Preetha S et al. GAIMS J Med Sci 2026;6(1) (Jan-June):124-131
Online ISSN: 2583-1763

Original Research Article

Histopathological Spectrum of Salivary Gland Tumors and Tumor-like Conditions: A Retrospective Study at a Tertiary Care Centre

S Preetha[1*], R Hemapriya[1], P Priyadharshini[2]

Department of Pathology, [1]Madras Medical College, Chennai, Tamil Nadu, India, [2]Government Medical College, Kallakurichi, Tamil Nadu, India

* Correspondence: Dr S Preetha (drpreetha88264@gmail.com)

ABSTRACT

Background: Salivary gland lesions represent a broad and heterogeneous spectrum of both neoplastic and non-neoplastic pathologies. These conditions frequently exhibit significant overlapping histo-morphological patterns, which present considerable diagnostic challenges for pathologists. Definitive characterization of these lesions relies primarily on comprehensive histopathological examination, judiciously supplemented by immunohistochemistry (IHC) to achieve accurate subtyping and to facilitate precise prognostic stratification.

Aims and Objectives: This study was meticulously designed with two primary objectives: first, to systematically delineate the histopathological spectrum of salivary gland tumors and tumor-like conditions that are routinely encountered at a major tertiary care referral center. Second, a crucial aim was to critically evaluate the diagnostic yield of fine-needle aspiration cytology (FNAC) and to assess the role of IHC in establishing definitive and accurate diagnoses for these complex lesions.

Materials and Methods: A total of fifty-one salivary gland specimens were meticulously subjected to retrospective review. Comprehensive data retrieved from departmental archives. Final diagnoses were stratified into three distinct categories: benign tumors, malignant tumors, and tumor-like or non-neoplastic conditions. FNAC reports were subsequently compared with the histopathological outcomes to compute key diagnostic performance metrics, including sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and overall accuracy.

Results: The study cohort comprised 51 patients, consisting of 29 males and 22 females, which yielded a male-to-female ratio of 1.3:1. The mean age of the cohort was determined to be 43.2. The parotid gland was the most commonly involved anatomical site (80.4%), followed by submandibular gland (11.8%) and minor salivary glands (2%). Benign tumors constituted 45.1% of all cases, while malignant tumors accounted for 19.6%, and tumor-like lesions represented 35.3%. Pleomorphic adenoma (35.3%) emerged as the most frequent benign tumor, with Warthin tumor (7.8%) being the second most common. Mucoepidermoid carcinoma (5.9%) was the most common malignancy. Tumor-like conditions, primarily constituted chronic sialadenitis (17.6%). FNAC demonstrated 86.7% diagnostic accuracy, with 100% specificity but only 33.3% sensitivity for malignancy (n=30). Selective IHC, including markers like DOG-1 and SOX10, provided crucial diagnostic information, and the Ki-67 index ranged from 3-10%.

Conclusion: Benign tumors, particularly pleomorphic adenoma, unequivocally predominated within this series, with mucoepidermoid carcinoma identified as the most frequently encountered malignancy. FNAC consistently demonstrated excellent specificity but exhibited notable limitations in sensitivity for malignancy detection. Consequently, the judicious and problem-oriented application of IHC substantially enhanced diagnostic accuracy in cases presenting with morphologically ambiguous lesions, highlighting its indispensable role in definitive diagnosis.

Keywords: Pleomorphic adenoma; Mucoepidermoid carcinoma; Warthin tumor; Immunohistochemistry

INTRODUCTION

Salivary gland tumors (SGTs) represent a relatively uncommon subset within the broader landscape of head and neck pathology, collectively comprising fewer than 5% of all neoplasms originating in this region [1,2]. Despite their comparative rarity, these lesions are characterized by an exceptional degree of morphological diversity, a feature that frequently presents substantial and intricate diagnostic challenges for even experienced pathologists. The anatomical distribution of SGTs demonstrates a distinct pattern, with the parotid gland being most frequently affected, consistently followed by the submandibular gland and, less commonly, the minor salivary glands [3]. This variability in anatomical site, coupled with a diverse histopathological spectrum, often results in clinical presentations that overlap significantly with those of more common inflammatory or reactive conditions, thereby profoundly complicating initial diagnostic impressions and necessitating a meticulous diagnostic approach.

The vast majority of SGTs are benign, with pleomorphic adenoma standing out as the principal entity, characterized by its distinctive epithelial and mesenchymal components. Warthin tumor consistently follows in frequency among the benign counterparts. In contrast, malignant SGTs, though less prevalent, possess significant clinical implications. These malignant lesions are notorious for their potential for local aggression, a tendency for recurrence even after seemingly complete excision, and the capacity for distant metastasis, which profoundly impacts patient prognosis and management strategies. Mucoepidermoid carcinoma and adenoid cystic carcinoma are recognized as the most frequently diagnosed malignant subtypes, each with unique clinical behaviors and therapeutic considerations [4,5]. Consequently, the accurate identification and precise classification of these entities, including meticulous grading, directly influence crucial clinical decisions such as the extent of surgical resection, the planning of adjuvant therapies, and the ultimate long-term prognosis for affected individuals.

Fine-needle aspiration cytology (FNAC) has long been and remains a widely employed preoperative diagnostic tool due to several compelling advantages, including its minimally invasive nature, rapid turnaround time, and notable cost-effectiveness. However, it is imperative to acknowledge that FNAC possesses well-documented limitations, which can hinder its definitive diagnostic capabilities, particularly in specific scenarios. These limitations are especially pronounced in distinguishing low-grade malignancies from benign lesions, where subtle cytological differences may be ambiguous, and in the comprehensive evaluation of biphasic or clear-cell-rich tumors, whose complex cellular compositions can obscure clear diagnostic features [6,7]. Consequently, histopathology remains unequivocally the definitive diagnostic modality. This gold standard enables not only precise classification in accordance with international criteria but also provides crucial prognostication based on a thorough assessment of grading and staging features derived from tissue architecture. Immunohistochemistry (IHC) serves as an increasingly valuable adjunct, especially in diagnostically challenging cases or when morphological features observed on routine hematoxylin and eosin (H&E) staining are equivocal or inconclusive [8,9,10]. The strategic application of IHC markers can effectively resolve diagnostic ambiguities by highlighting specific cellular lineages, differentiation patterns, and proliferative activities.

This study aims to systematically document the histopathological spectrum of salivary gland lesions at a tertiary care center in Chennai. Concurrently, it rigorously evaluates FNAC accuracy and the utility of IHC in routine diagnostic practice, thereby contributing to regional epidemiological understanding and refining diagnostic algorithms.

MATERIALS AND METHODS

Study Design and Setting: This investigation was designed and conducted as a retrospective, cross-sectional observational study. The choice of a retrospective design was predicated on the ability to efficiently analyze a substantial volume of existing pathological data and clinical records over a defined period, which is particularly suitable for assessing the prevalence and spectrum of relatively uncommon conditions such as SGTs. The study was exclusively undertaken within the Institute of Pathology at Madras Medical College, Chennai. This institution provides a robust and representative sample of salivary gland pathologies. The defined study period encompassed 18 months, from January 2023 to May 2024, ensuring that the collected data reflects current diagnostic practices and recent epidemiological trends.

Inclusion and Exclusion Criteria: Consecutive salivary gland excisions and biopsies with definitive histopathological diagnoses of tumor and tumor-like lesions from the departmental archives were included. Inadequate, poorly preserved, or non-representative specimens were excluded to ensure data quality and diagnostic accuracy.

Data Collection: A comprehensive dataset was retrieved from the departmental archives. The collected information encompassed patient demographics, including precise age at diagnosis and sex, the exact anatomical site of the lesion (e.g., parotid, submandibular, minor), laterality (left or right side), and the specific specimen type (e.g., excisional biopsy, incisional biopsy). Crucially, all available preoperative FNAC results, the final histopathological diagnosis rendered after tissue processing, and any accompanying IHC results were documented. In instances

where FNAC reports were available, the corresponding cytological smears were re-examined to ensure consistency and completeness of the cytological reporting.

Diagnostic Classification: All cases were broadly categorized into three fundamental groups: benign tumors, malignant tumors, or tumor-like/non-neoplastic conditions. This initial stratification facilitated a clear overview of the disease burden. Furthermore, all tumors underwent detailed subtyping and grading, adhering strictly to the most recent and authoritative World Health Organization (WHO) 5th edition criteria for Head and Neck Tumors [1]. The consistent application of these globally recognized criteria is paramount for ensuring diagnostic uniformity and comparability of results with international literature. For example, specific criteria for mucoepidermoid carcinoma grading (low, intermediate, high) were rigorously applied to ensure accurate prognostication.

Immunohistochemistry Panel: Immunohistochemistry (IHC) was applied selectively, not universally, based on specific morphologic suspicion that arose from the initial review of routine hematoxylin and eosin (H&E) stained sections. This problem-oriented approach optimizes resource utilization without compromising diagnostic accuracy. The meticulously chosen panel of markers comprised several key categories:

• Basal and Myoepithelial Markers: p63, a marker for basal and myoepithelial cells, essential for diagnosing biphasic tumors and myoepithelial-rich lesions; S100 protein, which also marks myoepithelial cells and neural differentiation; and calponin, another reliable myoepithelial marker. These markers are critical for elucidating the presence and distribution of myoepithelial components, which are vital for tumor types such as pleomorphic adenoma, adenoid cystic carcinoma, and epithelial-myoepithelial carcinoma.

• Ductal/Acinar Markers: Cytokeratin 7 (CK7), a broad-spectrum cytokeratin typically expressed in ductal epithelial cells, and Epithelial Membrane Antigen (EMA), another marker for epithelial differentiation. These markers help confirm the ductal epithelial lineage of many salivary gland neoplasms, assisting in the diagnosis of entities like adenocarcinomas and mucoepidermoid carcinomas.

• Lineage-Specific Markers: DOG-1 (Discovered On GIST-1), which is a highly sensitive and specific marker utilized for acinic cell differentiation, making it invaluable in confirming acinic cell carcinoma [8]. SOX10 (SRY-Box Transcription Factor 10) was employed for neural crest and myoepithelial differentiation, useful in distinguishing polymorphous adenocarcinoma, epithelial-myoepithelial carcinoma, and certain melanoma mimics [8,9]. GATA-3 (GATA-binding protein 3) was included, particularly useful for confirming ductal differentiation in mucoepidermoid carcinoma and secretory carcinoma, and Mammaglobin was specifically utilized to aid in the diagnosis of secretory carcinoma, given its high specificity [11].

• Proliferation Marker: The Ki-67 labelling index was meticulously recorded as a percentage of positive tumor cells. This marker provides an objective measure of the proliferative activity within the tumor, aiding in tumor grading and providing valuable prognostic information, particularly for malignant lesions.

Statistical Analysis: Descriptive statistics were performed to accurately summarize all collected data. Frequencies and percentages were systematically utilized for the presentation of categorical variables, such as patient sex, specific site distribution of lesions, and the distribution across diagnostic categories. Continuous variables, including patient age and the Ki-67 index, were comprehensively expressed as mean, standard deviation (SD) and median (interquartile range IQR), providing a robust representation of central tendency and dispersion. For FNAC results, a comprehensive set of diagnostic parameters, including sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and overall diagnostic accuracy, were meticulously computed by directly comparing FNAC findings with the final histopathological diagnoses, which were unequivocally considered the gold standard. All statistical data analysis was conducted using standard biostatistical methods and appropriate software packages to ensure accuracy and reliability of the reported findings.

RESULTS

Demographics: The study encompassed a total of 51 cases of salivary gland pathology, providing a robust dataset for analysis. The cohort demonstrated a male predominance, consisting of 29 males and 22 females, which yielded a male-to-female ratio of 1.3:1 (Table-1). This observation, while not statistically significant in this particular cohort, generally aligns with some epidemiological trends reported in certain SGT subtypes. The mean age of the patients at the time of diagnosis was calculated to be 43.2 years. The median age was 40 years, with an interquartile range (IQR) of 32.5–56.5 years. The broad age range observed, extending from 12 to 75 years, unequivocally indicates that salivary gland pathology affects a wide demographic spectrum, encompassing adolescents through to the elderly. However, a noticeable clustering of cases was observed in the middle decades of life, suggesting a peak incidence during adulthood (Tables 2A and 2B).

Site Distribution: The anatomical distribution of salivary gland lesions revealed a clear pattern. The parotid gland was identified as the most frequently involved major salivary gland, accounting for a substantial 80.4% (n=41) of all cases. This overwhelming predominance of parotid involvement is highly consistent with global literature and reflects the larger volume of glandular tissue within the parotid compared to other salivary glands. The submandibular gland was affected in 11.8% (n=6) of cases,

representing the second most common site. Conversely, involvement of the minor salivary glands was notably rare, constituting only 2% (n=1) of the total cases (Table-3). While less common, it is generally acknowledged that lesions in minor salivary glands carry a higher probability of malignancy compared to those in major glands, making their accurate diagnosis particularly critical. Laterality data indicated a slight, though statistically non-significant, predilection for lesions situated on the left side, which may be an incidental finding given the cohort size.

Table-1: Gender Distribution of Cases (n=51)

Gender	Number of cases	Percentage
Male	29	56.9
Female	22	43.1

Table-2A: Age Distribution of Cases (n=51)

Age group (years)	Number of cases	Percentage
10-19	4	7.8
20-29	7	13.7
30-39	15	29.4
40-49	7	13.7
50-59	13	25.5
60-69	2	3.9
70-79	3	5.9

Table-2B: Mean, Median and IQR of Age (years) Distribution of Cases

Number of cases	Mean (SD) of age	Median (IQR) of age	Age Range
51	43.2 (16.0)	40.0 (32.5-56.5)	12-75

Table-3: Site Distribution of Cases (n=51)

Gland Site	Number of cases	Percentage
Parotid	41	80.4
Submandibular gland	6	11.8
Minor salivary gland	1	2
Palate	1	2
Buccal mucosa	1	2
Maxilla	1	2

Histopathological Spectrum: The comprehensive histopathological evaluation revealed a clear predominance of benign tumors (Table-4A) (Figure-1: a,b), which constituted 45.1% (n=23) of the total cases. Pleomorphic adenoma, a tumor characterized by its classical dual epithelial and mesenchymal differentiation and typically encased by a fibrous capsule, was the leading benign entity, identified in 35.3% (n=18) of all cases. Its characteristic cytomorphology and architectural patterns make it relatively straightforward to diagnose on histopathology. Warthin tumor, also known as papillary cystadenoma lymphomatosum, followed in frequency, comprising 7.8% (n=4) of cases. This benign neoplasm is notable for its unique oncocytic epithelial lining and prominent lymphoid stroma, almost exclusively occurring in the parotid gland. One case of Basal cell adenoma was reported showing a monomorphic basaloid population of epithelial cells having scant cytoplasm. Tumor-like or non-neoplastic conditions (Figure-1: c,d) comprised a substantial proportion, representing 35.3% (n=18) of all cases, highlighting the importance of distinguishing these from true neoplasms. Chronic sialadenitis, an inflammatory condition leading to glandular destruction and fibrosis, was the most common non-neoplastic lesion, observed in 17.6% (n=9) of cases. This can often mimic neoplasms clinically. Other tumor-like conditions encountered included sclerosing sialadenitis, sialadenitis with mucinous metaplasia, acute inflammatory lesions (e.g., abscesses), Caseating granulomatous lymphadenitis (which can be due to localised or systemic tuberculous infection), and a critical documented case of invasive mucormycosis, a severe fungal infection with devastating potential, which emphasizes the broad differential diagnoses and an rare case of nodular oncocytic hyperplasia which is an unencapsulated nodular proliferations of epithelial oncocytes and clear cells (Table-4B).

Table-4A: Category of Lesions

Category	Number of cases	Percentage
Benign tumor	23	45.1
Tumor-like/non-neoplastic	18	35.3
Malignant tumor	10	19.6

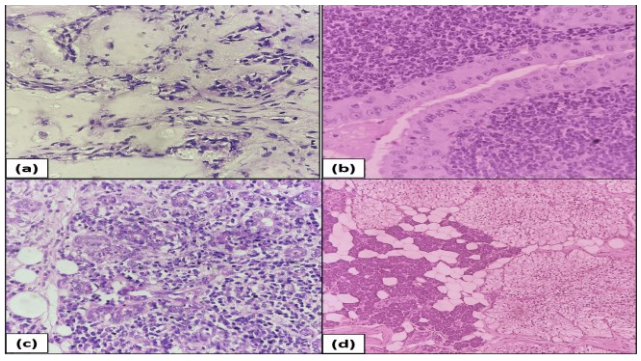

Figure-1: Benign tumors and non-neoplastic lesions of salivary gland (H&E;40x): (a) Pleomorphic adenoma, (b) Warthin tumor, (c) Chronic sialadenitis, (d) Nodular oncocytic hyperplasia (H&E;10x)

Table-4B: Histopathological Spectrum of Salivary Gland Lesions

Diagnosis	Number of cases	Percentage
Pleomorphic Adenoma	18	35.3
Chronic Sialadenitis	9	17.6
Warthin Tumor	4	7.8
Acute Inflammatory Pathology	3	5.9
Acinic Cell Carcinoma	2	3.9
Mucoepidermoid Carcinoma-Intermediate Grade	2	3.9
Mucoepidermoid Carcinoma-Low Grade	1	2
Adenoid Cystic Carcinoma	1	2
Epithelial-Myoepithelial Carcinoma	1	2
Myoepithelial Carcinoma	1	2
Hyalinizing Clear Cell Carcinoma	2	3.9
Basal Cell Adenoma	1	2
Chronic Sclerosing Sialadenitis	1	2
Chronic Sialadenitis with Mucinous Metaplasia	1	2
Nodular Oncocytic Hyperplasia-Clear Cell Type	1	2
Invasive Mucormycosis	1	2
Caseating Granulomatous Lymphadenitis	1	2
Descriptive	1	2

Malignant tumors represented a significant, albeit smaller, proportion of the overall spectrum, accounting for 19.6% (n=10) of the cases (Figure-2: e,f,g,h). Mucoepidermoid carcinoma, a malignancy composed of mucinous, epidermoid, and intermediate cells, was identified as the most frequent malignant tumor, accounting for 5.9% (n=3) of cases. Two of which was intermediate grade and one was of low grade (Grading as per AFIP system). Its varied cellular composition and potential for cystic degeneration can sometimes pose diagnostic challenges. This was succeeded by acinic cell carcinoma in 3.9% (n=2) of cases, a low-grade malignancy characterized by serous acinar differentiation. Two of hyalinizing clear cell carcinoma, a rare entity often presenting with distinct clear cell morphology along with other malignant entities identified, each with single cases, included epithelial-myoepithelial carcinoma, a biphasic tumor with distinct epithelial and myoepithelial components; myoepithelial carcinoma showing polyhedral cells arranged in nests and cords and adenoid cystic carcinoma, known for its aggressive infiltrative growth and perineural invasion were reported.

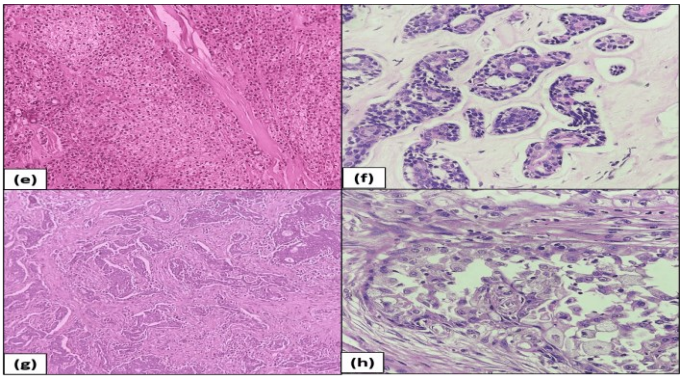

Figure 2: Malignant tumors of salivary gland: (e) Clear cell carcinoma (H&E;10x), (f) Adenoid cystic carcinoma (H&E;40x), (g) Myoepithelial carcinoma (H&E;10x), (h) Mucoepidermoid carcinoma (H&E;40x)

FNAC–Histopathology Correlation: FNAC-histopathology correlation was rigorously performed in 30 cases where both preoperative cytological reports and definitive histopathological diagnoses were available for comparative analysis. The overall concordance between FNAC and histopathology was determined to be 73.3%, indicating a reasonable level of agreement. FNAC demonstrated excellent specificity (100%) for malignancy, indicating no false positives. However, its sensitivity for malignancy was limited (33.3%), leading to false negative results predominantly in low-grade mucoepidermoid carcinoma and epithelial-myoepithelial carcinoma. This highlights the inherent cytological challenges in differentiating these entities from benign mimics due to morphological overlap. The overall diagnostic accuracy of FNAC was 86.7%, with 73.3% concordance with histopathology (Table-5).

Table-5: FNAC Correlation with HPE (n=30)

Correlation	Number of cases
True positive	2
True negative	24
False positive	0
False negative	4
Sensitivity	33.3
Specificity	100
Accuracy	86.7
Overall agreement	73.3

IHC Findings: Immunohistochemistry was strategically performed selectively in cases where morphological overlap, diagnostic ambiguity, or the need for specific subtyping was evident from the routine H&E sections. p63 expression, a highly reliable marker for myoepithelial differentiation, was universally observed in all three tested

cases, thereby confirming the presence and identity of myoepithelial cells in these particular lesions. Calponin and S100 protein, also recognized as robust myoepithelial markers, exhibited focal positivity in 25% of cases each where they were applied. The presence and pattern of these markers are critical for diagnosing entities like pleomorphic adenoma and adenoid cystic carcinoma, where myoepithelial cells play a significant role. CK7 and EMA consistently confirmed ductal epithelial lineage in relevant tumors, aiding in the classification of various epithelial neoplasms. DOG-1 and SOX10 proved particularly informative. DOG-1 was instrumental in confirming the diagnosis of acinic cell carcinoma, given its high specificity for acinar differentiation [8]. SOX10 played a pivotal role in characterizing biphasic tumors and other lesions with myoepithelial or neural differentiation components, such as polymorphous adenocarcinoma, thereby helping to delineate specific tumor types [8,9]. GATA-3 and mammaglobin, although less frequently employed in this series, provided additional discriminative value in diagnostically equivocal cases, aiding in the distinction of certain ductal-derived carcinomas, like secretory carcinoma [11]. The Ki-67 proliferative index, meticulously assessed in malignant cases, ranged from 3% to 10%, with a mean value of 5.7%. This index offers an objective measure of the tumor's proliferative activity, providing an additional crucial parameter for prognostication and grading, with higher indices generally correlating with more aggressive biological behavior [12].

DISCUSSION

This comprehensive institutional review provides valuable and detailed insights into the histopathological landscape of salivary gland pathology observed at a major tertiary care center in Chennai. The findings robustly corroborate the well-established international and national trends concerning the predominance of benign tumors within the spectrum of salivary gland lesions [13,14,15]. Specifically, pleomorphic adenoma was identified as the single most common lesion, consistent with its status as the most frequent benign salivary gland tumor globally. Its characteristic biphasic morphology and relatively indolent course contribute significantly to its high prevalence with a slight female predominance. Warthin tumor consistently followed in frequency, seen in men and associated with smoking which is also a pattern observed in numerous other series [14], particularly in regions with an older demographic or specific environmental exposures. Conversely, mucoepidermoid carcinoma emerged as the most frequently diagnosed malignant entity in this cohort, a finding that closely parallels data reported from other tertiary Indian centers [16,17]. This malignant tumor's variable grade and potential for diverse presentations underscore its diagnostic importance.

The critical evaluation of FNAC accuracy within this study revealed an excellent specificity but a disappointingly poor sensitivity for malignancy detection, a finding that consistently resonates with extensive global literature addressing the diagnostic utility of FNAC in salivary gland pathology [18,19,20]. While FNAC undeniably remains a valuable preoperative tool due to its minimally invasive nature, rapid results, and cost-effectiveness, these inherent limitations underscore the indispensable and definitive role of histopathology for accurate tumor subtyping, precise grading, and comprehensive prognostication. The diagnostic challenges inherent to FNAC are particularly evident in specific scenarios, such as in distinguishing low-grade carcinomas from benign mimickers, where the cytological features may be subtle or ambiguous. Examples include low-grade mucoepidermoid carcinoma and epithelial-myoepithelial carcinoma, both of which can exhibit bland cytological features that obscure their malignant potential on aspirate smears. Furthermore, FNAC can be particularly challenging in evaluating cystic lesions, where cellularity may be sparse, or in lesions with significant inflammatory components, which can obscure neoplastic cells. The relatively low sensitivity observed highlights the necessity for histopathological confirmation, even in cases with a benign FNAC diagnosis, particularly if clinical suspicion for malignancy remains high. This emphasizes a complementary rather than a mutually exclusive role for FNAC and histopathology.

The selective application of IHC proved diagnostically contributory in a significant subset of challenging cases, demonstrating its critical role in resolving diagnostic ambiguities. Myoepithelial markers, including p63, S100, and calponin, were crucial in confirming the presence and distribution of myoepithelial components, which is vital for the accurate classification of biphasic and myoepithelial-rich tumors, such as pleomorphic adenoma and epithelial-myoepithelial carcinoma. Ductal markers, comprising CK7, EMA, and GATA-3, supported the definitive classification of lesions exhibiting predominant ductal differentiation, aiding in the diagnosis of various adenocarcinomas and mucoepidermoid carcinomas. Notably, lineage-specific markers like DOG-1 and SOX10 were critical in confirming specific diagnoses of acinic cell carcinoma [8] and SOX10 in polymorphous adenocarcinoma, thereby resolving critical diagnostic dilemmas [8,9]. The Ki-67 proliferative index offered significant prognostic insight, with higher values generally correlating with more biologically aggressive behavior and poorer clinical outcomes [12]. The judicious, problem-oriented use of this comprehensive IHC panel, meticulously tailored to address specific morphological suspicions derived from routine H&E examination, ensured a high diagnostic yield while concurrently maintaining cost-effectiveness. This balanced approach is particularly vital and pragmatic in resource-limited healthcare settings, where optimizing diagnostic expenditure without compromising accuracy is paramount.

Strengths: This study integrates a comprehensive array of clinical, cytological, histopathological, and immunophenotypic data collected from a high-volume tertiary referral center. This holistic approach provides a robust and multifaceted view of salivary gland pathology encountered in routine practice. The deliberate and strategic use of a problem-oriented IHC panel, rather than a broad, indiscriminate application, significantly enhances the study's relevance and applicability to everyday diagnostic practice, especially in settings with limited resources.

Limitations: Despite its strengths, the retrospective design of this study inherently introduces certain limitations. These include the potential for incomplete FNAC and IHC data across all cases, as not all markers or procedures may have been uniformly applied in every instance, leading to some data gaps. The relatively small malignant cohort also restricts the generalizability of findings specifically related to individual malignant subtypes, making it challenging to draw definitive conclusions about the incidence or behavior of very rare tumors. Furthermore, as a single-center study conducted within a specific geographical region, the external validity and generalizability of these findings to broader national or international populations are necessarily limited. Future multicentric prospective studies encompassing larger and more diverse cohorts would significantly strengthen the robustness, statistical power, and overall generalizability of these important findings, thereby providing a more comprehensive understanding of SGT epidemiology and diagnosis.

CONCLUSION

Histopathology remains the undisputed diagnostic gold standard for the accurate and definitive classification of salivary gland tumors and associated tumor-like lesions. While fine-needle aspiration cytology (FNAC) consistently demonstrated high specificity, its inherent limitations, particularly its restricted sensitivity in malignancy detection, unequivocally reinforce the critical and indispensable need for subsequent histopathological confirmation. The selective and judicious application of immunohistochemistry (IHC), guided by specific morphological ambiguities, proved instrumental in refining diagnoses, especially in those challenging and equivocal cases where routine staining alone was insufficient. This study comprehensively highlights the clear and continued predominance of benign tumors within the salivary gland spectrum and meticulously delineates the intricate diagnostic complexities inherent to malignant salivary gland neoplasms. The findings not only contribute significantly to the regional epidemiological understanding of SGTs but also offer pragmatic, evidence-based guidance for diagnostic practice within resource-sensitive tertiary care centers, facilitating improved patient management and outcomes.

REFERENCES

1. WHO Classification of Head and Neck Tumours. 5th ed. Lyon: IARC; 2022.

2. WHO Classification of Tumours: Salivary Gland Tumours. 4th ed. Lyon: IARC; 2017.

3. Speight PM, Barrett AW. Salivary gland tumours. Oral Dis. 2002;8(5):229–40.

4. Barnes L, Eveson JW, Reichart P, Sidransky D. Pathology and Genetics of Head and Neck Tumours. Lyon: IARC; 2005.

5. Seethala RR, Stenman G, Nagao T. Update from the 5th edition of the WHO classification of head and neck tumours: salivary gland tumours. Head Neck Pathol. 2022;16(1):40–53.

6. Stewart CJ, MacKenzie K, McGarry GW, Mowat A. Fine-needle aspiration cytology of salivary gland: a review of 341 cases. Diagn Cytopathol. 2000;22(3):139–46.

7. Zbären P, Nuyens M, Loosli H, Stauffer E. Diagnostic accuracy of fine-needle aspiration cytology and frozen section in primary parotid carcinoma. Cancer. 2004;100(9):1876–83.

8. Skalova A, Starek I, Vanecek T, et al. Expression of SOX10 and DOG1 in salivary gland neoplasms: diagnostic utility. Histopathology. 2016;69(6):1006–15.

9. Ohtomo R, Mori T, Shibata S, et al. Diagnostic value of DOG1 and SOX10 in salivary gland tumors. Hum Pathol. 2013;44(11):2343–51.

10. Ellis GL, Auclair PL. Tumors of the Salivary Glands. Atlas of Tumor Pathology. Washington DC: AFIP; 2008.

11. Bishop JA, Yonescu R, Batista D, et al. Utility of GATA3 immunohistochemistry in salivary gland and head and neck tumors. Head Neck Pathol. 2014;8(3):311–7.

12. Skalova A, Vanecek T, Sima R, et al. Prognostic significance of Ki-67 index in salivary gland carcinomas. Histopathology. 2012;61(2):217–28

13. Subhashraj K. Salivary gland tumors: a single institution experience in India. Br J Oral Maxillofac Surg. 2008;46(8):635–8.

14. Vaidya S, Sugoor P, Halli R, et al. Clinicopathological spectrum of salivary gland tumours: a 10-year experience in South India. Indian J Otolaryngol Head Neck Surg. 2016;68(4):508–16.

15. Sharma N, Singh V, Sinha A, et al. Salivary gland tumors: clinicopathological analysis of 76 cases. J Oral Maxillofac Pathol. 2017;21(1):46–50.

16. Chauhan DS, Guruprasad Y. Incidence and management of salivary gland tumors: a 10-year retrospective study in India. Indian J Dent Res. 2018;29(6):665–70.

17. Kumar M, Pant MC, Singh AK, et al. Salivary gland tumors: clinicopathological spectrum in a North Indian tertiary hospital. J Oral Maxillofac Pathol. 2019;23(2):296–301.

18. Boccato P, Altavilla G, Blandamura S. Fine needle aspiration biopsy of salivary gland lesions: a reappraisal of pitfalls and problems. Acta Cytol. 1998;42(4):888–98.

19. Al-Khafaji BM, Nestok BR, Katz RL. Fine-needle aspiration of 154 parotid masses with histologic correlation: ten-year experience at The University of Texas M.D. Anderson Cancer Center. Cancer. 1998;84(3):153–9.

20. Baloch ZW, LiVolsi VA. Fine-needle aspiration of salivary gland lesions: recent advances and diagnostic problems. Diagn Cytopathol. 2002;27(4):197–202.

Source of support: Nil
Conflict of interest: None declared

How to cite: Preetha S, Hemapriya R, Priyadharshini P. Histopathological Spectrum of Salivary Gland Tumors and Tumor-like Conditions: A Retrospective Study at a Tertiary Care Centre. GAIMS J Med Sci 2026;6(1):124-131.
https://doi.org/10.5281/zenodo.18368507