

SALIVARY GLAND TUMORS - A SEVEN YEARS STUDY AT ARMED FORCES INSTITUTE OF PATHOLOGY RAWALPINDI, PAKISTAN

Muhammad Asif¹, Sheza Malik², Ayesha Khalid², Madeeha Anwar³, Hafeez Ud Din¹, Muhammad Tahir Khadim¹

¹Armed Forces Institute of Pathology, Rawalpindi (National Institute of Medical Sciences), Pakistan.

²Army Medical College Rawalpindi (National Institute of Medical Sciences), Pakistan.

³Combined Military Hospital Quetta (National Institute of Medical Sciences), Pakistan.

ABSTRACT

Objective: To compare frequency of benign and malignant tumors in the salivary gland.

Material & Methods: This Retrospective study was carried out at Histopathology Department, Armed Forces Institute of Pathology (AFIP) Rawalpindi, over a period of 7 years (Jan 2010 to 31st Dec 2016) including a total of sixty (n=60) major and minor salivary gland tumor cases, accessioned from 1st Jan 2010 to 31st Dec 2016. Descriptive statistics and frequencies were calculated with respect to age, gender, anatomical location and histopathological type. The data was analyzed using SPSS version 24.

Results: A total of 60 cases were included, out of which 29 were of male patients while 31 were of female patients. They were within the age range of 3 to 88 years. Mean age being 44.01 + 17.71 years. Benign tumors were more frequent (51.66%) than malignant (48.33%). The commonest anatomical site for benign tumor was parotid gland (54.84%), whereas for the malignant tumors it was submandibular gland (75.86%). Pleomorphic adenoma was found to be the most common benign tumor in both genders (93.75%, n=15 in females, 93.33% n=14 in males). Among the malignant tumors, the commonest one in the males was found to be mucoepidermoid carcinoma (42.9% n=6) which in turn was followed by adenoid cystic carcinoma and epithelial and myoepithelial carcinoma (14.3% each n=2). In the females, adenoid cystic carcinoma was the most prevalent tumor (46.7% n=7) followed by mucoepidermoid carcinoma (20% n=3). Benign tumor had a peak incidence at 51-60 years of age followed by 21-30 years. Whereas the malignant tumors, were the most prevalent within the age group of 61-70 years followed by 41-51 years.

Key Words: Adenoid cystic carcinoma, Pleomorphic adenoma, Salivary gland tumors.

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INTRODUCTION

Salivary gland tumors (SGTs) are a diverse group of neoplasm in head and neck region with diverse histological features and varied clinical course. The prevalence of these tumors is relatively less accounting for about 3% to 10% of neoplasm of the maxillofacial area [1,2,3]. In 1972, the first histological classification of salivary gland neoplasm was put forward by World Health Organization. The latest edition of this classification got published in 2017. Salivary gland tumors may be parenchymal or mesenchymal in origin. On the basis of biological behavior, they can be subdivided as benign or malignant tumors [4,5,6,7,8].

Benign Tumors include benign parenchymal tumors that are also known as adenomas. These tumors have well-defined margins, are painless, do not metastasize and have resemblance with parental cells in some manners. Examples include pleomorphic adenoma, monomorphic adenoma etc. Malignant Tumors are also known as adenocarcinomas. These tumors do not have well-

defined margins, they have ability to metastasize and do not have a resemblance to parental cells e.g. adenoid cystic carcinoma, mucoepidermoid carcinoma, etc. Malignant tumors can further be subclassified as low and high-grade tumors. Low-grade tumors include acinic cell carcinoma, epithelial and myoepithelial carcinoma, cystadenocarcinoma and mucoepidermoid carcinoma (grade I or II) [9,10,11,12]. High-grade tumors include mucoepidermoid carcinoma (grade III), salivary duct carcinoma, squamous cell carcinoma, and adenoid cystic carcinoma [13,14]. Usually, in clinical practice, it is believed that minor salivary glands have a higher chance of developing malignant tumors. In parotid, submandibular and sublingual glands the chance of developing malignancy is 20-25%, 40%, and 90% respectively [15,16].

The causative agents of salivary gland cancers are uncertain. Unlike other maxillofacial tumors, smoking and drinking have no role to play in these tumors [17]. The risk factors for salivary gland tumors include radiotherapy for head and neck cancers, occupational exposure in rubber and wood industry, employment at beauty shops, history of Epstein Barr virus-related cancers, HIV infection [18], immunosuppression and Hodgkin's lymphoma. On

Correspondence: Dr. Madeeha Anwar, Department of Pathology, Combined Military Hospital Quetta (National Institute of Medical Sciences) Pakistan

Email: madihaxulfiqar@gmail.com

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the other hand, some studies have shown that low cholesterol and vitamin C rich diet has a preventive role in these tumors [19,20,21].

Salivary gland tumors are a prime issue in the head and neck pathology. The diagnosis and treatment of these tumors is difficult. Moreover, the clinical course is also uncertain so comparatively less research is done on the spectrum of these tumors as compared to other tumors [22]. Therefore, this study was conducted to find out the prevalence of various types of neoplasms in our population.

MATERIAL AND METHODS

This retrospective study was carried out at the Histopathology Department of Armed Forces Institute of Pathology, Rawalpindi. Record of computerized histopathology laboratory reports were retrieved from the laboratory information management software (LIMS) from 1st Jan 2010 to 31st Dec 2016. The sampling technique was non-probability consecutive sampling. The cases included in the study were patients who were diagnosed with salivary gland tumors on histopathology, both benign and malignant. All improperly fixed samples and recurrent tumors were excluded. A total of 60 cases fulfilled the inclusion criteria. All histopathology reports and slides of the cases were reviewed. Descriptive statistics and frequencies were calculated with respect to age, gender, anatomical location and histopathological type. This data was analyzed on

Statistical Package for Social Sciences (SPSS) version 24.

RESULTS

Total sample size was 60 out of which 29 were male patients while 31 were females with male to female ratio of 1:1. Patients were within the age range of 3 to 88 years. Mean age being 44.01 with a standard deviation of 17.71. Pleomorphic adenoma (93.54% n=29) was found to be the most common benign tumor, followed by warthin tumor (1.5% n=1) and hemangioma (1.5% n=1). Whereas adenoid cystic carcinoma (13.8% n=9) and mucoepidermoid carcinoma (13.8% n=9) were the commonest malignant histological type followed by epithelial myoepithelial carcinoma (6.2% n=4), squamous cell carcinoma (3.1% n=2), basal cell adenocarcinoma (1.5% n=1), papillary cystadenocarcinoma (1.5% n=1), salivary duct carcinoma (1.5% n=1), MALT lymphoma (1.5% n=1) and carcinoma ex pleomorphic adenoma (1.5% n=1).

Pleomorphic adenoma was found to be the most common benign tumor in both genders (93.75%, n=15 in females, 93.33% n=14 in males). While warthin Tumor (6.67% n=1) and hemangioma (6.25% n=1) had generally equal prevalence (Table-1).

Table-1: Distribution of benign neoplasia of salivary glands according to histological type and gender of patients.

HISTOLOGICAL TYPES	FEMALE		MALE		TOTAL	
	(n)	%	(n)	%	(n)	%
Pleomorphic Adenoma	15	93.75	14	93.33	29	93.54
Warthin Tumor	-	-	1	6.67	1	3.23
Hemangioma	1	6.25	-	-	1	3.23
Total	16	100	15	100	31	100

Among the malignant tumors the commonest one in the males is mucoepidermoid carcinoma (42.9% n=6), which in turn were followed by adenoid cystic carcinoma and epithelial myoepithelial carcinoma (14.3% n=2, each). In the females,

adenoid cystic carcinoma was the most prevalent tumor (46.7% n=7) followed by mucoepidermoid carcinoma (20%, n=3) (Table-2).

Table-2: Distribution of malignant neoplasia of salivary glands according to histological type and gender of patients.

HISTOLOGICAL TYPES	FEMALE		MALE		TOTAL	
	(n)	%	(n)	%	(n)	%
Mucoepidermoid carcinoma	3	20	6	42.9	9	31
Adenoid cystic carcinoma	7	46.7	2	14.3	9	31
Squamous cell carcinoma	1	6.7	1	7.1	2	6.8
Epithelial myoepithelial carcinoma	2	14.3	2	14.3	4	13.7
Basal cell adenocarcinoma	-	-	1	7.1	1	3.4
MALT lymphoma	-	-	1	7.1	1	3.4
Papillary cystadenocarcinoma	-	-	1	7.1	1	3.4
Salivary duct carcinoma	1	6.7	-	-	1	3.4
Carcinoma ex-pleomorphic adenoma	1	6.7	-	-	1	3.4
Total	15	100	14	100	29	100

Pleomorphic adenoma was found to be the most prevalent benign tumor (93.54% n=29). The commonest site of benign tumors was parotid gland

(54.84%) followed by submandibular (22.58%) and minor salivary glands (12.9%) (Table-3).

Table-3: Distribution of benign salivary gland neoplasia according to histological type and anatomical site.

Histological type	Parotid gland (n-%)	Submandibular gland (n-%)	Salivary gland un-specified (n-%)	Sub-lingual gland (n-%)	Minor salivary gland (n-%)	Total (n-%)
Pleomorphic adenoma	16-94.11	7-100	3-100	-	3-75	29-93.54
Warthin tumor	1-5.89	-	-	-	-	1-3.23
Hemangioma	-	-	-	-	1-25	1-3.23
Total	17-100.00	7-100	3-100	-	4-100	31-100

Most common malignant tumors were mucoepidermoid carcinoma (31% n=9) and adenoid cystic carcinoma (31% n=9). The commonest anatomical site of malignant tumors was

submandibular gland (75.86%) which was followed by minor salivary glands (10.34%) [Table IV].

Table-4: Distribution of malignant neoplasia of salivary glands according to histological type and anatomical site.

Histological type	Parotid gland (n-%)	Submandibular gland (n-%)	Salivary gland unspecified (n-%)	Sublingual gland (n-%)	Minor salivary gland (n-%)	Total (n-%)
Mucoepidermoid carcinoma	-	8-34.78	-	1-100	-	9-31
Adenoid cystic carcinoma	-	7-30.43	-	-	2-66.67	9-31
Squamous cell carcinoma	-	2-8.70	-	-	-	2-6.89
Epithelial myoepithelial carcinoma	-	1-4.35	2-66.6	-	1-33.33	4-13.79
Basal cell adenocarcinoma	-	1-4.35	-	-	-	1-3.44
MALT lymphoma	-	1-4.35	-	-	-	1-3.44
Papillary cystadenocarcinoma	-	1-4.35	-	-	-	1-3.44
Salivary duct carcinoma	-	-	1-33.33	-	-	1-3.44
Carcinoma ex pleomorphic adenoma	-	1-4.35	-	-	-	1-3.44
Total	-	22-100.00	3-100.00	1-100.00	3-100.00	29-100.00

Pleomorphic adenoma being the commonest benign tumor had a peak incidence at 51-60 years of age followed by 21-30 years of age. 91.6% of the benign tumors were found in 3rd to 6th decade. Among the malignant tumors, mucoepidermoid and adenoid cystic carcinomas were the most prevalent with no specific age group predominance. 63.31% of malignant tumors were evident in 4th to 7th decade.

DISCUSSION

Tumors of the salivary glands are relatively infrequent and comprise a wide variety of benign and malignant neoplasms, which exhibit difference not only in biological behavior but in prognosis as well. Many studies have been carried out in the West, however published data in Pakistan is scanty. The incidence of these tumors is on the rise for example in a study conducted in United states, the incidence of these tumors accounted for 6.3% of all maxillofacial cancers in 1974–1976, as compared to 8.1% in 1998-1999 [23].

According to our study, benign tumors were more frequent than malignant tumors and the commonest anatomical site for benign tumor being parotid gland, whereas for malignant tumors it was submandibular gland. These results are comparable with the results of the study conducted in Iran [24] with benign tumors involving parotid gland more frequently and out numbering the malignant tumors reported in that study. Considering the same study parotid and minor salivary glands showed the most frequent involvement with malignant tumors. However, no malignant tumor involving parotid gland was recorded in our study, which may be due to limited sample size.

In our study, pleomorphic adenoma was found to be the most common benign tumor in both genders. These results are comparable with the results of a study conducted in Valparaiso, Chile, showing pleomorphic adenoma as the commonest of all benign tumors (53.8%). Whereas, Warthin tumor was the second most common tumor (8.2%) [25].

However, only one case of warthin tumor was documented in our study, which may again be attributable to limited sample size. Our study depicted that among the malignant tumors of salivary gland, the commonest one in the males was found to be mucoepidermoid carcinoma followed by adenoid cystic carcinoma and epithelial myoepithelial carcinoma. However, in the females, adenoid cystic carcinoma was the most prevalent tumor followed by mucoepidermoid carcinoma. Similarly, another study by Sarfraz *et al* of the same institute concluded that the most common malignant tumor of salivary gland was mucoepidermoid carcinoma (49.3%) followed by adenoid cystic carcinoma (31.3%) [26]. In yet another study, Balasubramaniyan *et al*, concluded that mucoepidermoid carcinoma is the most common malignant salivary gland tumor [27].

Our study revealed that minor salivary gland was most frequently involved by adenoid cystic carcinoma. A related study conducted in the same institution analyzing malignant tumors of minor salivary gland over a decade, manifested the same results with adenoid cystic carcinoma being the commonest malignant neoplasm followed by mucoepidermoid carcinoma and palate was the commonest location of these tumors [28].

In the current study, benign tumor had a peak incidence at 51-60 years of age followed by 21-30 years. Whereas malignant tumors, were the most prevalent within the age group of 61-70 followed by 41-50 years. A study conducted in Uganda illustrated similar results; the mean age (43.1years) of patients with malignant lesion was 9.6 years older than those with benign lesions (33.5 years) [29].

Our study was an epidemiological analysis of neoplasms of salivary glands in the Armed Forces Institute of Pathology, Rawalpindi, Pakistan. Our results about the gender, age, site and histopathological type were consistent with those reported in the literature. Pleomorphic adenoma was the most common benign whereas adenoid cystic carcinoma was the most common malignant salivary gland tumor.

Though the gender distribution of salivary gland tumors is equal but there is a wide variation in sex ratio between the tumor types [30]. There are hardly any epidemiological studies of significant proportions regarding salivary gland tumors in Pakistan. Since our study was confined to a single institution more research in this field is greatly encouraged.

CONCLUSION

Benign were more common than malignant neoplasm of salivary glands. Pleomorphic adenoma was the most common benign tumor whereas among the malignant tumors, the commonest one in the males was mucoepidermoid carcinoma and in the females, adenoid cystic carcinoma was the most prevalent tumor. The commonest site of the origin of the tumor was submandibular gland followed by parotid gland. Pleomorphic adenoma had a peak occurrence between 51-60 years of age. 91.6% of benign tumors were diagnosed in 3rd to 6th decade of life, while 63.3% malignant tumors were diagnosed in 4th to 7th decade of life, a decade later.

FUTURE PROSPECTS:

The number of salivary gland tumors discussed in this study though is small; the results should contribute in better understanding of the disease. As very little information is available on the tumors of head and neck over the last two-three decades so only a few researches have been published from Pakistan, hence prospective studies need to be carried out on bigger samples to better discriminate the influencing factors and to allow for a better management and prognosis of the disease.

AUTHORS CONTRIBUTION

Muhammad Asif & Madeeha Anwar: Conceived the idea and contributed in data analysis.

Sheza Malik, Ayesha Khalid: Collected the data, analyzed and interpreted the results and wrote the initial manuscript.

Muhammad Hafeez Ud Din: Critically reviewed the manuscript.

Muhammad Tahir Khadim: Reviewed and finally approved the manuscript for submission to the journal.

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