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Histopathological Spectrum of Salivary Gland Lesions Reported at a Tertiary Care Hospital, Kharian Cantt, Pakistan

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ABSTRACT

Background: Salivary gland tumors, though uncommon, are clinically significant due to their diverse histological patterns, diagnostic complexity, and varying malignant potential. These tumors arise from both major and minor salivary glands, with the parotid gland being most frequently affected. Despite extensive global research, there is limited local epidemiological data in Pakistan. This study aimed to determine the morphological patterns and frequency of various salivary gland pathologies in biopsy specimens of patients at a tertiary care hospital, Kharian Cantt, and to compare the findings with national and international data.

Methods: This retrospective cross-sectional study was conducted at the Department of Histopathology and Surgery, Tertiary care hospital, Kharian Cantt. Over 04 years from July 1, 2019, to June 30, 2023. A total of 50 patients of both genders with biopsy-confirmed salivary gland tumors were included using consecutive sampling. Clinical information was retrieved from pathology request forms. Biopsies were fixed in 10% formal saline, processed, and stained with hematoxylin and eosin. Histological evaluation was performed independently by two consultant histopathologists. Data were analyzed using SPSS version 22.

Results: Among the 50 patients, 64% were male and 36% female (male-to-female ratio 1.78:1). The most common presentation was a painless, firm glandular swelling (80%). The parotid gland was the most frequently involved site (64%). Benign tumors (84%) were more prevalent, with pleomorphic adenoma being the most common. Mucoepidermoid carcinoma was the most frequent malignant tumor.

Conclusion: Salivary gland tumors in this setting were predominantly benign, with male predominance and parotid gland involvement being most common.

Keywords: Biopsy, Salivary Gland, Benign and Malignant Neoplasms.
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INTRODUCTION

There are two main categories of salivary glands: the major glands (parotid, submandibular, and sublingual) and numerous smaller glands located in the oral cavity's submucosa[1]. The primary role of these glands is to produce saliva, which aids in digestion, facilitates speech and chewing, and provides immune protection against infections[2].

Salivary gland tumors are rare, constituting less than 1% of all body tumors and less than 5% of head and neck tumors in adults[3,4]. However, in pediatric populations, these tumors can account for up to 5% of cases[5]. These tumors can originate from both major and minor salivary glands, with the parotid gland being the most common site of origin[3,4].

The clinical presentation of unilateral enlargement of major salivary gland mostly occurs in sialadenitis, cysts, or tumors, while bilateral enlargement is common in diffuse neoplasms and granulomatous inflammation[2]. Generally benign tumors constitute a major proportion of salivary gland tumors (roughly two-thirds), mostly in the 3rd to 4th decades, while malignant tumors are less frequent, mostly arising in minor salivary glands in the 4th to 5th decades[1].

Research studies in Pakistan and globally have consistently shown that the most common non-cancerous tumor (benign neoplasm) is pleomorphic adenoma, while the most common cancerous tumor (malignant neoplasm) is adenoid cystic carcinoma. Unfortunately, adenoid cystic carcinoma often involves the facial nerve and leads to tissue death (necrosis), which is an indicator of a poor prognosis and is frequently observed in this type of cancer[3,6].

A preoperative assessment of salivary gland enlargement with ultrasound and FNAC mostly gives a clue to diagnosis[5,7]. Some cases also require CT and MRI scans/imaging studies, but surgical excision followed by histopathology is still the gold standard for final diagnosis [2,8]. Surgical excision for benign tumors should be conservative, while it should be more extensive with wide margins in malignant tumors[5,9]. Incisional or core needle biopsy is not recommended in salivary gland tumors as they may predispose to fistula or tumor implantation via needle tract[2].

Immunohistochemistry markers application on biopsy slides is also of significance in diagnosis, like GFAP and SOX10 markers positivity is mostly seen in pleomorphic adenoma[10].

Despite conducting an extensive review of existing research, it was found that there is a lack of studies on the prevalence of salivary gland disorders in the local population. This study aimed to investigate the distribution of salivary gland tumors among Pakistani patients at the tertiary care hospital Kharian Cantt, with a focus on age and gender demographics, to provide valuable insights for clinicians to improve patient care and management.

METHODS

After obtaining approval from the Ethical Committee (ethical number A/24/15) of the hospital, a retrospective cross-sectional study was conducted. The study was carried out in the Departments of Histopathology and Surgery at CMH Kharian Cantt and the Pathology Department of CMH Kharian Medical College, Kharian Cantt. Data were collected over four years, from July 1, 2019, to June 30, 2023.

A total of 50 patients of both genders who underwent salivary gland biopsies were included using a consecutive (non-probability) sampling technique, and sample size was calculated using the WHO sample size calculator taking confidence level of 95%[1]. The study included patients of both genders who had a histological diagnosis of salivary gland neoplasms. Patients diagnosed with acute or chronic sialadenitis, those who had received chemotherapy or radiotherapy before surgery, and biopsies with insufficient material were excluded. Biopsies were collected and placed in 10% formal saline for twenty-four hours. Following tissue fixation, representative sections were taken and routinely processed for histology in the histopathology lab. H&E-stained sections of salivary gland tissue were examined by both me and another consultant histopathologist under 10x and 40x objectives in the histopathology department to determine the exact histologic diagnosis. Data analysis, including frequencies and percentages for age, gender, tumor type (benign or malignant), histological diagnosis, and tumor site, was conducted using SPSS version 22.

RESULTS

Table 1: Demographic Characteristics of Patients

Variables	N (%)
Gender	
Male	32 (64%)
Female	18 (36%)

Age Group	
10–20 Years	06 (12%)
21–30 Years	10 (20%)
31–40 Years	10 (20%)
41–50 Years	10 (20%)
51–60 Years	06 (12%)
>60 Years	08 (16%)
Clinical Presentation	
Enlarged, painless, firm salivary gland lump	40 (80%)
Painless diffuse swelling	06 (12%)
Mass hard palate	04 (8%)

Among a total of 50 patients who underwent salivary gland biopsy, the maximum patients were in the age group of 21 to 50 years (60% with n=30). Males were predominant being 64% (n=32) and 36% (n=18) were females with a male: female ratio of 1.78:1. The most frequent clinical presentation was enlarged, painless firm salivary gland lump in 80% patients (n=40) followed by painless diffuse swelling in 12% (n=6) and Mass hard palate in 8% (n=4). The sociodemographic characteristics are given in **Table 1.**

Table 2: Site and Histopathology of Salivary Gland Lesions

Variables	N (%)
Common Site of Tumor	
Parotid Gland	32 (64%)
Submandibular Gland	10 (20%)
Maxillary Sinus	02 (4%)
Hard Palate	04 (8%)
Exact Site Not Mentioned	02 (4%)
Morphology	
Benign	42 (84%)
Malignant	08 (16%)
Histological Diagnosis	
Pleomorphic Adenoma	36 (72%)
Warthin's Tumor	06 (12%)
Mucoepidermoid Carcinoma	04 (8%)
Acinic Cell Carcinoma	02 (4%)
Adenoid Cystic Carcinoma	02 (4%)

The majority of lesions (64%) were found in the parotid gland, followed by the submandibular gland, which accounted for 20% of the cases. Benign tumors were more prevalent than malignant ones, constituting 84% (n=42) of the total. Among the benign tumors, pleomorphic adenoma was the most common, representing 85.7% (n=36) of these cases. The most frequently observed malignant lesion was mucoepidermoid carcinoma, with four instances in **Table 2**.

Table 3: Association between Age Group and Gender with Benign and Malignant Histology

Age Group (Years)	Male (Benign, Malignant)	Female (Benign, Malignant)	Chi-Square (df)	P-Value
10 – 20	6 (B=4, M=2)	0 (B=0, M=0)	4.00	0.135
21 – 30	6 (B=6, M=0)	4 (B=2, M=2)	3.75	0.053
31 – 40	8 (B=8, M=0)	2 (B=2, M=0)	13.36	0.020
41 – 50	2 (B=2, M=0)	8 (B=8, M=0)	12.61	0.027
51 – 60	4 (B=2, M=2)	2 (B=0, M=2)	1.50	0.221
> 60	6 (B=6, M=0)	2 (B=2, M=0)	18.25	0.003

Note: B = Benign, M = Malignant

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Table 3 presents the association between age groups and gender with the histological classification of salivary gland lesions into benign and malignant types. The data indicate that in younger age groups (10–20 years), males showed both benign and malignant lesions, while no cases were observed in females. In the 21–30 years group, males predominantly had benign lesions, whereas females had an equal number of benign and malignant cases.

Significant associations between age, gender, and histology were observed in the 31–40, 41–50, and >60 years groups, with p-values of 0.020, 0.027, and 0.003, respectively. In these age groups, benign lesions were more frequent overall, but the distribution between males and females varied. For instance, males had more benign cases in the 31–40 and >60 years groups, while females had more benign cases in the 41–50 years group.

No significant association was found in the 10–20 and 51–60 years age groups ($p > 0.05$). Overall, the data suggest a statistically significant relationship between age, gender, and lesion type in certain age categories, indicating that both factors may influence the histopathological presentation of salivary gland tumors.

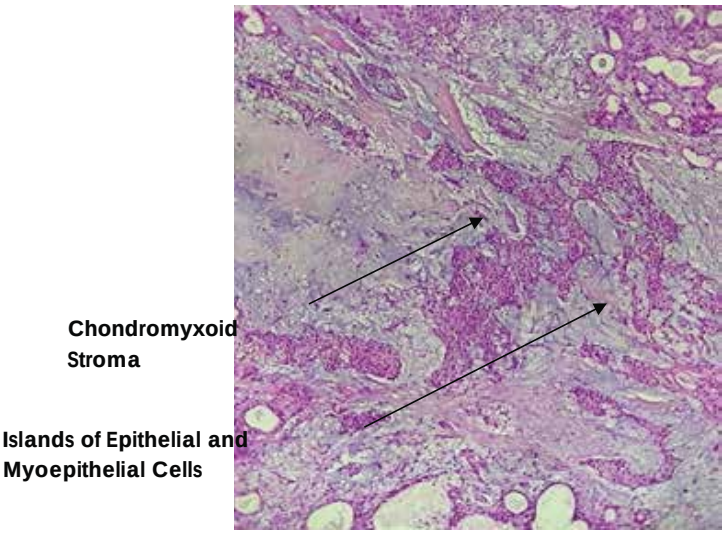

Fig.1: Pleomorphic adenoma at (100X) showing islands of Epithelial and Myoepithelial Cells with Chondromyxoid Stroma.

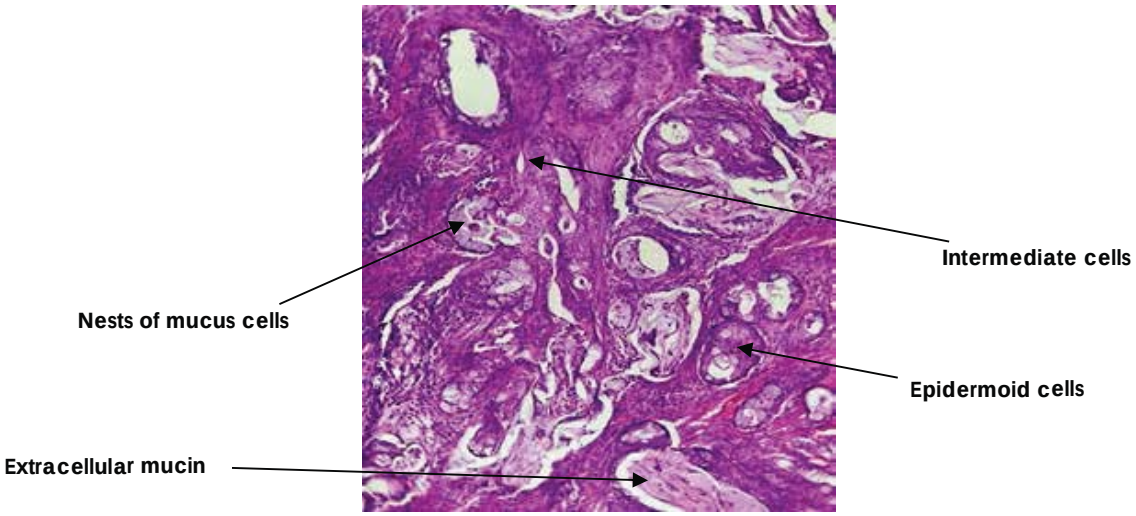

Fig.2: Mucoepidermoid Carcinoma (Low Grade) At(X100x) Showing Nests of Mucus Cells, Intermediate Cells, and Epidermoid Cells as Well as Extracellular Mucin.

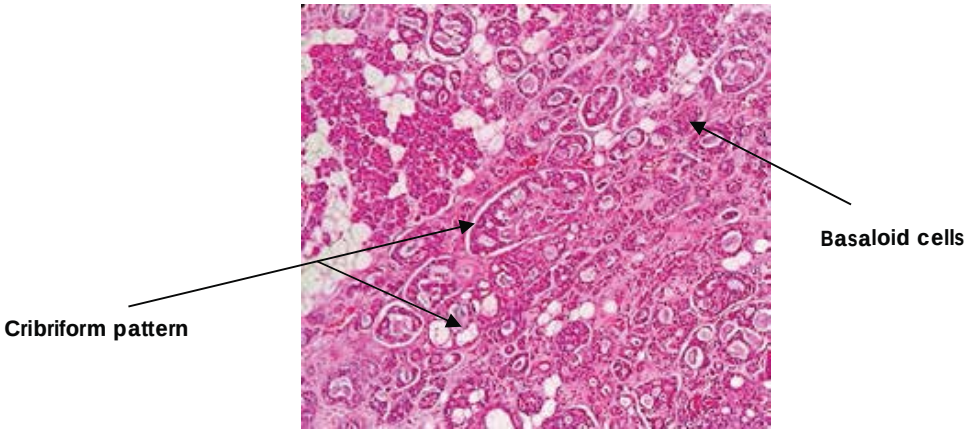

Fig.3: Adenoid Cystic Carcinoma at 100X Composed of Basaloid Cells Arranged in Cribriform Pattern.

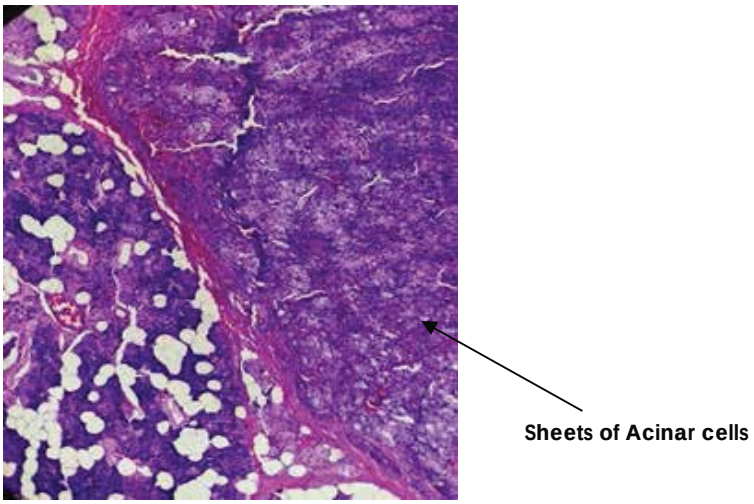

Fig 4: 100x View of Acinic Cell Carcinoma Showing Sheets of Large and Polyhedral Acinar Cells with Basophilic Granular Cytoplasm and Eccentric Nuclei.

DISCUSSION

The salivary gland lesions, though accounting for <5% of head and neck tumors in adults, pose difficulty for clinicians and histopathologists in diagnosing them due to diverse clinical appearances and variable morphological patterns[11,12,13].

In the current study, salivary gland neoplasms were found to be more prevalent in males' gender (64%) than females. A study was conducted at a tertiary care hospital in Pakistan on 50 patients in our study[14]. Another study conducted in rural India[15] showed female predominance with a female-to-male ratio of 1.15:1, contrary to our study.

Our study showed the prevalence of salivary gland neoplasms (i.e, 60%) in the 3rd to 5th decades, followed by 16% in the age group > 60 years. This shows overlap to some extent with a study conducted in rural India, which showed the maximum number of cases in the 2nd to 4th decade[15]. A study conducted showed the prevalence of salivary gland neoplasms from the 4th to the 7th decade[16]. The most common site of neoplasms in our study is the parotid gland (64%), followed by the submandibular gland (20%). Similarly, a study conducted in rural India[15] and another study also showed the parotid gland to be the most common site[17]. Contrary to this, a study conducted in Mexico showed the Palate (minor salivary gland) to be the most common site of tumors[18].

Out of our total 50 cases, 42 cases (84%) are of benign neoplasms, with the remaining 16 cases (16%) being malignant. A study conducted in Mexico[18] and Iceland[19] showed comparable results. Out of 42 benign neoplasm cases, 67% (n=28) were in males and 33% (n=14) in females. Contrary to that, a study conducted showed more benign

neoplasms in females than males, with a F: M of 1.23:1[16].

In the current study, males of the age group 21 to 50 years showed only benign neoplasms with no malignant ones, while females of the same age group had mostly benign neoplasms with occasional malignant cases, and the age group above 50 years showed benign as well as malignant cases in both genders. This is contrary to a study which showed benign neoplasms in younger and malignant neoplasms in older age group[20].

Pleomorphic adenoma was the most common benign neoplastic lesion in a recent study, which found that 65.3% of neoplastic lesions were benign, with pleomorphic adenomas accounting for 61.1% of the cases [21]. Similarly, in our study, the most common benign tumor was pleomorphic adenoma, accounting for 86% of benign cases, followed by Warthin's tumor at 14%. Mucoepidermoid carcinoma was the most common malignant neoplasm, present in 50% of malignant cases, followed by adenoid cystic carcinoma and acinic cell carcinoma, each constituting 25%. A study in 2022 also reported similar findings[22]. However, a study conducted in Denmark found adenoid cystic carcinoma to be the most common malignant neoplasm[23].

The most common malignant neoplastic lesions in the salivary glands were mucoepidermoid carcinoma, adenoid cystic carcinoma, and acinic cell carcinoma. These findings are consistent with prior research, which identified mucoepidermoid carcinoma as the most prevalent malignant salivary gland tumor[24,25].

CONCLUSION

Based on the results, the study concluded that salivary gland neoplasms were not very common among the local population attending Tertiary Care Hospital, Kharian Cantt, with benign neoplastic lesions outnumbering malignant ones and a predominance observed in males. Though fine needle aspiration cytology (FNAC) and radiological imaging provide an early diagnostic clue about the tumor but most ultimately require surgical excision for definitive diagnosis. Therefore, the collaborative action of Pathologists, Radiologists, and Surgeons in early diagnosis and prompt treatment is of utmost value in this regard.

LIST OF ABBREVIATIONS

Cantt – Cantonment
H&E – Hematoxylin and Eosin
FNAC – Fine Needle Aspiration Cytology
CT – Computed Tomography
MRI – Magnetic Resonance Imaging
GFAP – Glial Fibrillary Acidic Protein
SOX10 – SRY-related HMG-box 10

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CONFLICT OF INTEREST

The author showed no conflict of interest.

ETHICAL APPROVAL

The ethical approval was provided by Combined Military Hospital Kharian Cantonment under ethical number A/24/15.

AUTHORS' CONTRIBUTION

US and **JA;** Idea Conception, Study design, data collection, data analysis, **IKK** and **MZ;** result interpretation, manuscript writing. **HA** and **MU**; Data collection, proofreading.

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