

IASR J. Med. Pharm. Sci.
ISSN: 2582-9343
Website: https://ijmps.com/
Open Access Journal
Country: India

IASR Journal of
Medical and Pharmaceutical
Science

ORIGINAL ARTICLE OPEN ACCESS

Clinicopathological Spectrum and Management Outcomes of Salivary Gland Tumours: A Hospital Based Observational Study

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OPEN ACCESS

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Received: 04 Oct 2026
Accepted: 20 Oct 2026
Published: 18 Nov 2026

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ABSTRACT

Background: Salivary gland neoplasms occur in a variety of histologies and sites, including the parotid, submandibular, sublingual, and minor salivary glands of the upper aerodigestive tract. They are categorized as epithelial tumors and stromal tumors according to the most recent WHO classification. [1] Primary epithelial salivary gland tumours (SGTs) are diverse group of tumors that pose a diagnostic challenge as there is no uniform classification and there are varying presentations and overlap between benign and malignant types. WHO outlines histopathological basis as the main and primary modality for classifying SGTs despite availability of immunohistological and molecular study modalities. Also non neoplastic lesions may resemble SGTs as well. Therefore this study aims to identify in patients presenting with salivary gland tumours; its etiology, associated factors, pattern of presentation, tumour behaviour and outlining a basic management outcome and prognosis for the same.

Materials and Methods: In this study, 25 medical records of patients with salivary gland neoplasms in a tertiary care center for 1 year duration (1st June 2025- 31st May 2026) were reviewed. The clinical data and histopathological features were analyzed using appropriate statistical tests. Continuous variables were summarised using measures of central tendency such as mean and median, while associations between categorical variables were assessed using Fisher's exact test.

Results: Among 25 patients, females predominated (60%) and the mean age was 43.16 ± 16.68 years. The parotid was the most common site (84%), and pleomorphic adenoma was the predominant histopathological diagnosis (80%). FNAC–histopathological concordance was 84%, with 16% discordance, including one adenoid cystic carcinoma. Superficial parotidectomy was the most common procedure (56%). Postoperative complications occured in 12% of patients, all involving facial nerve dysfunction.

Conclusion: Pleomorphic adenoma is the most common salivary gland tumor. Although most of the results of this study were similar to those reported in other populations, some differences were observed.

Key Words: *Benign tumors, epidemiology, malignant tumors, salivary gland tumors, pleomorphic adenoma.*

INTRODUCTION

The most common benign neoplasms found in the parotid gland are pleomorphic adenoma (53.3-85%), Warthin's tumor (25-32%), Basal cell adenoma (2-7%), Myoepithelioma (1-3%) and Oncocytoma (1%). Majority of these benign lesions present as painless, slow growing mass of insidious onset.[2]

The submandibular gland encompasses 10 to 15% of all salivary gland tumors, with an even distribution of benign and malignant neoplasms. The most common benign submandibular tumor is pleomorphic adenoma, which consists of 36% of all submandibular tumors.[3]

Sublingual gland tumors are extremely rare. The most common benign sublingual gland tumor is pleomorphic adenoma. Minor salivary glands comprise 9.5% to 14.7% of all salivary gland tumors, with the most commonly affected site being the palate.[4]

Salivary gland tumors are heterogeneous in their morphology and are postulated to develop from the same stem-cell differentiation pathways as normal salivary gland tissues. Four main theories have been proposed. These include the basal reserve cell theory, pluripotent unicellular reserve cell theory, semi-pluripotent bicellular reserve cell theory and multicellular theory. [5] [6]

In histopathological examination, salivary glands have various presentations according to their cells of origin, eg. pleomorphic adenomas have mixed epidermal and mesenchymal components. Warthin tumour presents with a classic bi-layered eosinophilic, oncocytic epithelium with papillary projections and interspersed goblet cells. A stroma of varying amounts of lymphoid tissue and germinal centers surrounds the epithelium. [3] They have some chances of recurrence if inadequate excision done. Likewise rarer types like sebaceous adenoma, myoepithelioma, ductal papilloma present in some patients and are not known to recur commonly.

The standard protocol for all benign salivary gland tumours is excision which can be done as a conservative or a wider approach, such as total conservative parotidectomy in case of deep lobe tumours.

The present study evaluates the clinicopathological profile, FNAC–histopathological correlation, surgical management and short-term postoperative outcomes.

MATERIALS AND METHODS:
In this study, the medical records of patients with salivary gland neoplasms, that were archived in the Department of ENT and Head & Neck surgery along with cooperation from Department of Pathology in a tertiary health care center from 1st June 2025 to 31st May 2026 were reviewed in a prospective manner. The total number of salivary gland tumors was 25 cases. Ethical committee approval was received from the institutional Ethics and Scientific Committee (Approval no: 14/2025, Date: 28/05/2025). Written and verbal informed consent was obtained from all the patients who agreed to take part in the study. The clinical data (age, gender, site of lesion, FNAC findings and histopathological pattern) were considered. The microscopic hematoxylin and eosin stained slides of all cases were reviewed by pathologists and all of the diagnoses were classified according to WHO classification of salivary gland neoplasms.[1] The data was analyzed by appropriate statistical tests such a descriptive statistics, Fisher's exact and Fisher-Freeman-Halton exact tests. $p < 0.05$ was considered to be statistically significant.

RESULTS:
Demographic characteristics-
There were 25 patients in the study. Fifteen were female (60%) and 10 were male (40%), giving a female-to-male ratio of 1.5:1.

The age ranged from 17 to 70 years, with a mean age of 43.16 ± 16.68 years and a median age of 45 years.
The largest age group was 40–59 years, comprising 12 patients (48%). The 20–39-year group included 5 patients (20%), while 4 patients each belonged to the 0–19-year and 60–79-year groups (16% each). The study population showed a predominance of middle-aged patients, with nearly half of the cases occurring between 40 and 59 years. (Table 1)

Table 1. Distribution of patients according to age group

Age group	No. of patients	Percentage
0–19 years	4	16%
20–39 years	5	20%
40–59 years	12	48%
60–79 years	4	16%
Total	**25**	**100%**

Table 2. Distribution according to sex

Sex	No. of patients	Percentage
Male	10	40%
Female	15	60%
Total	**25**	**100%**

A female predominance was observed, with females constituting 60% of the study population. (Table 2)
The parotid gland was the most frequently involved site, accounting for 21 of the 25 cases (84%). The submandibular gland accounted for 2 cases (8%), while 2 cases (8%) involved minor salivary gland/floor-of-mouth regions. (Table 3)

Table 3. Distribution according to site

Site	No. of patients	Percentage
Parotid gland	21	84%
Submandibular gland	2	8%
Sublingual gland	0	0
Minor salivary gland	2	8%
Total	**25**	**100%**

FNAC findings-
FNAC suggested pleomorphic adenoma in 19 patients (76%). Four cases were reported as cystic/cyst-like lesions, one as sialadenitis and one as Warthin tumour. (Table 4)

Table 4. FNAC findings

FNAC diagnosis	No.	Percentage
Pleomorphic adenoma	19	76%
Cyst/cystic lesion	4	16%
Sialadenitis	1	4%
Warthin tumour	1	4%
Total	**25**	**100%**

Histopathological finding- Histopathology demonstrated pleomorphic adenoma in 20 patients (80%). Two patients had parotid cysts, one had Warthin tumour, one had adenoid cystic carcinoma with perineural invasion and one had cellular angiofibroma/soft fibrous tumour. (Table 5)

Table 5. Histopathological diagnosis

Histopathological diagnosis	No.	Percentage
Pleomorphic adenoma	20	80%
Parotid cyst	2	8%
Warthin tumour	1	4%
Adenoid cystic carcinoma with perineural invasion	1	4%
Cellular angiofibroma/soft fibrous tumour	1	4%
Total	**25**	**100%**

FNAC–histopathological correlation-
FNAC and histopathology were concordant in 21 of 25 cases (84%). Four cases (16%) showed clinically relevant discordance. (Table 6)

The four discordant cases were:

1. FNAC: sialadenitis → HPE: pleomorphic adenoma.
2. FNAC: pleomorphic adenoma → HPE: adenoid cystic carcinoma with perineural invasion.
3. FNAC: benign cystic lesion → HPE: pleomorphic adenoma.
4. FNAC: cystic lesion → HPE: cellular angiofibroma/soft fibrous tumour.

The case of adenoid cystic carcinoma is important because the lesion was diagnosed as pleomorphic adenoma on FNAC but was identified as adenoid cystic carcinoma with perineural invasion on definitive histopathology.

Table 6. FNAC–HPE correlation

Finding	No.	Percentage
Concordant	21	84%
Discordant	4	16%

Total	**25**	**100%**

Although FNAC demonstrated a good portion of concordance with histopathology, four cases showed diagnostic discordance, thus highlighting the importance of definitive histopathological examination.

Surgical management- The most frequently performed operation was superficial parotidectomy, accounting for 14 cases (56%). Total conservative parotidectomy was performed in 4 cases (16%). Excision was performed in 3 cases (12%), submandibular sialadenectomy in 2 cases (8%), extracapsular parotidectomy in 1 case (4%) and total parotidectomy with supraomohyoid neck dissection in 1 case (4%).

Postoperative complications - Postoperative complications occurred in 3 of 25 patients (12%). All three complications involved facial nerve dysfunction.

Two patients (8%) developed temporary facial palsy, while one patient (4%) developed permanent facial palsy. The facial nerve dysfunction was recorded as House–Brackmann grade III for temporary palsy and grade V for permanent palsy in the study dataset. No patient developed seroma or haematoma, Frey's syndrome, wound infection or salivary fistula**.** At 3 months follow up, no recurrence was documented. One patient had persistent neurological deficit related to permanent facial nerve dysfunction. (Table 7)

Table 7. Surgical procedure versus postoperative complication

Surgical procedure	**Complication present**	**No complication**	**Total**
Superficial parotidectomy	2	12	14
Total conservative parotidectomy	0	4	4
Excision	0	3	3
Submandibular sialadenectomy	0	2	2
Extracapsular parotidectomy	0	1	1
Total parotidectomy + SOHND	1	0	1
Total	**3**	**22**	**25**

Using the Freeman–Halton extension of Fisher's exact test for the 6×2 table, the association was **not statistically significant (p=0.364)**.

Surgical procedure versus facial nerve dysfunction-
The distribution of facial nerve dysfunction was identical to that of postoperative complications: two temporary and one permanent facial palsy. (Table 8)

Table 8. Surgical procedure versus facial nerve dysfunction

Surgical procedure	**Facial dysfunction**	**No dysfunction**	**Total**
Superficial parotidectomy	2	12	14
Total conservative parotidectomy	0	4	4
Excision	0	3	3
Submandibular sialadenectomy	0	2	2
Extracapsular parotidectomy	0	1	1
Total parotidectomy + SOHND	1	0	1
Total	**3**	**22**	**25**

The Freeman–Halton exact test showed **no statistically significant association (p=0.364)**.

DISCUSSION:
The present study evaluated 25 cases of salivary gland tumours/lesions with respect to demographic characteristics, site, FNAC, histopathology, surgical management and short-term outcome.

The study shows a female predominance, with females accounting for 60% of the cases. A similar female predominance was reported by de Oliveira et al.[7] Al-Khateeb and Ababneh also reported a slight female predominance, with a male-to-female ratio of 1:1.2.[2] In contrast, Subhashraj's Indian series included a broader population of benign and malignant

tumours and reported different sex distributions according to tumour category.[8] These differences emphasize the geographical and population-related variation described in epidemiological studies of salivary gland neoplasia.

The mean age in the present study was 43.16 years, with the 40–59-year age group accounting for 48% of cases. This is broadly comparable with several published series. Al-Khateeb and Ababneh reported a mean age of 40 years in their North Jordanian series, while de Oliveira et al. reported a median age of 45 years.[2,7] Lukšić et al. reported an average age of 50 years among patients with benign tumours in their Croatian series.[9] The difference between studies may be attributable to differences in inclusion criteria, tumour spectrum and population characteristics.

The parotid gland was the predominant anatomical site in the present study, accounting for 84% of cases. This is consistent with several major series. Al-Khateeb and Ababneh reported the parotid as the most common major salivary gland site, accounting for 51% of cases.[2] Subhashraj reported parotid involvement in 61% of cases, while de Oliveira et al. reported parotid involvement in 68.5%.[7,8] The higher proportion of parotid lesions in the present study may partly reflect the relatively small sample size and the clinical setting from which the cases were obtained.

The predominance of pleomorphic adenoma was one of the most consistent findings. Histopathology identified pleomorphic adenoma in 20 of 25 cases (80%). This is comparable with the high proportion reported in other series. Subhashraj reported pleomorphic adenoma in 86% of benign tumours in his Indian institutional series [8], while Jaafari-Ashkavandi et al. reported pleomorphic adenoma as the most frequent benign neoplasm, accounting for 80.2% of their cases.[10] De Oliveira et al. reported pleomorphic adenoma as the most common tumour overall, accounting for 68.4% of cases.[7] Thus, the predominance of pleomorphic adenoma in the present study is in keeping with the general pattern reported in several populations, although the exact percentage varies.[7,8,10]

The present study also demonstrated one Warthin tumour. Warthin tumour is recognized as one of the important benign salivary gland neoplasms in larger epidemiological series, although its frequency varies considerably between populations.[7,9] Its occurrence as a single case in the present study is therefore not unexpected given the small sample size.

An important finding was the presence of one adenoid cystic carcinoma with perineural invasion. This case was diagnosed as pleomorphic adenoma on FNAC. Adenoid cystic carcinoma is a recognized malignant salivary gland neoplasm and is particularly relevant because of its propensity for perineural spread. In the North Jordanian series of Al-Khateeb and Ababneh, adenoid cystic carcinoma represented the most frequent malignant neoplasm, accounting for 13% of the total series.[2] Otoh et al. also reported adenoid cystic carcinoma as an important malignant tumour, particularly among minor salivary gland lesions.[11]

The FNAC–histopathological comparison demonstrated 84% concordance and 16% clinically relevant discordance. The discordant cases included sialadenitis subsequently diagnosed as pleomorphic adenoma, a cystic lesion subsequently diagnosed as pleomorphic adenoma, pleomorphic adenoma on FNAC subsequently diagnosed as adenoid cystic carcinoma, and a cystic lesion subsequently diagnosed as cellular angiofibroma/soft fibrous tumour. The findings reinforce the role of histopathology in establishing the final diagnosis, particularly in lesions with overlapping or misleading cytological appearances. The complexity and morphological overlap of salivary gland neoplasms have been emphasized in pathological literature.[3,5,6]

The cellular angiofibroma identified in the present study is unusual in this context. Cellular angiofibroma is a benign mesenchymal neoplasm that most commonly occurs in the vulvoperineal and paratesticular regions; Eversole reported two cases involving the oral mucosa and emphasized its rarity at this site.[12] The presence of such a lesion in a floor-of-mouth/minor-gland region therefore represents an unusual finding in the present dataset rather than a typical salivary gland tumour. Furthermore IHC analysis is warranted.

Surgical management in the present series was predominantly directed toward parotid lesions, with superficial parotidectomy being the most frequently performed procedure (56%). The choice of surgical procedure in benign salivary gland neoplasms is influenced by tumour location, size, relationship to the facial nerve, gland involved and the requirement for adequate tumour removal. Carlson and McCoy emphasized the importance of appropriate margins and preservation of the pseudocapsule during surgery for benign salivary gland neoplasms.[4]

Postoperative complications occurred in 12% of patients. All recorded complications involved facial nerve dysfunction, with temporary facial palsy in 8% and permanent facial palsy in 4%. The relatively low overall complication rate should be interpreted cautiously because of the small sample size. Furthermore, the occurrence of facial nerve dysfunction primarily in patients undergoing more extensive parotid surgery is clinically plausible, but the present study was not sufficiently powered to establish a statistically significant relationship between procedure type and facial nerve dysfunction.

Comparison with large international series demonstrates that the broad pattern of the present study is generally compatible with established epidemiological observations, but there are important quantitative differences. For example, the Brazilian series reported 68.5% parotid involvement, whereas the present series showed 84%; Subhashraj reported 61% parotid involvement, whereas the present study showed a substantially higher proportion.[7,8] The Sri Lankan series reported a much larger proportion of minor salivary gland tumours and an approximately equal benign-to-malignant distribution, illustrating the substantial population differences in tumour distribution.[13] Similarly, the Croatian series demonstrated a substantial number of minor salivary gland tumours and a higher proportion of malignant tumours than seen in the present dataset.[9]

CONCLUSION:

This study highlights that benign salivary gland tumours predominantly affected females and the parotid gland, with pleomorphic adenoma being the most common histopathological diagnosis. Surgical management was generally associated with favourable short-term outcomes, with facial nerve dysfunction being the main postoperative complication. The study also emphasizes the importance of definitive histopathological examination, particularly in detecting unexpected malignant pathology.

Larger, multicentric studies with longer follow-up are required to establish more reliable associations and long-term treatment outcomes.

Conflict of interest: None

Funding: None

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