

Original Research Article

CLINICOPATHOLOGICAL STUDY OF SALIVARY GLAND LESIONS WITH REFERENCE TO HISTOLOGICAL TYPES, AGE, SEX AND SITE DISTRIBUTION

Urmi Chakravarty Vartak¹, Shital Mahure², Shailesh Vartak¹, Shailaja Puri²

¹Associate Professor, Department of Pathology, Lokmanya Tilak Municipal Medical College & General Hospital, Sion, Mumbai, India

²Resident, Department of Pathology, Lokmanya Tilak Municipal Medical College & General Hospital, Sion, Mumbai, India

Received : 09/02/2026
Received in revised form : 23/03/2026
Accepted : 12/04/2026

Corresponding Author:

Dr. Urmi Chakravarty Vartak,
Associate Professor, Department of
Pathology, Lokmanya Tilak Municipal
Medical College & General Hospital,
Sion, Mumbai, India.
Email: urmichakravarty@yahoo.co.in

DOI: 10.70034/ijmedph.2026.2.100

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (2); 595-601

ABSTRACT

Background: Salivary gland lesions comprise a diverse group of pathological conditions ranging from non-neoplastic inflammatory processes to benign and malignant neoplasms. Due to their varied histological patterns and clinical presentations, accurate diagnosis remains a challenge. The aim is to study the clinicopathological spectrum of salivary gland lesions with reference to histological types, age, sex, and site distribution.

Materials and Methods: This hospital-based observational study included 79 cases of salivary gland lesions diagnosed over a defined study period at a tertiary care center. Clinical details such as age, sex, and site were recorded. Specimens were processed using standard histopathological techniques, and lesions were classified according to WHO guidelines. Statistical analysis was performed using appropriate tests, with $p < 0.05$ considered significant.

Results: The mean age of patients was 38.9 ± 16.4 years, with the highest incidence in the 41–60 years age group (43.0%). There was no significant gender predilection, with males (50.6%) and females (49.4%) being almost equally affected. The parotid gland (62.0%) was the most commonly involved site. Benign lesions constituted the majority (49.4%), followed by non-neoplastic (39.2%) and malignant lesions (11.4%). Pleomorphic adenoma (44.3%) was the most common benign tumor, while mucoepidermoid carcinoma (10.1%) was the most frequent malignant lesion. Non-neoplastic lesions such as sialadenitis and abscess were also commonly observed.

Conclusion: Salivary gland lesions show a wide clinicopathological spectrum with a predominance of benign tumors, particularly pleomorphic adenoma. The parotid gland is the most commonly affected site, and lesions are most frequent in middle-aged individuals. Histopathological examination remains essential for accurate diagnosis and appropriate management.

Keywords: Salivary gland lesions. Pleomorphic adenoma. Mucoepidermoid carcinoma.

INTRODUCTION

Salivary gland lesions represent a diverse and complex group of pathological entities ranging from non-neoplastic inflammatory conditions to benign and malignant neoplasms. These lesions are relatively uncommon but clinically significant due to their wide histopathological spectrum and varied biological behavior. The incidence of salivary gland tumors is estimated to be approximately 2.5–3 cases per 100,000 population annually, accounting for less than 2% of all head and neck tumors. Despite their

rarity, these lesions pose a diagnostic challenge because of their morphological diversity and overlapping histological features.^[1]

Salivary glands are broadly classified into major glands parotid, submandibular, and sublingual and numerous minor salivary glands distributed throughout the oral cavity, oropharynx, and upper aerodigestive tract. The majority of salivary gland tumors arise in the parotid gland, followed by submandibular and minor salivary glands. Interestingly, while most tumors in the parotid gland are benign, the proportion of malignancy increases in

smaller glands, with minor salivary glands showing a higher likelihood of malignant transformation.^[2]

Histologically, salivary gland tumors exhibit remarkable heterogeneity. The World Health Organization (WHO) classification recognizes more than 30 distinct histological types, including benign tumors such as pleomorphic adenoma and Warthin's tumor, and malignant tumors like mucoepidermoid carcinoma and adenoid cystic carcinoma. Among these, pleomorphic adenoma is the most common benign tumor, whereas mucoepidermoid carcinoma is the most frequent malignant counterpart. The diversity in histological patterns reflects the complex architecture of salivary glands, composed of ductal, acinar, and myoepithelial components.^[3]

Clinically, salivary gland lesions often present as painless swellings, though malignant tumors may show rapid growth, pain, facial nerve involvement, or ulceration. The diagnosis relies on a combination of clinical evaluation, imaging, and histopathological examination. Histopathology remains the gold standard for definitive diagnosis, as it provides insights into tumor type, grade, and prognostic features.^[4]

Epidemiological factors such as age, sex, and site distribution play a crucial role in understanding the behavior of salivary gland lesions. Benign tumors are more common in younger individuals, whereas malignant tumors are frequently observed in older age groups. Gender predilection varies with tumor type, with some lesions showing female predominance while others are more common in males. Site distribution also significantly influences the likelihood of malignancy.^[5]

Aim: To study the clinicopathological spectrum of salivary gland lesions with reference to histological types, age, sex, and site distribution.

Objectives

1. To evaluate the histopathological patterns of salivary gland lesions.
2. To analyze the distribution of lesions according to age and sex.
3. To study the site-wise distribution and classify lesions into benign and malignant categories.

MATERIALS AND METHODS

Source of Data: The data for the present study were obtained from patients diagnosed with salivary gland lesions in the Department of Pathology of a tertiary care hospital. Both retrospective and prospective cases were included, and relevant clinical and histopathological records were analyzed.

Study Design: The study was a hospital-based observational descriptive study.

Study Location: The study was conducted in the Department of Pathology at a tertiary care teaching hospital.

Study Duration: The study was carried out over a period of two years (retrospective + prospective duration as applicable).

Sample Size: A total of 79 cases of salivary gland lesions were included in the study.

Inclusion Criteria

- All patients with clinically suspected salivary gland lesions who underwent biopsy or surgical excision.
- Cases with confirmed histopathological diagnosis.
- Patients of all age groups and both sexes.

Exclusion Criteria

- Cases with inadequate or poorly preserved tissue samples.
- Incomplete clinical or histopathological records.
- Non-salivary gland lesions mimicking salivary pathology.

Procedure and Methodology: All cases of salivary gland lesions received in the pathology department were included. Detailed clinical data including age, sex, presenting complaints, and site of lesion were collected from patient records. Gross examination of specimens was performed, noting size, shape, consistency, and cut surface characteristics.

Tissue specimens were fixed in 10% formalin and processed routinely. Paraffin-embedded sections were prepared and stained with hematoxylin and eosin (H&E). Histopathological evaluation was carried out to classify lesions based on WHO classification into non-neoplastic, benign, and malignant categories.

Special stains and immunohistochemistry were applied wherever necessary for confirmation of diagnosis.

Sample Processing

- Specimens were fixed in 10% neutral buffered formalin.
- Routine tissue processing was performed using dehydration, clearing, and paraffin embedding.
- Sections of 3–5 μm thickness were cut and stained with H&E.
- Special stains/IHC were used in selected cases.

Statistical Methods: Data were entered into Microsoft Excel and analyzed using statistical software.

- Categorical variables were expressed as frequency and percentage.
- Continuous variables were expressed as mean \pm standard deviation.
- Chi-square test was applied to assess association between variables.
- A p-value <0.05 was considered statistically significant.

Data Collection: Data were collected using a predesigned proforma including demographic details, clinical findings, and histopathological diagnosis. All relevant variables such as age, sex, site, and histological type were systematically recorded and analyzed.

RESULTS

[Table 1] presents the clinicopathological spectrum of salivary gland lesions in the study population. The

mean age of patients was 38.9 ± 16.4 years, with a statistically significant distribution ($p < 0.001$), indicating that salivary gland lesions were observed across a wide age range, with a central tendency in middle-aged individuals. The gender distribution showed almost equal prevalence, with 40 males (50.6%) and 39 females (49.4%), and no statistically significant difference ($p = 0.910$), suggesting no gender predilection.

With respect to site distribution, the parotid gland was the most commonly involved site (62.0%), followed

by the submandibular gland (31.6%) and minor salivary glands (6.3%), with a highly significant difference ($p < 0.001$), indicating a strong predominance of parotid involvement.

Regarding the biological nature of lesions, benign lesions constituted the majority (49.4%), followed by non-neoplastic lesions (39.2%) and malignant lesions (11.4%), with a statistically significant difference ($p < 0.001$).

Table 1: Clinicopathological spectrum of salivary gland lesions with reference to age, sex, site and biological nature (N = 79)

Variable	Category	n (%) / Mean \pm SD	Test of significance	95% CI	p value
Age (years)	Overall age	38.9 \pm 16.4	One-sample t test	35.3 to 42.5	<0.001*
Sex	Male	40 (50.6)	$\chi^2 = 0.01$	39.6% to 61.6%	0.910
	Female	39 (49.4)			
Site	Parotid gland (right + left)	49 (62.0)	$\chi^2 = 52.48$	51.3% to 72.7%	<0.001*
	Submandibular gland (right + left)	25 (31.6)			
	Minor salivary gland (lip)	5 (6.3)			
Nature of lesion	Benign	39 (49.4)	$\chi^2 = 18.43$	38.4% to 60.4%	<0.001*
	Malignant	9 (11.4)			
	Non-neoplastic	31 (39.2)			

Table 2: Histopathological patterns of salivary gland lesions (N = 79)

Histopathological pattern	n (%)	Test of significance	95% CI	p value
Pleomorphic adenoma	35 (44.3)	$\chi^2 = 87.62$	33.4% to 55.2%	<0.001*
Basal cell adenoma	1 (1.3)		0.0% to 3.7%	
Canalicular adenoma	1 (1.3)		0.0% to 3.7%	
Schwannoma	2 (2.5)		0.0% to 6.0%	
Mucoepidermoid carcinoma	8 (10.1)		3.5% to 16.8%	
Adenoid cystic carcinoma	1 (1.3)		0.0% to 3.7%	
Sialadenitis	12 (15.2)		7.3% to 23.1%	
Sjögren syndrome	5 (6.3)		0.9% to 11.7%	
Lymphoepithelial cyst	2 (2.5)		0.0% to 6.0%	
Abscess	12 (15.2)		7.3% to 23.1%	
Total	79 (100.0)			

[Table 2] illustrates the histopathological patterns of salivary gland lesions. The most common lesion observed was pleomorphic adenoma (44.3%), which showed a highly significant predominance ($p < 0.001$), confirming it as the most frequent salivary gland tumor. Among benign neoplasms, other lesions such as basal cell adenoma (1.3%), canalicular adenoma (1.3%), and schwannoma (2.5%) were relatively uncommon.

Among malignant tumors, mucoepidermoid carcinoma (10.1%) was the most common, followed by adenoid cystic carcinoma (1.3%), indicating that malignant lesions were less frequent overall.

Non-neoplastic lesions constituted a considerable proportion, with sialadenitis (15.2%) and abscess (15.2%) being the most common inflammatory conditions, followed by Sjögren syndrome (6.3%) and lymphoepithelial cyst (2.5%).

Table 3: Distribution of salivary gland lesions according to age and sex (N = 79)

Variable	Category	n (%)	Test of significance	95% CI	p value
Age group	0–20 years	8 (10.1)	$\chi^2 = 21.36$	3.5% to 16.8%	<0.001*
	21–40 years	26 (32.9)		22.5% to 43.3%	
	41–60 years	34 (43.0)		32.1% to 53.9%	
	>60 years	11 (13.9)		6.3% to 21.6%	
Sex	Male	40 (50.6)	$\chi^2 = 0.01$	39.6% to 61.6%	0.910
	Female	39 (49.4)			
Additional sex-wise age distribution					
Age group	Male n (%)	Female n (%)	Test of significance	95% CI for difference	p value
0–20 years	5 (6.3)	3 (3.8)	$\chi^2 = 1.84$	-0.07 to 0.18	0.606
21–40 years	13 (16.5)	13 (16.5)		-0.14 to 0.14	
41–60 years	16 (20.3)	18 (22.8)		-0.16 to 0.11	
>60 years	6 (7.6)	5 (6.3)		-0.10 to 0.13	
Total	40 (50.6)	39 (49.4)			

[Table 3] shows the distribution of salivary gland lesions according to age and sex. The majority of

cases were observed in the 41–60 years age group (43.0%), followed by 21–40 years (32.9%), >60 years

(13.9%), and 0–20 years (10.1%), with a statistically significant difference ($p < 0.001$). This indicates that salivary gland lesions were most prevalent in middle-aged individuals.

The sex distribution remained nearly equal, with 50.6% males and 49.4% females, and the difference

was not statistically significant ($p = 0.910$), reinforcing the absence of gender predominance.

Further analysis of age distribution across genders showed no significant association ($p = 0.606$), with comparable proportions of males and females in each age group. The highest number of cases in both sexes was seen in the 41–60 years age group.

Table 4: Site-wise distribution and classification of lesions into benign, malignant and non-neoplastic categories (N = 79)

Site	Benign n (%)	Malignant n (%)	Non-neoplastic n (%)	Total n (%)	Test of significance	95% CI	p value
Right parotid gland	16 (20.3)	4 (5.1)	9 (11.4)	29 (36.7)	$\chi^2 = 10.92$	25.9% to 47.5%	0.028*
Left parotid gland	11 (13.9)	2 (2.5)	7 (8.9)	20 (25.3)		15.7% to 34.9%	
Right submandibular gland	7 (8.9)	2 (2.5)	6 (7.6)	15 (19.0)		10.4% to 27.6%	
Left submandibular gland	4 (5.1)	1 (1.3)	5 (6.3)	10 (12.7)		5.4% to 20.0%	
Lip minor salivary gland	1 (1.3)	0 (0.0)	4 (5.1)	5 (6.3)		0.9% to 11.7%	
Total	39 (49.4)	9 (11.4)	31 (39.2)	79 (100.0)			

[Table 4] depicts the site-wise distribution of lesions along with their classification into benign, malignant, and non-neoplastic categories. The right parotid gland was the most commonly involved site (36.7%), followed by the left parotid gland (25.3%), indicating a predominance of parotid gland involvement overall. Submandibular gland involvement was also notable, with right side (19.0%) and left side (12.7%), while minor salivary gland involvement (lip) accounted for 6.3% of cases.

Benign lesions were predominantly observed in the parotid gland, especially on the right side (20.3%), followed by the left parotid and submandibular glands. Malignant lesions were relatively fewer and were also more commonly seen in the parotid region. Non-neoplastic lesions were distributed across all sites, with a notable presence in both parotid and submandibular glands.

The association between site and type of lesion was found to be statistically significant ($p = 0.028$), indicating that the distribution of benign, malignant, and non-neoplastic lesions varies significantly with anatomical location.



Figure 1: Pleomorphic adenoma; cut section of parotid gland showing grey white tumor

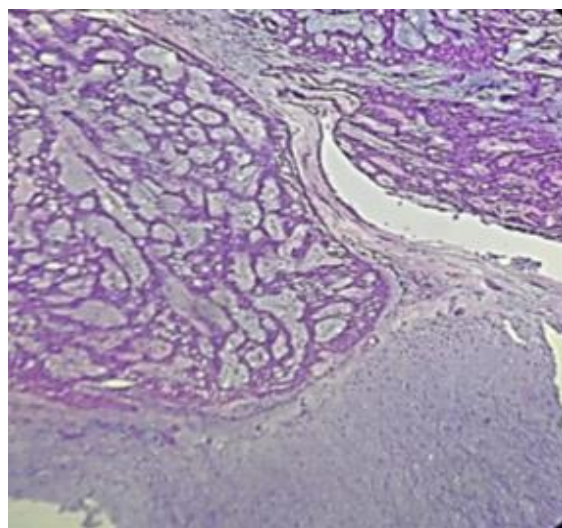


Figure 2: Pleomorphic adenoma showing ductal structures surrounded by chondromyxoid stroma (100X low power view, H&E)

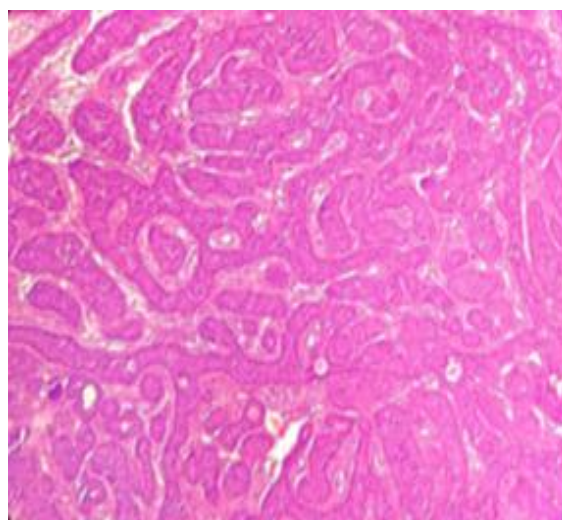


Figure 3: Basal cell adenoma; trabecular pattern showing elongated trabeculae with peripheral palisading separated by cellular stroma (100X low power view H&E)



Figure 4: Schwannoma; figure showing cut section of parotid gland with grey white mass.

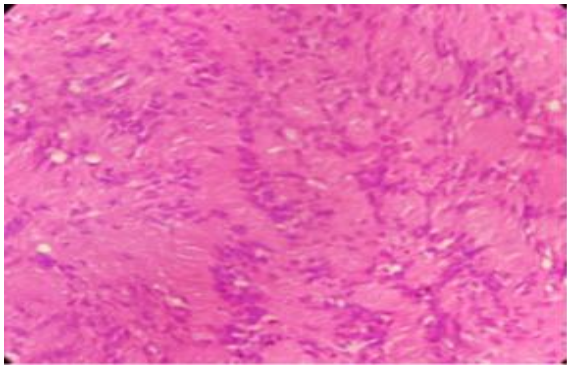


Figure 5: Schwannoma showing the hyper-cellular area composed of spindle cells showing nuclear palisading forming varocay bodies (400X high power view, H&E)



Figure 6: Mucoepidermoid carcinoma; cut section of left parotid gland showing grey white solid cystic mass.

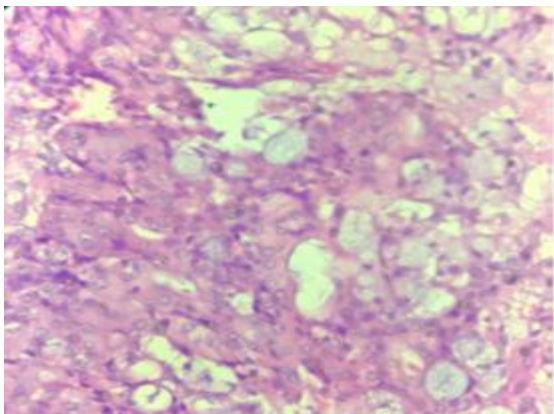


Figure 7: Mucoepidermoid carcinoma showing squamoid cells with mucus cells. (400X high power view, H&E)

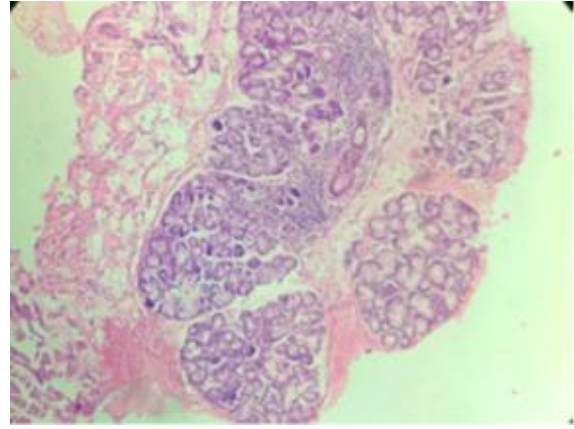


Figure 8: Sjogren syndrome salivary gland tissue with lymphoid aggregates focally destroying it (100X low power, H&E).

DISCUSSION

[Table 1] Clinicopathological spectrum of salivary gland lesions: In the present study, the mean age of patients was 38.9 ± 16.4 years, indicating that salivary gland lesions predominantly affected the middle-aged population. This finding is comparable to the study by Alsanie et al (2022),^[1] who reported a mean age of around 40–50 years in salivary gland tumors. Similarly, Kokubun et al (2023),^[2] observed a mean age of 42 years, supporting the present findings. However, Cunha et al (2021),^[3] reported a slightly higher mean age (around 46 years), suggesting regional variation.

The gender distribution in the present study showed almost equal male-to-female ratio (50.6% vs 49.4%), with no statistically significant difference ($p = 0.910$). This is in agreement with Ghartimagar et al (2020),^[4] who found no significant gender predilection in salivary gland tumors. However, McKenzie et al (2023),^[5] reported a slight female predominance, whereas Barreiros et al (2021),^[6] demonstrated a mild male predominance, indicating variability across populations.

Regarding site distribution, the parotid gland was the most commonly involved site (62.0%), followed by submandibular gland (31.6%) and minor salivary glands (6.3%), with a highly significant association ($p < 0.001$). This is consistent with Lavareze et al (2023),^[7] who reported that approximately 60–70% of salivary gland tumors arise in the parotid gland. Similar findings were also noted by Alsanie et al (2022),^[1] where parotid involvement was predominant. However, studies such as Nishida et al (2023),^[8] reported relatively higher involvement of minor salivary glands, suggesting geographical variation.

In terms of biological behavior, benign lesions constituted the majority (49.4%), followed by non-neoplastic lesions (39.2%) and malignant lesions (11.4%), with statistical significance ($p < 0.001$). This aligns with Barreiros et al (2021),^[6] who reported that nearly 70–80% of salivary gland tumors are benign. Similarly, Kokubun et al (2023),^[2]

observed a predominance of benign lesions, while Wang et al (2020),^[9] also emphasized the relatively lower proportion of malignant tumors.

[Table 2] Histopathological patterns of salivary gland lesions: The present study demonstrated that pleomorphic adenoma was the most common lesion (44.3%), which is consistent with multiple studies. Alsanie et al (2022),^[1] reported pleomorphic adenoma as the most frequent benign tumor, accounting for approximately 45–60% of cases. Similarly, McKenzie et al (2023),^[5] observed pleomorphic adenoma in nearly half of the cases, closely matching the present findings.

Among malignant lesions, mucoepidermoid carcinoma (10.1%) was the most common, followed by adenoid cystic carcinoma. This finding is in agreement with Cunha et al (2021),^[3] who reported mucoepidermoid carcinoma as the most common malignant tumor. Lavareze et al (2023),^[7] also confirmed that mucoepidermoid carcinoma is the predominant malignant salivary gland neoplasm.

Non-neoplastic lesions such as sialadenitis and abscess (each 15.2%) constituted a significant proportion. Similar observations were made by Ghartimagar et al (2020),^[4] who reported inflammatory lesions as a substantial component of salivary gland pathology. However, some studies such as Ghartimagar et al (2020),^[4] primarily focused on neoplastic lesions, thus reporting relatively lower proportions of inflammatory conditions.

The overall distribution of histopathological patterns was statistically significant ($p < 0.001$), indicating a clear predominance of pleomorphic adenoma, which is in line with global literature.

[Table 3] Distribution according to age and sex: In the present study, the highest number of cases were observed in the 41–60 years age group (43.0%), followed by 21–40 years (32.9%). This is consistent with Wang et al (2020),^[9] who reported peak incidence in the 4th to 6th decade. Similarly, Sharma et al (2023),^[10] observed that most salivary gland tumors occur in middle-aged individuals.

The absence of significant gender difference ($p = 0.910$) further supports findings by Cherian et al (2021),^[11] who reported nearly equal gender distribution. However, McKenzie et al (2023),^[5] noted a slight female predominance, indicating that gender variation may depend on population characteristics.

The age-wise distribution across sexes in the present study did not show statistical significance ($p = 0.606$), suggesting that both males and females are equally affected across all age groups. This finding is comparable to Rodrigues et al (2025),^[12] who also reported no significant gender-based age variation.

[Table 4] Site-wise distribution and lesion classification: The present study demonstrated that the parotid gland (especially right side) was the most commonly involved site, followed by submandibular and minor salivary glands, with a statistically significant association ($p = 0.028$). This finding is in agreement with Alramadhan et al (2020),^[13] who

reported the parotid gland as the most frequent site of salivary gland lesions.

Benign lesions were predominantly seen in the parotid gland, which is consistent with Sarwar et al (2025),^[14] who noted that most parotid tumors are benign. Malignant lesions, though fewer, were also mainly distributed in the parotid and submandibular glands. This pattern aligns with Aly et al (2022),^[15] who reported higher malignancy rates in smaller glands but overall predominance in major glands.

Non-neoplastic lesions were distributed across all sites, particularly in parotid and submandibular glands, similar to findings by Ghaderi et al (2023),^[16] who described a widespread distribution of inflammatory salivary gland conditions.

CONCLUSION

The present study provides a comprehensive evaluation of the spectrum of salivary gland lesions encountered in a tertiary care setting. The study highlights the diverse nature of salivary gland pathology, encompassing non-neoplastic, benign, and malignant lesions, each with distinct clinical and histopathological characteristics.

In this study, salivary gland lesions were observed across a wide age range, with a mean age of 38.9 ± 16.4 years, indicating that these lesions predominantly affect the middle-aged population. The highest incidence was noted in the 41–60 years age group, emphasizing that salivary gland pathologies are more common in the economically productive age group. However, the presence of lesions in younger and older age groups suggests that no age group is entirely spared, underlining the importance of early diagnosis and evaluation.

The gender distribution revealed an almost equal involvement of males and females, with no statistically significant difference. This finding indicates that salivary gland lesions do not exhibit a strong gender predilection, although slight variations may be observed depending on the type of lesion and geographical factors. The equal gender distribution further emphasizes that clinicians should maintain a high index of suspicion for salivary gland lesions in both sexes.

The site-wise distribution demonstrated that the parotid gland is the most commonly affected site, accounting for the majority of cases, followed by the submandibular gland and minor salivary glands. This finding is consistent with the known anatomical and functional characteristics of salivary glands, where the parotid gland, being the largest, is more prone to neoplastic and non-neoplastic conditions. The statistically significant association between site and lesion type further highlights the importance of anatomical location in determining the nature and behavior of salivary gland lesions.

From a pathological perspective, benign lesions constituted the majority of cases, followed by non-neoplastic lesions and a smaller proportion of

malignant tumors. Among benign lesions, pleomorphic adenoma emerged as the most common histological subtype, reaffirming its status as the most frequent salivary gland tumor. Its varied histological appearance underscores the importance of meticulous histopathological examination for accurate diagnosis.

Among malignant tumors, mucoepidermoid carcinoma was the most commonly encountered lesion, followed by adenoid cystic carcinoma. Although malignant lesions were relatively less frequent, their clinical significance lies in their aggressive behavior, potential for recurrence, and impact on patient prognosis. Therefore, early identification and appropriate management of these lesions are crucial.

Non-neoplastic lesions, including sialadenitis, abscess, and autoimmune conditions such as Sjögren syndrome, formed a substantial proportion of cases. These findings highlight that inflammatory and reactive conditions are common contributors to salivary gland pathology and should be considered in differential diagnosis.

The study also demonstrated a significant association between histopathological type, site distribution, and biological behavior, reinforcing the role of histopathology as the gold standard in diagnosis. The integration of clinical, radiological, and pathological findings is essential for accurate classification and optimal management of salivary gland lesions.

Limitations of Study

1. The sample size (n = 79) was relatively small, which may limit the generalizability of the findings.
2. The study was conducted at a single tertiary care center, which may not reflect the broader population distribution.
3. Being an observational study, causal relationships could not be established.
4. Limited use of advanced diagnostic techniques such as immunohistochemistry in all cases may have affected precise subtyping.
5. Lack of long-term follow-up data prevented assessment of recurrence and survival outcomes.
6. Some rare histological subtypes were underrepresented due to low incidence.
7. Potential selection bias as only biopsied or surgically excised cases were included.
8. Radiological correlation was not uniformly available for all cases.

REFERENCES

1. Alsanie I, Rajab S, Cottom H, Adegun O, Agarwal R, Jay A, Graham L, James J, Barrett AW, van Heerden W, De Vito M. Distribution and frequency of salivary gland tumours: an international multicenter study. *Head and neck pathology*. 2022 Dec;16(4):1043-54.
2. Kokubun K, Chujo T, Yamamoto K, Akashi Y, Nakajima K, Takano M, Katakura A, Matsuzaka K. Intraoral minor salivary gland tumors: a retrospective, clinicopathologic, single-center study of 432 cases in Japan and a comparison with epidemiological data. *Head and Neck Pathology*. 2023 Sep;17(3):739-50.
3. Cunha JL, Hernandez-Guerrero JC, de Almeida OP, Soares CD, Mosqueda-Taylor A. Salivary gland tumors: a retrospective study of 164 cases from a single private practice service in Mexico and literature review. *Head and Neck Pathology*. 2021 Jun;15(2):523-31.
4. Ghartimagar D, Ghosh A, Shrestha MK, Thapa S, Taiwar OP. Histopathologic profile of salivary gland tumors among specimens from a tertiary care hospital: A descriptive cross-sectional study. *JNMA: Journal of the Nepal Medical Association*. 2020 Oct 31;58(230):729.
5. McKenzie J, Lockyer J, Singh T, Nguyen E. Salivary gland tumours: an epidemiological review of non-neoplastic and neoplastic pathology. *British Journal of Oral and Maxillofacial Surgery*. 2023 Jan 1;61(1):12-8.
6. Barreiros P, Amaral J, Monteiro L, Vizcaíno J. Clinicopathology and Incidence Analysis of Malignant and Being Salivary Gland Tumours: A 20-Year Retrospective Study in the North of Portugal According to the New WHO Head and Neck Tumour Classification. *Ann med clin Oncol*. 2021;3:132.
7. Lavareze L, Scarini JF, de Lima- Souza RA, Kimura TD, Gondak RD, Egal ES, Altemani A, Mariano FV. Clinicopathological and survival profile of patients with salivary gland myoepithelial carcinoma: A systematic review. *Journal of Oral Pathology & Medicine*. 2023 Feb;52(2):101-8.
8. Nishida H, Kusaba T, Kawamura K, Oyama Y, Daa T. Histopathological aspects of the prognostic factors for salivary gland cancers. *Cancers*. 2023 Feb 15;15(4):1236.
9. Wang JQ, Deng RX, Liu H, Luo Y, Yang ZC. Clinicopathological characteristics and prognostic analysis of lymphoepithelial carcinoma of salivary gland: a population-based study. *Gland Surgery*. 2020 Dec;9(6):1989.
10. Sharma R, Manikandan M, Yadav V, Malik A, Thakur P. Clinicopathological and Demographic Profile of Salivary Gland Cancer Patients from a Tertiary Care Hospital: An Institutional Experience. *Journal of Head & Neck Physicians and Surgeons*. 2023 Jan 1;11(1):44-8.
11. Cherian DM, Jadhav RM, Murtuza S, Fatima T, Bhople KS. Histopathological spectrum of salivary gland lesions in rural India. *Journal of Pathology of Nepal*. 2021 Mar 20;11(1):1830-6.
12. Rodrigues FL, Colares DF, Ribeiro RR, Santos PP, Souza LB. A 14-year retrospective study on clinical and histopathological features of epithelial salivary gland neoplasms. *Revista Portuguesa de Estomatologia, Medicina Dentária e Cirurgia Maxilofacial*. 2025 Mar;66(1):17-24.
13. Alramadhan SA, Fitzpatrick SG, Cohen DM, Bhattacharyya I, Islam MN. Retrospective study of buccal mucosal salivary neoplasms. *Head and neck pathology*. 2020 Dec;14(4):1013-20.
14. Sarwar U, Ahsan J, Khurshid IK, Zubair M, Arif H, Umair M. Histopathological Spectrum of Salivary Gland Lesions Reported at a Tertiary Care Hospital, Kharian Cantt, Pakistan. *Pakistan Journal of Medicine and Dentistry*. 2025 Jul 21;14(3):270-6.
15. Aly MM, Abdul-Aziz MA, Elchaghaby MA. A retrospective analysis of oral and maxillofacial pathological lesions in a group of Egyptian children over 21 years. *BMC Oral Health*. 2022 Jan 7;22(1):2.
16. Ghaderi H, Kruger E, Ahmadvand S, Mohammadi Y, Khademi B, Ghaderi A. Epidemiological profile of salivary gland tumors in Southern Iranian population: a retrospective study of 405 cases. *Journal of Cancer Epidemiology*. 2023;2023(1):8844535.