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Epidemiologic Characteristics of Salivary Gland Tumors in an Iranian Population

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Abstract

Background: Salivary gland tumors include a wide variety of benign and malignant tumors in the oral and maxillofacial region. Although these tumors are not common, they are not rare. The prevalence of these tumors varies with regard to age, gender, and their location in the body.
Objectives: This study aimed to evaluate the frequency of benign and malignant salivary gland tumors in patients referred to three referral hospitals in Tehran, Iran.
Methods: This retrospective cross-sectional study examined the demographic and pathologic records of the patients with salivary gland tumors submitted to the Department of Pathology of Amir Alam, Loghman Hakim, and Shohada Hospitals from 2005 to 2016. In this study, the histological variants of salivary gland tumors and clinical parameters such as age, gender, and the location of the tumor were examined. The clinical data were analyzed using SPSS software version 21.
Results: Of 137632 patient records, 1180 cases were salivary gland tumors. Pleomorphic adenoma in 794 cases (67.3%) and adenoid cystic carcinoma in 109 cases (9.2%) were the most common tumors, respectively. Salivary gland tumors were more common in males, and the participants' mean age was 42.86 $\pm$ 16.5 years. The most common site was parotid and minor salivary glands, with 937 (79.4%) and 137 (12%) cases, respectively.
Conclusions: In this study, the most common benign tumor was pleomorphic adenoma in the parotid gland, and the most common malignant tumor was adenoid cystic carcinoma in the major salivary glands. Furthermore, benign tumors were more frequent than malignant tumors.

Keywords: Frequency, Salivary Gland, Tumor, Benign, Malignant

1. Background

Three pairs of major salivary glands (namely parotid, submandibular, and sublingual) and minor salivary glands are distributed in the upper aerodigestive tract, especially in the oral cavity and oropharynx, resulting in the emergence of a wide range of neoplasms. Salivary gland tissues constitute many different types of cells. A majority of salivary gland neoplasms have an epithelial/myoepithelial origin and are uncommon (1).

The annual incidence of salivary gland neoplasms ranges from 1.0 to 6.5 cases per 100000 population worldwide (2). These tumors account for 3% of all head and neck tumors; however, they are considered as remarkable lesions in the head and neck because of their diverse and complex histopathologic features and different clinical behaviors and outcomes (1). According to an epidemiologic study by Gao et al. (3), pleomorphic adenoma was the most common salivary gland tumor, and parotid was the most common location. In their study, the male-to-female ratio was 1: 1.02, and the participants' mean age was 47 years. Some researchers have investigated the frequency and epidemiologic characteristics of salivary gland tumors in other cities or other hospitals in Iran (1, 4-8). However, the analysis of the findings of numerous epidemiologic studies indicated that the incidence and distribution of salivary gland neoplasms vary worldwide (9).

2. Objectives

Accordingly, this study aimed to reveal the epidemiologic characteristics of salivary gland neoplasms over an 11-

year period in Tehran (one of the three largest cities in the Middle East), Iran.

3. Methods

In this multicenter retrospective study, 137632 biopsy reports of an 11-year-period (March 2005 to March 2016) were retrieved from the archives of the pathology department of three referral hospitals (Amir Alam, Shohada, and Loghman Hakim hospitals) in Tehran, Iran. All the reports were electronic, except for the reports of two years. Specimens with a confirmed diagnosis of salivary gland tumor were included in the study, and the others with uncertain diagnoses or incomplete information were excluded. The demographic data included in this study were age, gender, specific location of lesions, and the frequency and histopathologic type of tumors. An expert oral and maxillofacial pathologist reviewed the reports, and the collected data were analyzed using SPSS software version 21.

4. Results

In the present study, out of 137632 biopsy records, 1180 cases (0.86%) were diagnosed with salivary gland tumors, among whom 596 cases (50.5%) were male, and 584 cases (49.5%) were female. The patients' age ranged from 2 to 90 years, with a mean age of 42.86 $\pm$ 16.5 years. The mean age of patients with benign and malignant salivary gland tumors was 41.41 $\pm$ 16.21 and 46.09 $\pm$ 16.92 years, respectively. From total lesions, 888 cases (75.2%) were benign (447 male (50.3%), 441 female (49.7%)) and 292 cases (24.7%) were malignant (149 male (51%), 143 female (49%)).

In benign salivary gland tumors, pleomorphic adenoma (89.4%) and basal cell adenoma and oncocytoma (0.9% for each tumor) had the highest and lowest frequency, respectively. Moreover, adenoid cystic carcinoma (37.3%) and oxyphilic carcinoma (1.0%) were the most and the least common histopathological variants of malignant salivary gland tumors, respectively. The distribution of benign and malignant salivary gland tumors by histopathological subtypes, age, and gender are summarized in Table 1. Table 2 shows the distribution of these tumors by histopathological subtypes and tumor location.

In benign salivary gland tumors, the first and the second most common types were pleomorphic adenoma and warthin's tumor, respectively (Table 1). Basal cell adenoma was noticed in the parotid glands, and Warthin's tumor and inverted ductal papilloma were observed only in the major and minor salivary glands, respectively (Table 2). Pleomorphic adenoma was most common in females, and men were twice as likely to be diagnosed with myoepithelioma. Warthin's tumor and inverted ductal papilloma were observed in one woman, and the other cases were noticed in men (Table 1).

Among the malignant salivary gland tumors, adenoid cystic carcinoma and mucoepidermoid carcinoma were the first and the second most common histopathologic types, respectively (Table 1). The most common location of the malignant tumors was the parotid gland, and there was a female predilection in almost all variations, except for mucoepidermoid carcinoma and epithelial myoepithelial carcinoma, which were most common in males (Table 2).

5. Discussion

Salivary gland tumors account for a major part of oral and maxillofacial disorders. Although they are not so common, they are not rare. Accordingly, each dentist should consider the possibility of occurring these tumors in an oral examination. There are considerable differences in the emergence of such disorders variables in terms of age, gender, and location of the lesion. The tumors appear in various shapes and sizes in the major and minor salivary glands (1, 2). This study aimed to evaluate the frequency of benign and malignant salivary gland tumors in patients referred to the Department of Pathology in Amir Alam, Loghman Hakim, and Shohada hospitals during 2005 - 2016.

In the present study, out of 44,838 patients from the Pathology Department of Amir Alam Hospital, 1,014 (2.26%) patients had Salivary gland tumors, and out of 46,588 patients from the Pathology Department, of Loghman Hakim hospital, 140 patients (0.3%) had salivary gland tumors. Moreover, out of 46,206 samples from the Pathology Department of Shohada Hospital, only 26 patients (0.05%) had salivary gland tumors.

Accordingly, out of 137,632 patients from these three pathology departments, 1180 cases had salivary gland tumors, accounting for 0.86% of all lesions. Out of 1180 cases of salivary gland tumors, 888 (75.2%) and 292 (24.7%) cases were benign and malignant, respectively. This finding is in accordance with those of most studies in Iran and other countries (3-5, 9-12).

In this study, the total frequency of salivary gland tumors was higher in males than females. The male-to-female ratio of benign tumors was 1: 0.98, while malignant tumors had a male-to-female ratio of 1:0.96. In other words, both benign and malignant tumors were slightly more common in males. These findings were consistent with those in some other studies (e.g., Lawal et al. (13), Wang et al. (14), Jaafari-Ashkavandi et al. (6), Chiaravalli et al. (15), Luukkaa et al. (16) and in contrast with the findings in Sando et al. (9), Abrahao et al. (17), Al-Khateeb and Ababneh (18), Lima et al. (19), and Boko et al.'s (20) studies. The

Table 1. Distribution of Salivary Gland Tumors by Gender and Mean Age[a]

Lesion	Gender			Mean Age
	Male	Female	Total	
Benign lesions				
Pleomorphic adenoma	367 (41.4)	427 (48)	794 (89.4)	39.32 ± 15.16
Warthin's tumor	57 (6.4)	1 (0.1)	58 (6.5)	58.10 ± 9.17
Myoepithelioma	7 (0.8)	4 (0.4)	11 (1.2)	47.45 ± 19.01
Basal cell adenoma	4 (0.4)	4 (0.4)	8 (0.9)	47.88 ± 8.34
Oncocytoma	4 (0.4)	4 (0.4)	8 (0.9)	65.25 ± 16.67
Inverted ductal papilloma	8 (0.9)	1 (0.1)	9 (1.0)	46.89 ± 16.01
Total	447 (50.3)	441 (49.7)	888 (100.0)	41.41 ± 16.21
Malignant lesions				
Adenoid cystic carcinoma	53 (18.2)	56 (19.1)	109 (37.3)	48.94 ± 14.79
Mucoepidermoid carcinoma	48 (16.4)	37 (12.7)	85 (29.1)	47.26 ± 20.48
Acinic cell carcinoma	22 (7.5)	23 (7.9)	45 (15.4)	43.09 ± 20.24
Salivary duct carcinoma	4 (1.4)	5 (1.7)	9 (3.1)	48.33 ± 12.87
Oxyphillic carcinoma	1 (0.3)	2 (0.7)	3 (1.0)	52.33 ± 14.46
Malignant mixed tumor	8 (2.8)	9 (3.1)	17 (5.9)	53.06 ± 14.72
Epithelial-myoepithelial carcinoma	9 (3.1)	5 (1.7)	14 (4.8)	52.57 ± 16.66
Adenocarcinoma (not otherwise specified)	4 (1.4)	6 (2.0)	10 (3.4)	61 ± 15.57
Total	149 (51.0)	143 (49.0)	292 (100.0)	46.09 ± 16.92

[a] Values are expressed as mean ± SD or No. (%).

inconsistent findings might be caused by the large number of cases evaluated over an 11-year period in the present study.

In this study, the patients' age varied from 2 to 90 years, with a mean age of 42.86 ± 16.5 years. The mean age of the patients with benign and malignant tumors was 41.41 ± 16.21 and 46.09 ± 16.92 years, respectively. This parameter was similar to the participants' mean age in previous studies (7, 10, 11, 13, 21). Our findings were contrary to those reported by Wang et al. (14), Al-Khateeb and Ababneh (18), Lima et al. (19), Fonseca et al. (22), and Otoh et al. (23). This difference might be caused by the small number of samples in their studies.

In the present study, most salivary gland tumors originated from the parotid gland (79.4%), followed by minor salivary glands (11.7%) as the second most common site. The next sites were submandibular (6.8%) and sublingual glands (2.1%), respectively. The findings were in agreement with those of some previous studies (3, 4, 6, 9, 10, 15, 16, 19, 22-24); however, they did not in line with the findings in some other studies (17, 20, 21, 25). This inconsistency might be associated with the small number of samples. Another finding of this study indicated that the palate was the most common site between the minor salivary glands, as documented in many other studies (3, 4, 6, 9, 10, 12, 13, 15, 16, 22-24).

Furthermore, this study confirmed previous reports suggesting that pleomorphic adenoma (67.2%) was the most common type of salivary gland tumor. The second and the third most common tumor types were adenoid cystic carcinoma (9.2%) and mucoepidermoid carcinoma (7.2%), introduced as the most common malignant tumors. This finding is in line with that of some other studies (6, 8-10, 13, 16, 19-21, 24). In contrast, some researchers, including Al Sarraj et al. (11), Ansari (4), Bradley and McGurk (12), Wang et al. (14), Chiaravalli et al. (15), Abrahao et al. (17), Fonseca et al. (22), Otoh et al. (23), Tilakaratne et al. (25), Williams et al. (26), and Ma'aita et al. (27), rejected this finding. The aforementioned studies considered mucoepidermoid carcinoma as the most common type of malignant salivary gland tumors. Sample size, genetic, ethnic, and environmental factors may account for the inconsistency of the findings.

5.1. Conclusions

Pleomorphic adenoma is the most common benign salivary gland tumor mainly emerged in the parotid gland,

Table 2. Distribution of Salivary Gland Tumors by Body Location

Lesion	Location												
	Parotid Gland	Submandibular Gland	Sublingual Gland	Palate	Upper Lip	Tongue	Floor of Mouth	Cheek	Maxillary Sinus	Nasopharynx	Parapharynx	Other Sites[a]
Benign lesions												
Pleomorphic adenoma	671 (75.5)	56 (6.3)	14 (1.6)	25 (2.9)	2 (0.2)	0 (0.0)	0 (0.0)	4 (0.4)	1 (0.1)	1 (0.1)	11 (1.2)	9 (1.0)
Warthin's tumor	54 (6.0)	2 (0.2)	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	(0.1)
Myoepithelioma	9 (1.0)	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Basal cell adenoma	8 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Oncocytoma	6 (0.7)	1 (0.1)	0 (0.0)	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Inverted ductal papilloma	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.2)	4 (0.4)	0 (0.0)	0.3)
Total	748 (84.2)	60 (6.7)	15 (1.6)	26 (2.9)	2 (0.2)	0 (0.0)	1 (0.1)	4 (0.4)	3 (0.3)	5 (0.5)	11 (1.2)	13 (1.4)
Malignant lesions												
Adenoid cystic carcinoma	45 (15.4)	12 (4.1)	4 (1.4)	5 (1.7)	1 (0.35)	4 (1.4)	4 (1.4)	3 (1.0)	7 (2.4)	13 (4.4)	0 (0.0)	11 (3.7)
Mucoepidermoid carcinoma	62 (21.2)	5 (1.7)	2 (0.7)	5 (1.7)	0 (0.0)	3 (1.0)	1 (0.3)	1 (0.3)	1 (0.35)	2 (0.7)	0 (0.0)	3 (1.0)
Acinic cell carcinoma	40 (13.7)	2 (0.7)	2 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.3)
Salivary duct carcinoma	8 (2.8)	0 (0.0)	0 (0.0)	1 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Oxyphilic carcinoma	3 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Malignant mixed tumor	13 (4.4)	0 (0.0)	1 (0.3)	2 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Epithelial-myoepithelial carcinoma	12 (4.1)	2 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Adenocarcinoma (Not otherwise specified)	6 (2.0)	0 (0.0)	1 (0.3)	2 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.3)
Total	189 (64.7)	21 (7.1)	10 (3.4)	15 (5.1)	1 (0.3)	7 (2.3)	5 (1.7)	5 (1.7)	8 (2.7)	15 (5.1)	0 (0.0)	16 (5.4)

[a] Other sites: Other locations of minor salivary glands, including the larynx, and those, the exact location of which were not reported.

and adenoid cystic carcinoma is the most common malignant neoplasm, especially in the minor salivary glands. In this study, the frequency of salivary gland tumors was higher in males than females. The mean age of patients with benign and malignant tumors was 41.41 $\pm$ 16.21 and 46.09 $\pm$ 16.92 years, respectively.

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Footnotes

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