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THE EPIDEMIOLOGY OF SALIVARY GLAND TUMORS IN IRAQI PATIENTS

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ABSTRACT

Background: Salivary gland tumors (SGTs) are uncommon, making up 3% to 6% of head and neck tumors. Their varied histological features and unpredictable clinical progression make diagnosis and treatment challenging. The aim of study is to determine the demographic findings and distribution of salivary gland tumors. **Method:** Data from a cross-sectional study was gathered from the histopathology lab at Ghazi AL-Hariri Hospital for Surgical Specialties between 2018 and 2022. A total of 100 SGTs were studied, recording patient information like age, gender, tumor size, type, and location. The study included all primary benign and malignant salivary gland tumors. **Results:** A cross-sectional study on 100 salivary gland tumor patients revealed a mean age of 45.5 ± 14 years with the majority being in the 51-60 age range and slightly more males than females. Eighty percent had parotid gland involvement, with 50% having pleomorphic adenoma. Tumor size varied significantly by histological type, and there was a notable association between tumor location and diagnosis. **Conclusion:** Salivary gland tumors vary greatly in type and behavior, with clear links between tumor size, type, and location. Despite this, age and gender didn't significantly correlate with the tumor's histological diagnosis. Comprehensive studies, including genomic data, are essential for a better understanding and management of these tumors.

KEYWORDS: Epidemiology, salivary, gland, tumors, Iraqi, patients.

INTRODUCTION

Salivary gland tumors (SGTs) are relatively rare neoplasms, accounting for only about 3% to 6% of all head and neck tumors.[1] Despite their rarity, SGTs present a significant diagnostic and therapeutic challenge due to their diverse histological presentation and unpredictable clinical behavior.[2] Their complex and multifaceted nature is highlighted by the World Health Organization's (WHO) recent classification in their fifth edition of the head and neck tumor classification, categorizing SGTs into four main groups: epithelial, soft tissue, hematolymphoid, and secondary tumors.[3] These tumors can originate from any of the three major paired salivary glands (parotid, submandibular, and sublingual) as well as from the numerous minor salivary glands scattered throughout the oral cavity submucosa.[4] This wide anatomical distribution further contributes to the complexity and heterogeneity of SGTs. Notably, each of these glands possesses a distinct propensity to harbor specific types of tumors and display unique disease patterns.[5] Salivary gland tumors present diverse gross morphologies, often dependent on their histological type and malignancy status. Benign tumors like pleomorphic adenomas typically appear as well-circumscribed, firm, encapsulated masses with a homogenous, grey-white cut surface. Malignant tumors, such as mucoepidermoid and acinic cell carcinomas, generally have ill-defined, invasive edges and firmer consistency, with possible necrosis or hemorrhage. Carcinomas ex pleomorphic adenoma is a carcinoma arising from a primary or recurrent benign pleomorphic adenoma, show mixed characteristics, with benign and malignant areas. Tumor location can influence presentation, with masses in major salivary glands visible or palpable externally, while minor salivary gland tumors often present as submucosal masses in the oral cavity.[5] SGTs exhibit overlapping histopathological features and clinical behaviors, which can make distinguishing between different types of SGTs challenging, and predicting their prognosis even more difficult, especially for the malignant forms.[6] This diagnostic ambiguity can lead to significant variations in therapeutic strategies and, consequently, patient outcomes. Moreover, epidemiological studies on SGTs have yielded inconsistent results globally, revealing substantial geographical and ethnic disparities.[7] The

reasons for these disparities are not yet well understood, but they may be attributed to genetic, environmental, and lifestyle factors.[8] These findings underscore the need for more comprehensive and integrated research to better understand the epidemiology, pathogenesis, and clinical progression of SGTs. The aim of study is to determine the demographic findings and distribution of salivary gland tumors.

METHOD

Data for cross sectional study were collected from the histopathology laboratory archive in Ghazi AL-Hariri Hospital for Surgical Specialties from 2018 to 2022. One hundred SGTs were collected, for each patient, data such as age, gender, tumor size, tumor type and location were recorded. All primary benign and malignant tumors in the salivary glands were included. Statistical analysis done by SPSS 22, frequency and percentage used for categorical data, mean, median and SD for continuous data. Chi-square used for assessed association between categorical variables. T test used for evaluation differences between mean and median of continues variables. P-value less or equal to 0.05 is consider significant.

RESULTS

Cross sectional study of 100 patients with salivary gland tumors, Mean age of patients 45.5 ± 14 years. As shown in table 1; 30 (30%) of patients in age group 51-60 years old and then 23 (23%) of them in age group 41-50 years old. Fifty-one (51%) of patients are males and 49 (49%) of them are females. Eighty (80%) of patients are parotid gland involvement. As shown in table 1.

Table 1: Distribution of patients according to study variables.

variables		frequency	percentage
Age group (years)	***11-20***	4	(4.0)%
	21-30	15	(15.0)%
	31-40	16	(16.0)%
	41-50	23	(23.0)%
	51-60	30	(30.0)%
	>60	12	(12.0)%
Gender	***Female***	49	(49.0)%
	Male	51	(51.0)%
Site of Tumor	***Parotid gland***	80	(80.0)%
	Submandibular gland	5	(5.0)%
	minor gland	15	(15.0)%

As shown in fig 1; 50 (50%) of patients have pleomorphic adenoma, 18 (18%) of them have Mucoepidermoid carcinoma and 12 (12%) of them have Adenoid cystic carcinoma and so on.

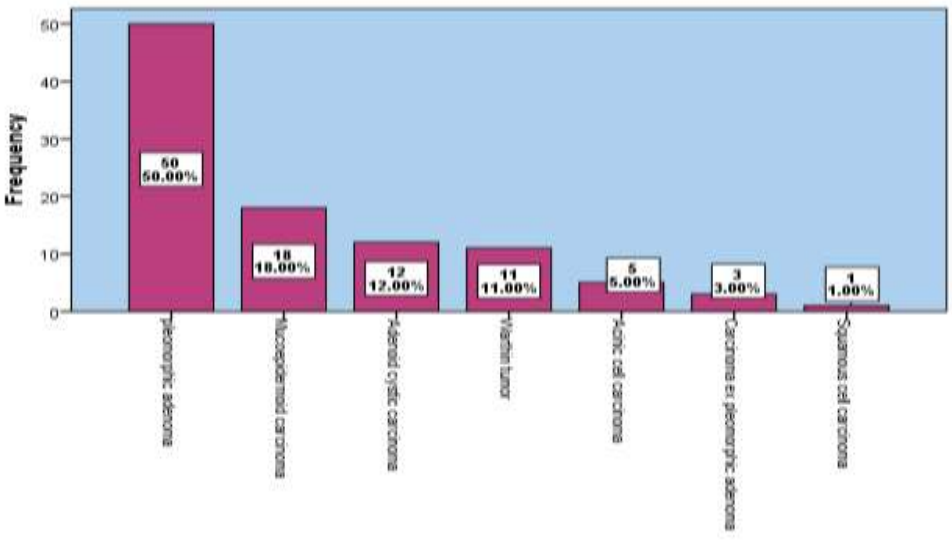


Fig. 1: Distribution of patients according to Histological types.

As shown in table 2; there is significant difference mean of tumor size according to Histological types, Carcinoma ex pleomorphic adenoma have significant tumor size then Mucoepidermoid carcinoma and Acinic cell carcinoma.

Table 2: Difference mean of tumor size according to Histological types.

Histological types	N	Mean	Std. Error	P-value
pleomorphic adenoma	50	2.72	0.15	**0.009**
Warthin tumor	11	2.68	0.15	
Carcinoma ex pleomorphic adenoma	3	4.0	0.57	
Mucoepidermoid carcinoma	18	3.1	0.34	
Adenoid cystic carcinoma	12	1.78	0.12	
Acinic cell carcinoma	5	3.0	0.35	
Squamous cell carcinoma	1	1.5	0	

P-value ≤0.05 (significant).

There is no significant association between age group of patients and histological diagnosis. As shown in table 3.

Table 3: Associationn between age group of patients and histological diagnosis.

		Age groups					
		11-20	**21-30**	**31-40**	**41-50**	**51-60**	**>60**
Histological Types	**pleomorphic adenoma**	4 (100%)	11 (73.3%)	11 (68.8%)	10 (43.5%)	8 (26.7%)	6 (50%)
	Warthin tumor	0 (0.0%)	0 (0.0%)	1 (6.3%)	3 (13.0%)	6 (20.0%)	1 (8.3%)
	Carcinoma ex pleomorphic adenoma	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.3%)	2 (16.7%)
	Mucoepidermoid carcinoma	0 (0.0%)	4 (26.7%)	2 (12.5%)	3 (13.0%)	7 (23.3%)	2 (16.7%)
	Adenoid cystic carcinoma	0 (0.0%)	0 (0.0%)	1 (6.3%)	6 (26.1%)	4 (13.3%)	1 (8.3%)
	Acinic cell carcinoma	0 (0.0%)	0 (0.0%)	1 (6.3%)	1 (4.3%)	3 (10.0%)	0 (0.0%)
	Squamous cellcarcinoma	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.3%)	0 (0.0%)
Total		4 100.0%	15 100.0%	16 100.0%	23 100.0%	30 100.0%	12 100.0%

P-value = 0.18 (not significant).

There is no significant association between gender of patients and histological diagnosis. As shown in table 4

Table 4: Association between gender of patients and histological diagnosis.

		Gender	
		Female	**Male**
Histological Types	**Pleomorphic adenoma**	29	21
		(59.2%)	(41.2%)
	Warthin tumor	1	10
		(2.0%)	(19.6%)
	Carcinoma ex Pleomorphic adenoma	2	1
		(4.1%)	(2.0%)
	Mucoepidermoid carcinoma	7	11
		(14.3%)	(21.6%)
	Adenoid cystic carcinoma	6	6
		(12.2%)	(11.8%)
	Acinic cell carcinoma	3	2
		(6.1%)	(3.9%)
	Squamous cell carcinoma	1	0
		(2.0%)	(0.0%)
Total		49	51
		100.0%	100.0%

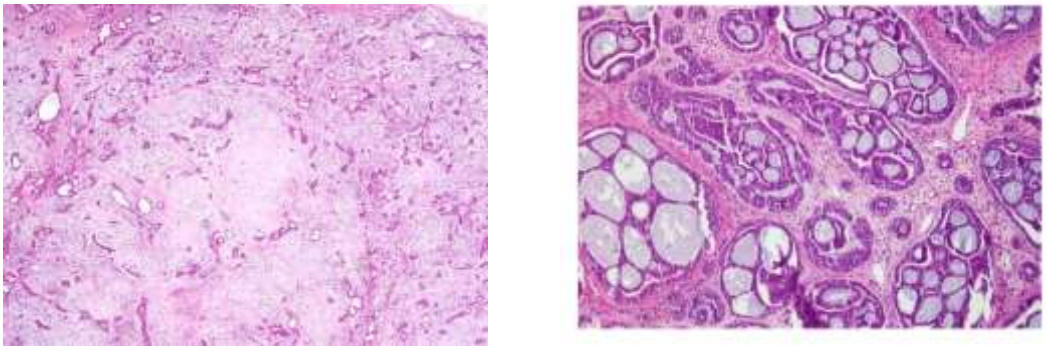
P-value = 0.08 (not significant).

There is significant association between site of tumor and histological diagnosis, 3 (60%) of submandibular and 43 (53.8%) of parotid gland tumors are pleomorphic adenoma, while 10 (66.7%) of minor gland tumor are adenoid cystic carcinoma. As shown in table 5.

Table 5: Association between site of tumor and histological diagnosis.

		Site of tumor		
		Parotid gland	**Submandibular gland**	**Minor gland**
Histological Types	**Pleomorphic adenoma**	43 (53.8%)	3 (60.0%)	4 (26.7%)
	Warthin tumor	11 (13.8%)	0 (0.0%)	0 (0.0%)
	Carcinoma ex Pleomorphic adenoma	3 (3.8%)	0 (0.0%)	0 (0.0%)
	Mucoepidermoi dcarcinoma	16 (20.0%)	1 (20.0%)	1 (6.7%)
	Adenoid cystic carcinoma	2 (2.5%)	0 (0.0%)	10 (66.7%)
	Acinic cell carcinoma	5 (6.3%)	0 (0.0%)	0 (0.0%)
	Squamous cell carcinoma	0 (0.0%)	1 (20.0%)	0 (0.0%)
Total		80 100.0%	5 100.0%	15 100.0%

P-value = 0.0001 (significant).



(A) **(B)**

A: This low power view of a PA shows a well-demarcated tumor with a lobulated growth pattern. The tubular and acinar structures formed by the epithelial component are admixed with myoepithelial cells in a background of myxoid stroma.

B: AdCC. cribriform pattern, characterized by nests of cells with mucopolysaccharide-filled spaces.

DISCUSSION

SGTs incidence and prevalence have been discussed in scholarly literature for 20 years. In 2005, 2017, and 2022, the WHO updated SGTs histology.[9,10] In present study Mean age of patients 45.5 ± 14 years. 30 (30%) of patients in age group 51-60 years old and then 23 (23%) of them in age group 41-50 years old. Fifty-one (51%) of patients are males and 49 (49%) of them are females. Eighty (80%) of patients are parotid gland involvement, while15% with minor salivary glands involvement. According to the present analysis, the ratio of males to females was approximately 1:1. Consistent with Fernandez et al.'s conclusion. According to Hao et al. and Araya et al.[11-13] there is a modest female preponderance. Wang et al., on the other hand, noted a minor male preponderance.[14] In current study 50 (50%) of patients have pleomorphic adenoma, 18 (18%) of them have Mucoepidermoid carcinoma and 12 (12%) of them have Adenoid cystic carcinoma, this is agreed with other studies that stated The most common benign tumour was pleomorphic adenoma (PA), which accounted for 82% of all benign tumours and 46% of all SGTs, the majority of which were found in the parotid gland. Similar findings were reported by other researchers.[15,16] Salivary gland tumors exhibit considerable diversity in their histological types. Among these types, Carcinoma ex pleomorphic adenoma (Ca-ex-PA), Mucoepidermoid carcinoma (MEC), and Acinic cell carcinoma (AcCC) represent three significant categories with distinct features and behaviors.[17] In clinical practice, it has been observed that the tumor size can significantly vary across these types, often playing a

pivotal role in the tumor's management, prognosis, and survival outcomes. Carcinoma ex pleomorphic adenoma is a malignant salivary gland tumor that arises from a pre-existing benign pleomorphic adenoma.[18] It is reported to have a larger mean tumor size compared to MEC and AcCC.[19] This could be attributed to the unique pathogenesis of Ca-ex-PA, whereby a prolonged asymptomatic period allows the tumor to grow larger before detection and diagnosis. The benign pleomorphic adenoma component, known for its slow-growing nature, can obscure the more aggressive carcinoma component, thus leading to a delay in diagnosis.[20] Mucoepidermoid carcinoma, on the other hand, is the most common malignant salivary gland neoplasm.[21] It typically exhibits a broad spectrum of behavior, ranging from slow-growing low-grade tumors to high-grade, rapidly growing and invasive tumors.[22] Despite this, MECs are generally smaller in size than Ca-ex-PAs, which could be due to their earlier presentation with symptoms such as pain, nerve palsy, or rapid growth, leading to an earlier detection and diagnosis.[23] Similarly, Acinic cell carcinoma, another major type of salivary gland malignancy, is also reported to be generally smaller than Ca-ex-PA.[24] AcCC is typically a slow-growing tumor that presents at an earlier stage than other salivary gland malignancies, resulting in smaller tumor size at the time of diagnosis.[25] These differences in mean tumor sizes highlight the importance of histological diagnosis in the management and prognostication of salivary gland tumors. Understanding these variations can guide clinical decision-making and potentially improve patient outcomes. The site of a salivary gland tumor has been associated with the histological diagnosis of the tumor supports this assertion. The three major types of salivary glands in the human body - the parotid, submandibular, and minor salivary glands - each show a unique distribution of different tumor types.[26] Pleomorphic adenoma is the most common benign salivary gland neoplasm, and it most frequently arises in the parotid gland.[27] According to data, a significant proportion of parotid (53.8%) tumors are pleomorphic adenomas. This aligns with prior studies, which report that 80-90% of pleomorphic adenomas occur in the parotid gland.[28] The predominance of pleomorphic adenomas in these larger glands can be explained by several factors. These glands have more tissue that can potentially undergo neoplastic changes, and their anatomic location might expose them to certain environmental or mechanical factors that stimulate tumor growth.[29] In contrast, minor salivary glands, despite their smaller size and number, harbor a higher proportion of malignant tumors. Current study observed that 66.7% of minor gland tumors were adenoid cystic carcinoma (AdCC), a common type of malignant tumor in these glands. This is consistent with prior reports indicating that AdCC is the most frequent malignant neoplasm in the minor salivary glands, accounting for approximately 40-50% of all minor gland malignancies.[30] This preference of AdCC for minor salivary glands could be related to the histological and embryological characteristics of these glands. The relationships between age and gender of patients and the histological diagnosis of salivary gland tumors (SGTs) have been an area of extensive research, albeit with varying findings across studies. In current study there is no significant association between the patient's age group or gender and the histological diagnosis of SGTs. Salivary gland tumors show a wide age distribution, but certain histologic types have been reported to have specific age predilections.[31] For instance, mucoepidermoid carcinoma tends to occur at a younger age, whereas carcinoma ex pleomorphic adenoma is more frequently observed in the older population.[32] However, these are broad generalizations, and individual cases can deviate considerably. Age was not a significant determinant of histologic type, possibly due to a balanced age distribution among various tumor types or because other factors may play a more significant role in tumor etiology. Regarding gender, previous studies report conflicting results. Some suggest that certain tumors, such as adenoid cystic carcinoma, appear more frequently in women, while others like acinic cell carcinoma show a male predominance.[33] However, these trends can vary depending on the population studied and the overall epidemiology of salivary gland neoplasms. Current findings indicate that gender did not significantly influence the histologic type of SGTs that other biological or environmental factors might be more relevant. These results underscored the complex nature of SGTs and their multifactorial etiology, influenced by an interplay of genetic, environmental, and lifestyle factors. More comprehensive studies, perhaps integrating genomic data, may help illuminate the roles of age and gender, among other factors, in the development and histological characteristics of SGTs.

CONCLUSION

Salivary gland tumors demonstrate considerable diversity in their histological types and behavior, with significant associations between tumor size and histological type, as well as tumor location and histological diagnosis. However, in the studied population, no significant associations were observed between the patient's age group or gender and the histological diagnosis of these tumors. These findings underscore the complex etiology of salivary gland neoplasms, suggesting that an interplay of various genetic, environmental, and lifestyle factors influence their occurrence and characteristics. Further comprehensive studies integrating genomic data are necessary to fully elucidate these associations and to improve management and prognosis of salivary gland tumors.

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