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ORIGINAL STUDY

Epidemiological Distribution of Primary Salivary Gland Tumors. Retrospective Analysis in Baghdad Medical City

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Abstract

Background: Studies on the incidence of salivary tumors around the world showed variations, including in Iraq. This study was intended to evaluate the relative incidence of these tumors among the Iraqi population.

Materials and methods: The current retrospective study encompassed 109 cases retrieved from the file records of the pathology laboratory of Baghdad Medical City over a five-year period from January 2017 to December 2021. Information regarding age, gender, site, and tumor type was assembled and analyzed using a statistical package for social sciences (SPSS version 20).

Results: The present study documented that salivary gland tumors represent 1.35% of the total sample studied. Approximately 56% were benign and 44% were malignant, with a ratio of benign to malignant was 1.27/1. The male-to-female ratio was 1/1. The prevalent benign tumor was pleomorphic adenoma, followed by Warthin's tumor. Warthin's tumor showed a predilection for male patients. The most common sites were the parotid gland (50%), palate (29%), and submandibular gland (10%), respectively. Regarding malignant tumors, adenoid cystic carcinoma ranked first followed by mucoepidermoid carcinoma.

Conclusions: Salivary gland tumors chiefly arise in major salivary glands without sex predilection, with pleomorphic adenoma and adenoid cystic carcinoma being the most common salivary tumors.

Keywords: Salivary gland tumors, Incidence, Pleomorphic adenoma, Adenoid cystic carcinoma

1. Introduction

The World Health Organization's (WHO) fifth edition of the head and neck tumor classification categorized salivary gland tumors (SGTs) into four main groups: epithelial, soft Tissue, hematology, and secondary tumors. These tumors arise from three major paired salivary glands and hundreds of small minor glands distributed in the submucosa of the oral cavity [1]. Salivary tumors are infrequent neoplasms and account for 3–6% of head and neck tumors. However, these tumors show overlapping histological and behavioral characteristics, making their diagnosis, treatment, and prediction of their prognosis difficult for most clinicians, particularly malignant tumors [2]. Although valuable information was obtained from epidemiological studies of SGTs worldwide, some

inconsistencies were recorded among different geographic zones and ethnic groups [3].

2. Materials and methods

Data for the current retrospective study were collected and reviewed from the histopathology laboratory archive in Baghdad Medical City from January 2017 to December 2021. One hundred and nine SGTs were collected from a total of 8069 case records of specimens received during that period. For each patient, data such as age, gender, tumor type, and location were recorded, and the data were descriptively analyzed using a statistical package for social sciences (SPSS version 20). The existing research was permitted by the Ethical Committee of the College of Dentistry at Al-Qadisiyah University.

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Table 1. Age distribution of the patients according to gender.

Age groups	Females			Males		
	Benign	Malignant	Mean \pm SD	Benign	Malignant	Mean \pm SD
1–20	5 (4.5%)	1 (0.9%)	13.50 \pm 6.94	0	1 (0.9%)	13
21–40	17 (15.5%)	9 (8.2%)	13.26 \pm 5.64	16 (14.6%)	7 (6.4%)	31.21 \pm 6.15
41–60	10 (9.1%)	12 (11%)	56.54 \pm 3.38	9 (8.2%)	9 (8.2%)	51.27 \pm 6.45
61–80	0	1 (0.9%)	70	4 (3.6%)	8 (7.3%)	67.91 \pm 6.43
Total	32 (29.3%)	23 (21.1%)	37.96 \pm 14.59	29 (26.6%)	25 (22.9%)	45.72 \pm 16.46

Table 2. Age distribution of the patients according to site.

Site	Age groups				Total	Mean \pm SD
	1–20	21–40	41–60	61–80		
Parotid	3 (2.7%)	23 (21.1%)	23 (21.1%)	5 (4.5%)	54 (49.5%)	41.83 \pm 14.03
Submandibular	2 (1.8%)	4 (3.6%)	3 (2.7%)	2 (1.8%)	11 (10%)	39.63 \pm 21.83
Palate	1 (0.9%)	18 (16.5%)	7 (6.4%)	6 (5.5%)	32 (29.3%)	42.21 \pm 16.54
Buccal mucosa	0	1 (0.9%)	4 (3.6%)	0	5 (4.5%)	47.40 \pm 13.97
Upper lip	1 (0.9%)	1 (0.9%)	2 (1.8%)	0	4 (3.6%)	35.75 \pm 29.28
Floor of mouth	0	1 (0.9%)	1 (0.9%)	0	2 (1.8%)	46.00 \pm 8.48
Tongue	0	1 (0.9%)	0	0	1 (0.9%)	39
Total	7 (6.4%)	49 (44.9%)	40 (36.6%)	13 (11.9%)	109 (100%)	41.80 \pm 15.96

3. Results

Out of 109 SGTs recorded in the current study, 54 were male and 55 were female. The male-to-female ratio was roughly one to one. The patients' ages ranged from 1 to 80 years, with an average age of 28.5 years and a median age of 40.5 years. Approximately (n = 49, 45%) were between 21 and 40 years old. The average age for female patients was 37.96 years and for male patients, 45.72 years, as illustrated in [Table 1](#). Sixty-one cases (56%) were benign and 48 cases (44%) were malignant tumors, with a ratio of 1.27/1. In terms of tumor location, (65, 60%) were in major glands, primarily parotid (49.5%), and (44%), primarily in minor glands, mostly of the palate (32 cases, 29.3%), as shown in ([Table 2](#)). The most common benign SGTs were pleomorphic adenomas (n = 50, 82%) and Warthin's tumor (7 cases, 11%), respectively. Regarding malignant tumors, the most common were adenoid cystic carcinoma (18 cases, 38%) followed by mucoepidermoid carcinoma

(11 cases, 23%). Pleomorphic adenoma was the most prevalent type of parotid tumors (31 cases, 57%), followed by Warthin's tumor and MEC (n = 6, 11%) for both tumors, as shown in [Tables 2 and 3](#).

4. Discussion

The incidence and prevalence of SGTs have been a subject of discussion in much of the scientific literature in the last 20 years. In this period, the histological classification of SGTs has been revised by the WHO three times, in 2005, in 2017, and in 2022 [1,4]. The present study stated that SGTs represent approximately 1.35 percent of all samples submitted for histopathological examination over a period of four years. The reported data regarding such incidence and prevalence were variable. Cunha et al., in 2021 mentioned a 1.48% value, whereas others' recorded rates ranged from 0.08 to 2.6% [5]. According to the present study, the male-to-female ratio was approximately one to one.

Table 3. Distribution of salivary gland tumors according to anatomical locations.

Tumor type		Major glands		Minor glands			Total
		Parotid	submandibular	Palate	Buccal mucosa	Other sites	
Benign tumors	Pleomorphic adenoma	31	3	15	1	0	50
	Warthin's tumor	6	1	0	0	0	7
	Other benign tumors	1	0	2	0	1	4
Malignant tumors	Adenoid cystic carcinoma	2	2	7	3	4	18
	Mucoepidermoid carcinoma	6	3	2	0	0	11
	Malignant mixed tumor	5	2	2	0	1	10
	Other malignant tumors	3	0	4	1	1	9
Total		54	11	32	5	7	109

Similar to the conclusion by Fernandez et al. A slight female predominance was stated by Hao et al. and Araya et al. [6–8]. In contrast, Wang et al. registered a slight male predominance [9]. In our investigation, the first mostly encountered tumor was pleomorphic adenoma (PA), comprising 82% of benign tumors and 46% of whole SGTs, mostly registered in the parotid gland. Similarly, other investigators reported comparable findings [2,9]. However, the proportion of PAs seems to be high relative to other benign tumors, compared to other reports worldwide. The second most prevalent benign tumor as documented in this research was Warthin's tumor (WT) ($n = 7$, 11%), all located in major glands, mostly in the parotid gland ($n = 6$, 86%) and in male patients ($n = 6$, 86%), with an average age of 52 years. Equivalent results were registered in many series [9–11]: Localization of WTs is unusual in extra-parotid sites and does not exceed 8% of all cases. The literature mentioned the predilection of WTs for males and those in the 4th to 7th decade of life [12]. The present study documented a solitary case of WT located in the submandibular gland. Gontarz et al. reported that in submandibular glands, benign and malignant tumors occur at an equivalent rate [2]. Dissimilarly, in our study, the majority were malignant tumors ($n = 7$, 64%).

In comparison to the previously published series regarding the incidence of malignant SGTs, which reported a range of 10–46% of all SGTs [9]. The current study documented that 48 cases, (44%) were malignant. This rate appeared, to some extent, high. However, another Iraqi study documented a higher rate of malignant tumors (60%) in younger age groups [13]. Attributable factors could be the high degree of pollution and the drastic effect of the war, particularly on the level of health services introduced to the population in general. The overall percentage of benign and malignant tumors in relation to the anatomical location were benign major ($n = 42$, 39%), malignant major ($n = 23$, 21%), benign minor ($n = 19$, 17%), and malignant minor ($n = 25$, 23%). The major-to-minor malignant SGT ratio was 0.92/1. Globally, comparable and variable results have been documented [7,9]. The malignant SGT that was mostly recorded in the present study was adenoid cystic carcinoma (AdCC) ($n = 18$, 37.5%), followed by mucoepidermoid carcinoma (MEC) ($n = 11$, 23%), and malignant mixed tumor (MMT) ($n = 10$, 21%).

AdCC is a relatively rare SGT characterized by a protracted clinical course, a misleading benign histopathological appearance, local aggressiveness, and a high rate of local recurrence and distant

metastasis [14]. Matching results were reported regarding the predominant malignant tumor in other series [15,16]. Others, on the other hand, have reported MEC as the chief malignant tumor [1,8,17,18]. Relative to age, the mean ages of the occurrence of AdCC, MMT, and MEC were 44.5, 44.6, and 47.9 years, respectively. The most recurrent tumor in teenagers was PA (60%), followed by AdCC and MEC (20%) for each tumor.

The main components of malignant mixed tumors are epithelial and/or myoepithelial elements that either arise from primary or recurrent pleomorphic adenomas. This study documented that MMT ranked third among malignant tumors ($n = 5$, 10%) with female predominance ($n = 4$, 80%), and all were located in the parotid, which represented nine percent of all parotid tumors. The average patient's age was 45 years. In the literature, this tumor was reported to have an incidence of (0.4–10%) [19–21].

Polymorphous adenocarcinoma (PAC) was formerly named polymorphous low-grade adenocarcinoma due to its indolent course, but a significant proportion of this tumor develops aggressive behavior. The WHO's 4th edition of tumor classification omitted the “low grade” term and retitled this tumor as polymorphous adenocarcinoma [22]. In this study, PAC ranked fourth among malignant SGT ($n = 3$, or 6%). All were located in minor salivary glands, typically in the palate ($n = 2$, 66%), accounting for 6% of all palatal tumors. The palate was the preferred site for the occurrence of PAC in much of the literature [23]. Previous reports recorded variable rank and incidence for PAC [4,14]. This tumor shares many histopathological resemblances with other SGTs, which renders its diagnosis difficult for many pathologists. This may elucidate the discrepancy in the incidence of this tumor in the literature.

Adenocarcinoma not otherwise specified, epimyoeplithelial carcinoma (EMC), and acinic cell carcinoma (ACC) were registered ($n = 2$, 4%) for each tumor particularly located in the parotid gland. Acinic cell carcinoma (ACC) (blue dot tumor) is a low-grade neoplasm that accounts for 17% of primary malignancies of the salivary glands, mostly occurring in the parotid gland and showing a preference for women [24]. Beyond what this study's findings revealed, ACC was registered as the second most prevalent tumor in many series [6,20].

5. Conclusions

A current study revealed that the salivary gland tumors in the studied sample were uncommon neoplasms with no sex predilection. These tumors

have a tendency to arise earlier in females than in males and mostly occur in the third and fourth decades of their lives. The majority of SGTs occur in the major salivary glands, particularly the parotid, followed by the minor glands of the palate. The most prevalent tumor was pleomorphic adenoma, followed by adenoid cystic carcinoma and mucoepidermoid carcinoma, respectively. The chief parotid tumors were pleomorphic adenoma, Warthin's tumor, and mucoepidermoid carcinoma, respectively. The most prevalent minor gland tumors were pleomorphic adenoma and adenoid cystic carcinoma.

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