect the elderly. Thankfully, many previous studies have addressed this limitation (van Wyk et al., 1977; Fleishman et al., 1985; Ekelund, 1988; Hoad-Reddick, 1989; Kaplan and Moskona, 1990; Corbet et al., 1994; Nevalainen et al., 1997; Reichart, 2000; Lin et al., 2001; Garcia-Pola Vallejo et al., 2002; Jankittivong et al., 2002; Espinoza et al., 2003). Additionally, this biopsy service receives specimen from staff and the general public, as well as cases for consultation from other institutions. We expect that the data obtained will be representative of the general Saudi population, but with some slight overestimation based on the nature of the institution as a referral center.

5. Conclusions

This study showed that the range of lesions in soft-tissue biopsies of geriatric patients evaluated in our teaching hospital is not significantly different from those reported from the other parts of the world. It bears a strong similarity with those from developing countries. However, the rate of SCC seen was particularly high, which necessitates advocating for a nationally supervised screening program for oral cancer and

pre-malignant lesions as part of oral health services for the geriatric population. This program is needed to diagnose these cancers early, thereby decreasing the mortality and the morbidity associated with them.

Conflict of Interest

Both authors declare no conflict of interest in this work.

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