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HISTOPATHOLOGICAL STUDY OF SALIVARY GLAND LESIONS IN A TERTIARY CARE HOSPITAL OF LAHORE

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ABSTRACT

Background: *Some salivary gland lesions, however, are very rare neoplastic tumors; one example includes pleomorphic adenoma and mucoepidermoid carcinoma, along with some non-neoplastic conditions like chronic sialadenitis and mucoceles. Such lesions mostly simulate each other, so precise diagnosis is of great importance.*

Objective: *To assess the frequency and distribution of various histopathological types of salivary gland lesions in patients at a tertiary care hospital in Lahore, Pakistan.*

Methods: *A cross-sectional study was conducted at Sir Ganga Ram Hospital, Lahore, from June to December 2024. A total of 136 biopsy specimens from patients diagnosed with salivary gland lesions through Fine Needle Aspiration Cytology (FNAC) were included. The specimens were processed and evaluated histopathologically for lesion type and other relevant characteristics. Data were analyzed using SPSS version 26.0.*

Results: *Pleomorphic adenomas were the most common lesion (39.7%), then mucoceles (19.1%), chronic sialadenitis (17.6%), and Warthin's tumors (6.6%). The majority of lesions were located in the parotid gland (56.6%), with a significant association between lesion type and location ($p < 0.001$). No significant differences were observed based on gender, age, or residence ($p > 0.05$).*

Conclusion: *The pleomorphic adenoma is the most common salivary gland lesion, especially of the parotid gland. The histopathological examination helps differentiate between neoplastic and non-neoplastic lesions, hence proper diagnosis and management. These findings will guide clinicians in early detection and treatment to improve patient outcomes in the region.*

Keywords: *Salivary Gland Lesions, Pleomorphic Adenoma, Mucoepidermoid Carcinoma, Chronic Sialadenitis, Histopathology, Fine Needle Aspiration Cytology.*

INTRODUCTION

The salivary glands present with a wide spectrum of lesions, comprising non-neoplastic and neoplastic lesions.[1] Neoplasms are not regularly observed in the salivary gland, constitute under 1% of all tumors, and epithelial tumors of 4% are observed in the head and neck regions.[2] Non-neoplastic lesions include inflammatory disorder due to infection, autoimmune or granulomatous related, obstructive, idiopathic and developmental disorders. Clinically, these nonneoplastic lesions may resemble tumors, and pathological results may resemble other salivary gland cancers.[3,4]

Salivary gland tumors have a variety of etiologies.[5] Ionizing radiation, chemotherapy, vitamin A deficiency, tobacco use, and extended sun exposure all contribute to the growth of salivary gland cancers.[6, 7] Tumors of the salivary glands can vary in shape between different tumor types and within tumors; the parotid gland has 80% of cancers, while the submandibular gland has 10-15%.[8] Pleomorphic adenoma is more prevalent than other benign tumors in the salivary glands.[9] When it comes to malignant tumors, mucoepidermoid carcinoma

is the most widely recognized.[10] According to a study by Anushree CN et al., the most prevalent types of salivary gland lesions were pleomorphic adenoma and chronic sialadenitis, which were found in 20.0% and 24.0% of cases, respectively.[11] According to a local study by Ammar AS et al., mucoepidermoid carcinoma was the most prevalent malignant tumor seen in roughly 23.28% of cases. In contrast, pleomorphic adenoma was the most common benign tumor found in roughly 43.8% of cases.[12]

In the comprehensive study of salivary gland lesions, Mucocele represents approximately 20.7% of all tumors, given that it constitutes 44.9% of non-neoplastic lesions. Chronic sialadenitis, a non-neoplastic inflammatory lesion, accounts for about 16.1% of all tumors. Ranula is found in approximately 3.1% of all tumors, reflecting its presence in 10.8% of benign lesions. Among benign tumors, pleomorphic adenoma is the most common, making up 45% of all tumors. Warthin's tumor contributes to 11% of all tumors, while myoepithelioma and basal cell adenoma represent 1% and 3% of all tumors, respectively. In the malignant category, mucoepidermoid carcinoma accounts for 9% of all tumors, and adenoid cystic carcinoma makes up 6%. Acinic cell carcinoma represents 3% of all tumors. In the malignant category, mucoepidermoid carcinoma was the most common, comprising 26% of malignant tumors (9% of all tumors) with 508 cases. Adenoid cystic carcinoma accounted for 17% of malignant tumors (6% of all tumors), with 336 cases. Acinic cell carcinoma was noted in 185 cases, representing 9% of malignant tumors (3% of all tumors).[14]

Although previous studies provide useful information, the findings of the present study will help us identify the most commonly occurring types of salivary gland lesions in my area of study. It will contribute towards early identification and management of the most frequent types of salivary gland lesions. So, this study aimed to assess the frequency of various histopathological types of salivary gland lesions in a centrally located Tertiary care hospital in Lahore.

Materials And Methods

This cross-sectional study was conducted at the Department of Histopathology, Sir Ganga Ram Hospital, Lahore, Pakistan, over six months (June 21, 2024, to December 21, 2024) following the approval of the synopsis. Ethical approval was taken before conducting the study. **Inclusion criteria** for the study included biopsy specimens from patients of all age groups and both genders diagnosed with salivary gland lesions via Fine Needle Aspiration Cytology (FNAC). **Exclusion criteria** included autolyzed or insufficient biopsy specimens and patients unwilling to participate in the study. The calculated sample size for the study was 136, determined using the WHO calculation taking a confidence interval of 95%, 4% margin of error, and the expected proportion of adenoid cystic carcinoma as 6.0%. [14] A consecutive non-probability sampling technique was employed to include all eligible cases. Written informed consent was obtained from patients or their guardians. A total of 136 biopsy specimens that met the inclusion and exclusion criteria were included. Each specimen was assigned a unique record number. Following a physical examination, biopsy tissues were processed, embedded in paraffin, and preserved in 10% formalin. From the paraffin blocks, sections ranging in thickness from 3 to 5 µm were cut out and stained for histological analysis. Cellular architecture, encapsulation, perineural invasion, vascular patterns, and involvement of adjacent tissues were all analyzed in the sections. The most recent classification of salivary gland tumors by the World Health Organization (WHO) was used to categorize the lesions.

Histopathological diagnoses included myoepithelioma, basal cell adenoma, mucoepidermoid carcinoma, adenoid cystic carcinoma, acinic cell carcinoma, mucocele, chronic sialadenitis, ranula, pleomorphic adenoma, Warthin's tumor, and myoepithelioma. Data on demographic characteristics (age, gender, area of residence), lesion location, and histopathological findings were systematically recorded using a structured proforma.

All histopathological examinations were performed by the researcher herself. Data were analyzed using SPSS version 26.0. Quantitative data, such as age, were presented as mean ± standard deviation, while qualitative variables, including gender, area of residence, lesion location, and lesion types, were expressed as frequencies and percentages. Stratification was performed to control effect modifiers like gender, age, lesion location, and area of residence, and the post-stratification chi-square test was applied, taking p-value ≤ 0.05.

Results

Table 1

Patient Population Characteristics (n=136)

Characteristics	N(%)	M(SD) Range
Gender		
Male	63(46.3)	
Female	73(53.7)	
Age(years)		42.22(15.89) 20.0-80.0
Residence		
Rural	82(60.3)	
Urban	54(39.7)	
Location of lesion		
Parotid Gland	77	56.6
Submandibular Gland	39	28.7
Minor Salivary Gland	20	14.7

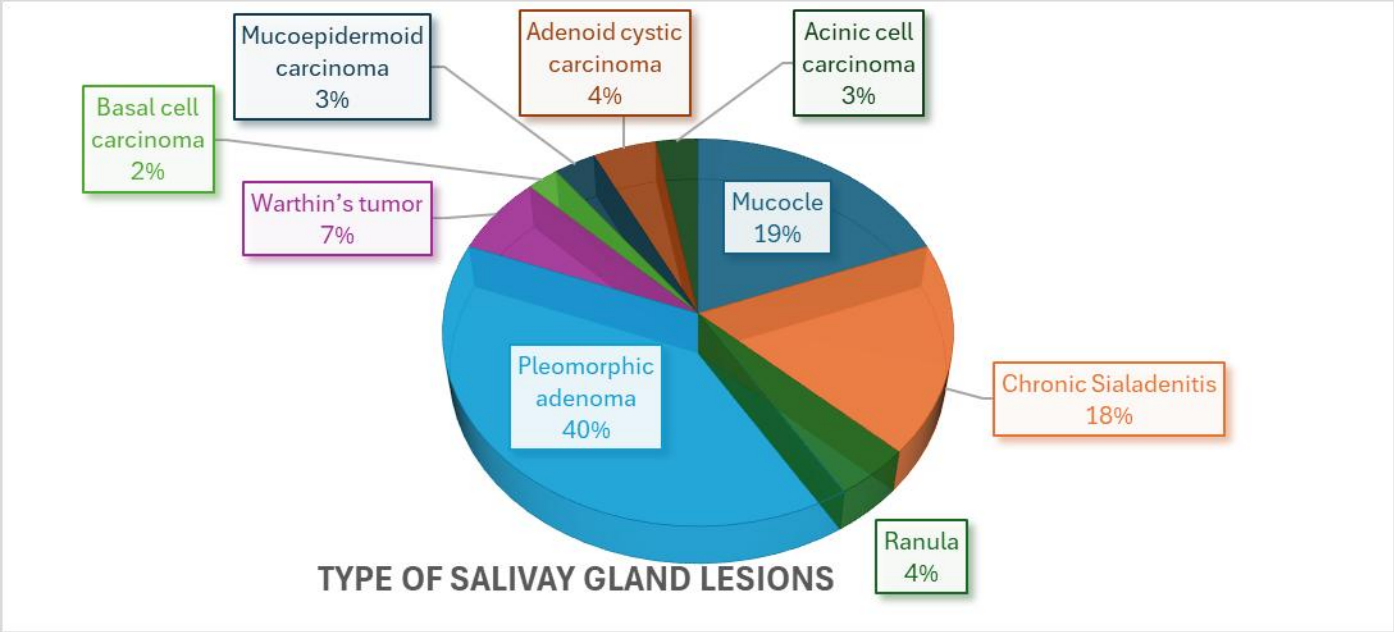

Figure 1. Distribution of salivary gland lesions

Table 2

Distribution of Clinical Parameters by Diagnosis and Gender, Age, Residence, and Lesion Location

Parameters	Mucocle	Chronic Sialadenitis	Ranula	Pleomorphic adenoma	Warthin's tumor	Basal cell carcinoma	Mucoepidermoid carcinoma	Adenoid cystic carcinoma	Acinic cell carcinoma	p-value
Gender										
Male	13 (20.6)	13 (20.6)	3 (4.8)	24 (38.1)	3 (4.8)	2 (3.2)	3 (4.8)	1 (1.6)	1 (1.6)	.633
Female	13 (17.8)	11 (15.1)	3 (4.1)	20 (41.1)	6 (8.2)	1 (1.4)	1 (1.4)	5 (6.8)	3 (4.1)	
Age										

20-40	12 (17.6)	14 (20.6)	4 (5.9)	24 (35.3)	4 (5.9)	1 (1.5)	1 (1.5)	5 (7.4)	3 (4.4)	
>40	14 (20.6)	10 (14.7)	2 (2.9)	30 (44.1)	5 (7.4)	2 (2,9)	3 (4.4)	1 (1.5)	1 (1.5)	.508
Residence										
Rural	15 (18.3)	15 (18.3)	5 (6.1)	31 (37.8)	7 (8.5)	2 (2.4)	2 (2.4)	4 (4.9)	1 (1.2)	
Urban	11 (20.4)	9 (16.7)	1 (1.9)	23 (42.6)	2 (3.7)	1 (1.9)	2 (3.7)	2 (3.7)	3 (5.6)	.736
Location of lesion										
Parotid Gland	14 (18.2)	9 (11.7)	6 (7.8)	38 (49.4)	3 (3.9)	1 (1.3)	3 (3.9)	3 (3.9)	0 (0)	
Submandibular Gland	7 (17.9)	12 (30.8)	0 (0)	10 (25.6)	6 (15.4)	1 (2.6)	1 (2.6)	0 (0)	2 (5.1)	
Minor Salivary Gland	5 (25.0)	3 (15.0)	0 (0)	6 (30.0)	0 (0)	1 (5.0)	0 (0)	3 (15.0)	2 (10.0)	.003

The study involved 136 patients, with a near-equal distribution of gender: 46.3% male (n=63) and 53.7% female (n=73). The mean age of the patients was 42.22 years, with a standard deviation of 15.89 years, and the age range was 20 to 80 years. Most patients (60.3%) resided in rural areas (n=82), while 39.7% were from urban areas (n=54). The majority of lesions were located in the parotid gland (56.6%, n=77), followed by the submandibular gland (28.7%, n=39) and minor salivary glands (14.7%, n=20). (Table 1)

Figure 1 outlines the frequency and distribution of the different types of salivary gland lesions. Pleomorphic adenomas were the most common diagnosis, accounting for 39.7% of cases, then mucoceles (19.1%), chronic sialadenitis (17.6%), and Warthin's tumor (6.6%). Other diagnoses, including basal cell carcinoma, mucoepidermoid carcinoma, adenoid cystic carcinoma, and acinic cell carcinoma, were less frequent, accounting for a total of 12.4% of cases.

Table 2 presents the distribution of clinical parameters by diagnosis, gender, age, residence, and lesion location in patients with salivary gland lesions. The analysis reveals that there are no significant gender-related differences across the various diagnoses (p=0.633). When considering age, there were no significant differences in diagnoses between the 20-40-year age group and those older than 40 years (p=0.508). In terms of residence, no significant difference was observed between rural and urban patients (p=0.736).

The most notable finding is the significant relationship between lesion location and diagnosis (p<0.001). Lesions located in the parotid gland were predominantly pleomorphic adenomas (49.4%), followed by mucoceles (18.2%) and chronic sialadenitis (11.7%). In contrast, the submandibular gland was most frequently associated with chronic sialadenitis (30.8%) and pleomorphic adenoma (25.6%). Minor salivary glands were more often diagnosed with pleomorphic adenomas (30%) and adenoid cystic carcinoma (15%).

Discussion

Salivary gland lesions have an extensive spectrum of histomorphology. Hence histopathological testing is essential for diagnosis.[15,16]

In line with the results of Pachori et al., who reported 43.8% non-neoplastic and 56.2% neoplastic lesions, we found that 41.2% of salivary gland lesions were non-neoplastic and 58.8% were neoplastic. The most common non-neoplastic lesions were mucocele (28.3%) and chronic sialadenitis (50.9%), which are frequently seen in the submandibular gland (47.17%). In the cases with neoplasm, 79.4% had benign lesions, and 20.6% had malignant ones. In 75% of parotids, neoplastic tumors were commonly seen. Pleomorphic adenoma was the most common benign tumor (81.4%). Malignant salivary tumors of the mucoepidermoid carcinoma type were the most common; 15 our findings also align with Mohan et al. (2011) [17] This suggests a similar distribution pattern across studies. However, our non-neoplastic cases were comparatively higher than those in studies by Laishram et al. (2013) (25%) and Kumar et al. (2017) (27.27%), which showed a lower proportion of non-neoplastic lesions.[18,19]

Regarding age distribution, we observed a peak age range of 20-40 years (mean age 42.22 ± 15.89 years) for non-neoplastic lesions, which is consistent with findings from Mohan et al. (2011), who also noted a higher frequency of non-neoplastic lesions in this age group.[17] This trend aligns with the global literature, where

young adults are more commonly affected by non-neoplastic conditions like chronic sialadenitis and mucoceles.

Our study also shows a female preponderance of 1:1.6, which is constant with Mohan et al. (2011) and Parasa et al. (2019), who reported similar female-to-male ratios of 1:1.2 and 1:1.3, respectively. [17,20] Lopez et al. (2006) similarly reported 94% of mucoceles in the lower lip, with male predominance (M: F ratio of 1.57:1).[21]

In a similar study, a majority of females was also noted, with an M: F ratio of 0.8:1. Of the 53 instances, 41 (77.35%) were neoplastic, and 12 (22.64%) were not. With a range of 12 to 75 years, the mean age was 46.7 years. In comparison to malignant tumors, benign tumors are much more common. The most frequent location for malignancies was the parotid (73.5%), and the most frequent salivary gland tumor seen in both sexes was pleomorphic adenoma. Adenoid cystic carcinoma was the second most prevalent malignant salivary gland tumor after muco-epidermoid carcinoma. Because salivary gland lesions exhibit complex characteristics, histopathological examination is the gold standard for diagnosis and classification.[22]

In another study, neoplastic lesions (78.42%) outnumbered non-neoplastic lesions (21.58%) in 329 cases of salivary gland lesions. [23] Our findings were like those of studies conducted by Nepal et al.[24] Ali et al. [25] and Moghadam et al.[26]

The study by Srinivasan et al. found a significantly significant p-value of 0.001 for FNAC and histological connection for neoplasm. [13]

As a result, the current study provides useful demographic and epidemiological data regarding different salivary gland lesions that occurred in a tertiary care hospital over 6 months. Despite the strong results, there are limitations to this study. The cross-sectional design would limit the ability to find causality or long-term outcomes related to the lesions. Furthermore, the method of diagnosis through Fine Needle Aspiration Cytology (FNAC) would result in misdiagnosis in some cases, more so in distinguishing between benign and malignant lesions. This is a well-noted challenge in salivary gland pathology, where overlapping histology between various types of tumors complicates the diagnosis.

The present study provides valuable data to the existing body of knowledge on salivary gland lesions, especially in the context of Lahore, Pakistan. The high prevalence of pleomorphic adenoma and the significant association between lesion type and location underline the need for accurate histopathological evaluation to guide effective management strategies. Future studies with larger sample sizes and longitudinal designs are recommended to elucidate the clinical implications of these lesions further.

Conclusion

Pleomorphic adenoma represented the most frequent salivary gland neoplasm, with the parotid gland being the most affected site. Congenital and developmental disorders were good with non-neoplastic conditions, including chronic sialadenitis and mucoceles. Among these, histopathological examination appears to have a potential role in the correct diagnosis of salivary gland lesions. Understanding different distributions and kinds of lesions will enhance clinical planning and, therefore, enhance treatment plans and outcomes. More studies with a large population sample size and regional comparison are needed to establish the salivary gland pathology patterns of Pakistan.

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