

## Original Article

# Clinicopathological study of 229 cases of salivary gland tumors in Isfahan population

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## ABSTRACT

**Background:** Salivary gland tumors are relatively uncommon and they consist of 3-10% of head and neck neoplasms. Most of studies have shown geographic variation in the incidence and histopathologic types of salivary gland neoplasms. The aim of this study was to evaluate the salivary gland tumors in Isfahan for 10 years duration.

**Materials and Methods:** In this epidemiological study, 229 medical records of patients with salivary gland neoplasms in Isfahan for 10 years duration (January 2001-December 2011) were reviewed. The clinical data and histopathological features were statistically analyzed using the Chi-square, analysis of variance and Fisher tests;  $P < 0.05$  was considered to be significant.

**Results:** The data showed that salivary gland tumors were most frequent in women. The mean age of patients with benign tumors was 41.26 years and 51.83 years in malignant tumors. Out of 229 salivary gland neoplasms, 127 (55.5%) were benign and 102 (44.5%) were malignant. Most were in parotid (105), followed by the minor salivary glands (95), the submandibular gland (28) and the sublingual gland (1).

**Conclusion:** Pleomorphic adenoma is the most common salivary gland tumor and mucoepidermoid carcinoma followed by adenoid cystic carcinoma are the most common malignancy of salivary gland tumors in Isfahan population. Although most of the results of this study were similar to those reported in other populations, some differences were observed.

**Key Words:** Benign tumors, epidemiology, malignant tumors, salivary gland tumors

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## INTRODUCTION

Salivary gland tumors consist of an important part of oral and maxillofacial pathologic lesions.<sup>[1]</sup> These tumors are relatively uncommon and they consist of 3-10% of head and neck neoplasms.<sup>[2]</sup> According to different histopathological features, there are different classifications for salivary gland neoplasms.<sup>[3]</sup> The main classification of salivary gland tumors is World Health Organization (WHO) classification.<sup>[3,4]</sup> Based on

the latest WHO classification, salivary gland neoplasms are classified as epithelial tumors and stromal tumors.<sup>[3]</sup>

There are a lot of studies on salivary gland neoplasms in different geographic areas of the world. Most of studies have shown geographic variation in the incidence and microscopic types of salivary gland neoplasms.<sup>[5-7]</sup> According to different studies, 50% of salivary gland tumors are benign and half of them occurred in major salivary glands with the most common site in the parotid (64-80%).<sup>[8]</sup> Pleomorphic adenoma is the most common benign tumor and mucoepidermoid carcinoma (MEC) is the most common malignant tumor of the parotid gland.<sup>[8-14]</sup> Minor salivary gland neoplasms consist 10-25% of all salivary gland tumors and most of them are malignant. MEC and adenoid cystic carcinoma (ACC) are the most common malignancies.<sup>[2,15-20]</sup>

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In studies by Ansari<sup>[9]</sup> in Iran, de Oliveira *et al.*<sup>[21]</sup> in Brazil and Lukšić *et al.*<sup>[22]</sup> in Croatia the mean age of affected patients have been reported 45-55 years and it has been shown that the most of salivary gland tumors occurred in women.<sup>[9,21,23,24]</sup> However, Tian *et al.*<sup>[25]</sup> showed a male predilection in salivary gland tumors in China.

Considering the limited studies on salivary gland neoplasms in Iran, the present demographic study was designed to evaluate the salivary gland tumors in Isfahan population for 10 years duration.

## MATERIALS AND METHODS

In this epidemiological study, the medical records of patients with salivary gland neoplasms, who were archived in Department of Oral Pathology of Dental School and also in related hospitals of Isfahan University of Medical Sciences from January 1, 2001 to December 31, 2011, were reviewed retrospectively. The total number of salivary gland tumors was 229 cases. The clinical data (age, gender, site of lesion and histopathological pattern) were considered. The microscopic hematoxylin and eosin stained slides of all cases were reviewed by two pathologists and all of the diagnoses were classified according to WHO classification of salivary gland neoplasms.<sup>[3]</sup> The data were analyzed by the Statistical Package for the Social Sciences version 13.0 (SPSS

Inc., Chicago, IL, USA) with the Chi-square, analysis of variance and Fisher tests.  $P < 0.05$  was considered to be statistically significant.

## RESULTS

### Age and gender

A total of 16,000 biopsy specimens were received in 10 years duration (2001-2011). Out of these, salivary gland neoplasms accounted for 0.01% (229) of all biopsies. In this study, 48.8% of affected patients were male (112) and 51.2% were female (117). This difference was not statistically significant ( $P = 0.97$ ). The age of patients in this study was between 9 and 80 years old (mean  $\pm$  standard deviation [SD] = 45.97  $\pm$  16.34). The mean age of patients with benign tumors was 41.26 years and it was 51.83 years in malignant tumors. This difference was statistically significant ( $P = 0.0$ ). The frequencies of salivary gland neoplasms according to age and sex are shown in Table 1.

### Histopathological features

Out of 229 salivary gland neoplasms, 127 (55.5%) cases were classified as benign tumors and 102 (44.5%) cases as malignant tumors. Pleomorphic adenoma was the most common benign tumor (87.5%) and MEC was the most common malignant tumor (53%). The frequencies of salivary gland neoplasms

**Table 1: Frequencies of salivary gland neoplasms according to age and sex**

Salivary gland tumors	Gender				Total	Mean age		
	M		F			M	F	Mean
	n	%	n	%				
<b>Benign tumors</b>								
PA	53	48.1	58	51.9	111	41.7	38.0	39.5
Myoepithelioma	3	50.0	3	50.0	6	45.3	30.3	37.8
Basal cell adenoma	2	40.0	3	60.0	5	57	65.3	62
Warthin's tumor	3	75.0	1	25.0	4	65.3	56	63
Oncocytoma	1	100.0	0	0.0	1	30	0.0	30
Total	62	48.8	65	51.2	127			
<b>Malignant tumors</b>								
MEC	28	51.9	26	48.1	54	48.0	49.4	48.6
ACC	12	50.0	12	50.0	24	55.0	61.1	58.0
Adenocarcinoma NOS	6	50.0	6	50.0	12	65.1	46.8	56.0
CA-ex-PA	1	20.0	4	80.0	5	43.0	49.5	48.2
PLGA	1	33.3	2	66.7	3	59.0	64.0	62.3
Synovial sarcoma	1	50.0	1	50.0	2	21.0	64.0	42.5
Myoepithelial carcinoma	1	100.0	0	0.0	1	34.0	0.0	34.0
Clear cell adenocarcinoma	0	0.0	1	100.0	1	0.0	46.0	46.0
Total	50	49.0	52	51.0	102			

PA: Pleomorphic adenoma; MEC: Mucoepidormoid carcinoma; ACC: Adenoid cystic carcinoma; NOS: Not otherwise specified; CA-ex-PA: Carcinoma-ex-pleomorphic-adenoma; PLGA: Polymorphous low-grade adenocarcinoma

according to histopathological features are shown in Table 2.

### Location

The majority of tumors occurred in major salivary glands (58.5%, 134/229). Most of them were in the parotid (45.9%, 105/229), followed by submandibular gland (12.2%, 28/229) and sublingual gland (0.4%, 1/229). Minor salivary glands neoplasms consisted of 41.5% of all tumors. Palate was the most common site of involvement. The malignant neoplasms occurred more often in minor salivary glands (54%, 55/102), followed by major salivary glands (46%, 47/102). This difference was statistically significant ( $P = 0.0$ ). On the other hand, benign tumors occurred more often in major salivary glands (68.5%, 87/127) with greater involvement of the parotid (77%, 67/87). The distribution frequencies of 229 salivary gland neoplasms according to the location are shown in Table 2.

## DISCUSSION

The present retrospective study considered 229 salivary gland neoplasms, which were archived in Oral Pathology Department and related hospitals of Isfahan University of Medical Sciences.

As the results indicated, the age of patients was in the range of 9-80 years (mean: 45 years). This finding is similar to those reported by Ansari<sup>[9]</sup> in Iran, Otoh

*et al.*<sup>[12]</sup> in Nigeria, Al-Khateeb and Ababneh<sup>[13]</sup> in north Jordanians and Li *et al.*<sup>[26]</sup> in China. In this study, also the mean age of affected patients by malignant salivary gland tumors was 52 years, while it was 41 years for patients with benign salivary gland neoplasms. This result has been supported by studies performed by Ansari<sup>[9]</sup> in Iran, de Oliveira *et al.*<sup>[21]</sup> in Brazil, Lukšić *et al.*<sup>[22]</sup> in Croatia and Spiro *et al.*<sup>[27]</sup> in United States of America. The results of these studies have shown that patients with malignant salivary gland neoplasms are older than patients with benign tumors.<sup>[9,21,22,27]</sup>

According to current results, there was a slight female predominance in salivary gland neoplasms (male/female: 1/1.04). This was similar to de Oliveira *et al.*<sup>[21]</sup> and Dhanuthai *et al.*<sup>[24]</sup> studies in Brazil and Thailand. However, Otoh *et al.*<sup>[12]</sup> and Tian *et al.*<sup>[25]</sup> have reported more male predilection in salivary gland neoplasms in Nigeria and China. The more frequency of Warthin's tumor in china populations may describe these different results.<sup>[12,25]</sup>

Data of this study indicated that the most common site of occurrence for salivary gland tumors was parotid (45.9%) and then minor salivary glands (41.5%). After that, submandibular gland (12.2%) and sublingual gland (0.4%) are affected. Among the minor salivary gland tumors, palate was the most frequent location accounting for 98% of the tumors. Other studies by Waldron *et al.*<sup>[15]</sup> in USA, Subhashraj<sup>[20]</sup> in India,

**Table 2: Frequencies of salivary gland neoplasms according to location**

Salivary gland tumors	Minor	Major			Total		% of total benign or malignant
		Submandibular	Parotid	Sublingual	n	%	
<b>Benign tumors</b>							
PA	33	18	59	1	111	48.5	87.5
Myoepithelioma	4	1	1	0	6	2.6	4.7
Basal cell adenoma	3	0	2	0	5	2.2	4.0
Warthin's tumor	0	0	4	0	4	1.8	3.0
Oncocytoma	0	0	1	0	1	0.4	0.8
Total	40	19	67	1	127	55.5	100.0
<b>Malignant tumors</b>							
MEC	31	6	17	0	54	23.6	53.0
ACC	11	2	11	0	24	10.5	23.5
Adenocarcinoma NOS	6	1	5	0	12	5.2	11.8
CA-ex-PA	1	0	4	0	5	2.1	5.0
PLGA	3	0	0	0	3	1.3	3.0
Synovial sarcoma	1	0	1	0	2	0.8	1.9
Myoepithelial carcinoma	1	0	0	0	1	0.4	0.9
Clear cell adenocarcinoma	1	0	0	0	1	0.4	0.9
Total	55	9	38	0	102	44.5	100

PA: Pleomorphic adenoma; MEC: Mucoepidormoid carcinoma, ACC: Adenoid cystic carcinoma; NOS: Not otherwise specified; CA-ex-PA: Carcinoma-ex-pleomorphic-adenoma; PLGA: Polymorphous low-grade adenocarcinoma

Tilakaratne *et al.*<sup>[23]</sup> in Sri Lanka, Kayembe and Kalengayi<sup>[28]</sup> in Congo and Ito *et al.*<sup>[29]</sup> in Brazil had reported the same result for the site of malignancies in salivary gland tumors.

The results of this study showed that benign tumors of salivary glands are more common (55.5%) than malignant tumors (44.5%). This finding is similar to studies by Bradley and McGurk<sup>[14]</sup> in United Kingdom, Subhashraj<sup>[20]</sup> in India, de Oliveira *et al.*<sup>[21]</sup> in Brazil and Lukšić *et al.*<sup>[22]</sup> in Croatia. However, most of studies have shown a predominance of benign over malignant salivary gland tumors.<sup>[15,28,29]</sup> On the other hand, these results are different from those reported by Tilakaratne *et al.*<sup>[23]</sup> and Dhanuthai *et al.*<sup>[24]</sup> Tilakaratne *et al.*<sup>[23]</sup> has reported an almost equal frequency of benign and malignant tumors. Dhanuthai *et al.*<sup>[24]</sup> showed that the number of malignant salivary gland tumors is slightly more than benign tumors. These difference in results can be due to the source of referred cases or that this really reflects the true incidence of malignant salivary gland tumors in these areas.

According to the results of the present study, pleomorphic adenoma is the most common salivary gland tumor, which consists of 48.5% of all tumors and 87.5% of benign salivary gland tumors. This tumor more often is seen in the parotid. Many of epidemiological studies have reported high incidence of pleomorphic adenoma (42-80%).<sup>[3,5,20]</sup>

In this study, the second most common benign tumor of salivary gland was myoepithelioma (4.7%), followed by basal cell adenoma and Warthin's tumor. Similar findings were observed in the study of Jaafari-Ashkavandi *et al.*<sup>[30]</sup> in southern Iran. Other studies have reported canalicular adenoma, cystadenoma or myoepithelioma as the second most common benign salivary gland tumors.<sup>[19,31,32]</sup> Many studies have reported Warthin's tumor as the second common benign tumor,<sup>[14,20-22,25]</sup> while in this study, Warthin's tumor was the fourth benign tumor (3%). Studies by Davies *et al.*<sup>[33]</sup> in Uganda and Shah *et al.*<sup>[34]</sup> in Jamaica also reported that Warthin's tumor consists only 3-4% of all salivary gland tumors. According to other studies, Warthin's tumor accounts for 4-13% of salivary gland neoplasms.<sup>[23]</sup> According to the present study, Warthin's tumor had occurred most often in the parotid gland (75%) which was similar to results of Al-Khateeb and Ababneh<sup>[13]</sup> in Jordanians. The Warthin's tumors are very uncommon in the

minor salivary glands. The smoking habits are the main etiological factor for Warthin's tumor.<sup>[23]</sup> The differences in results could be affected by racial, behavioral, geographical and unknown environmental factors.

The results of the present study showed that malignant salivary gland tumors consists of 44.5% of all salivary gland tumors. MEC was the most common malignant salivary gland tumor, which was similar to results of other studies.<sup>[9,14,22,24]</sup> In contrast, in studies by Otoh *et al.*<sup>[12]</sup> in Nigeria, Subhashraj<sup>[20]</sup> in India, de Oliveira *et al.*<sup>[21]</sup> in Brazil and Tain *et al.*<sup>[25]</sup> in China, ACC had been reported as a most common malignant salivary gland tumor. In this study, adenocarcinoma was the third most common malignant tumor, which was similar to the results of Li *et al.* study in China.<sup>[26]</sup>

## CONCLUSION

In this study, epidemiological data about clinical and histopathological characteristics of salivary gland tumors in Isfahan population was compared with other world-wide studies. Parotid gland was the most affected and women were affected more than men. Pleomorphic adenoma was the most common salivary gland tumors and MEC followed by ACC were the most common malignancies of salivary gland tumors. However, there were few differences in the frequency of salivary gland tumors between this study and other researches.

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