

**Fine Needle Aspiration Cytology (FNAC) In the Diagnosis of Salivary Gland Lesion**

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**Abstract**

Salivary gland tumours are uncommon painless enlarged masses, the overall incidence in the Western world is 2.5-3.0 cases / 100000 populations per year. It is difficult to study their biologic activity and response to therapy<sup>1</sup> Most of the patients who are in their sixth or seventh decade of life are reported with salivary gland tumors.<sup>2,3</sup> Salivary gland tumors are difficult to diagnose in regards to their origin. These tumors affect approximately 3% of parotid tumors of head and neck.<sup>4</sup> The fine needle aspiration cytology (FNAC) is an reliable diagnostic measure which differentiate the swelling and mass formation and also identify the origin. As preauricular and submandibular lymph node swellings can mimic salivary gland neoplasm, FNAC clinically diagnose the nature of tumor / mass.<sup>11</sup> Patients with salivary gland swelling referred for cytological examination were selected as the study participants. Total 105 patients with salivary gland swelling attended the cytopathology section of the department during the one year period were included in the study. Fine-needle aspiration in the salivary gland was done using 22 gauze needle and 5 cc

syringe and smears were stained with Giemsa stain. FNAC diagnoses results were divided into non-neoplastic lesions, benign neoplasms and malignant neoplasms. The present study shows that the parotid gland was the commonest site of involvement and majority of lesions were neoplastic. So, it is concluded that that the fine needle aspiration cytology (FNAC) of the salivary gland is a safe and reliable technique in diagnosis of salivary gland lesions which distinguish the benign and malignant lesions and further helped in planning appropriate treatment for the patient.

**Keywords:** Carcinoma, Neoplasm, FNAC, Salivary gland neoplast, Salivary gland lesions.

**Introduction**

Salivary gland tumors are uncommon painless enlarged masses, the overall incidence in the Western world is 2.5-3.0 cases / 100000 populations per year. It is difficult to study their biologic activity and response to therapy<sup>1</sup> Most of the patients who are in their sixth or seventh decade of life are reported with salivary gland tumors.<sup>2,3</sup> Salivary gland tumors are difficult to diagnose in regards to their origin. These tumors affect approximately 3% of

parotid tumors of head and neck.<sup>4</sup> Approximately 15% of salivary neoplasm arise in the submandibular salivary gland, of which 60% are benign among them 95% tumors are pleomorphic. 10% of salivary neoplasms arise from minor salivary glands, of which only 40% are benign and all the benign tumors are pleomorphic adenomas.

Tumors can be formed in major and minor salivary glands.<sup>5</sup> The salivary gland tumors consist of a variety of morphological patterns at a single site and the characteristics of the lesion cannot be determined through clinical examination, thus, pathological examination is required.<sup>6,7</sup>

World Health Organization (WHO) in 2005 identified 24 different malignant salivary gland cancers; the most common histologies include mucoepidermoid carcinoma (MEC), acinic cell carcinoma (ACC), adenoid cystic carcinoma (AdCC), carcinoma ex-pleomorphic adenoma (CExPA), and adenocarcinoma.<sup>8</sup>

In 1920, technique of aspiratory puncture with fine needle was used to identify the injuries in salivary gland.<sup>9</sup> The fine needle aspiration cytology (FNAC) differentiate the benign and malignant diseases and now these days FNAC has become a common possible approach to diagnose the tumors / masses in head and neck.<sup>10,11</sup>

The fine needle aspiration cytology (FNAC) is reliable diagnostic measure which differentiate the swelling and mass formation and also identifies the origin. As preauricular and submandibular lymph node swellings can mimic salivary gland neoplasm, FNAC clinically diagnose the nature of tumor / mass.<sup>11</sup> However, many of the salivary gland tumors are the heterogenic due to overlapping of their cytomorphological features presents

which is a challenge to conclude with precise diagnosis in some instances.

Fine-needle aspiration cytology (FNAC) is used widely in the diagnosis of head and neck tumors which is safe, quick, simple, inexpensive, well-accepted and well-tolerated diagnostic approach.<sup>12</sup>

FNAC provides the best possible assessment in collaboration with clinical and radiological findings which helps in appropriate management. Majority of the salivary glands does not have specific clinical symptoms, thus, the FNAC can evaluate the nature and condition of the tumors / masses.

Although the fine needle aspiration cytology is an accurate method in diagnosing the histopathology but inadequate sampling and inappropriate preparation of sample can be a diagnostic error.

The collaboration of FNAC findings with clinical and radiological findings provides an appropriate data / result.<sup>13</sup>

The present study was undertaken to elucidate the cytomorphological features of various salivary gland lesions.

### **Material and methods**

This prospective observational study was done in the department of pathology of Government Medical College, Jammu, during the period January 2019 to December 2019 after obtaining approval from the institute ethical committee.

Patients with salivary gland swelling referred for cytological examination were selected as the study participants.

Total 105 patients with salivary gland swelling attended the cytopathology section of the department during the one year period were included in the study.

Detailed clinical examinations followed by routine haematological and biochemical investigations were carried out in all cases. Fine-needle aspiration in the salivary gland was done using 22 gauge needle and 5 cc syringe and smears were stained with Giemsa stain. FNAC diagnoses results were divided into non-neoplastic lesions, benign neoplasms and malignant neoplasms.

Data was organized, tabulated, analyzed and interpreted in both descriptive and inferential statistics i.e. frequency and percentage distribution, mean by using statistical package for social science software (SPSS), version 21. Categorical variables were expressed as number and percentage.

**Observations and results**

In the present study, 105 cases of salivary gland swelling had undergone fine-needle aspiration and cytological diagnosis.

Age range was from 12 to 79 years; the youngest patient was 12 years old and the oldest was 79 years old with maximum cases were found in the age range of 31-40 years as depicted in table no. 1.

Table 1: Age distribution

Age range	No. of cases	Percentage
0-10	0	0
11-20	2	1.9
21-30	13	12.3
31-40	59	56.19
41-50	12	11.42
51-60	4	3.8
61-70	5	4.76
71-80	10	9.52

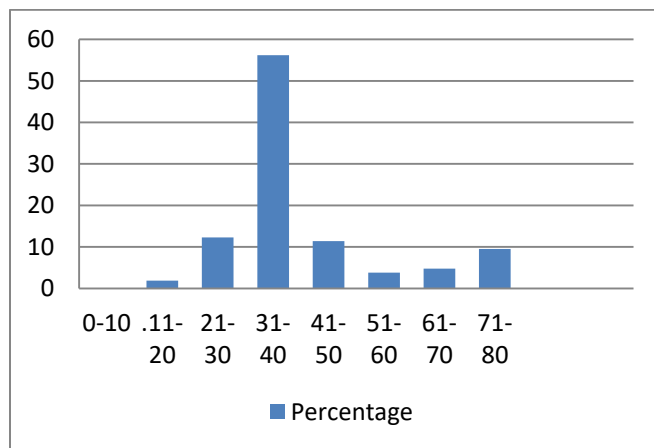


Figure 1: Age distribution

In the present study majority of the cases were males 79.04% and 20.95% cases were females with the male female ratio of 3.77:1 as depicted in table no. 02.

Table 2: Gender distribution

Gender	No. of cases	Percentage
Male	83	79.04
Female	22	20.95

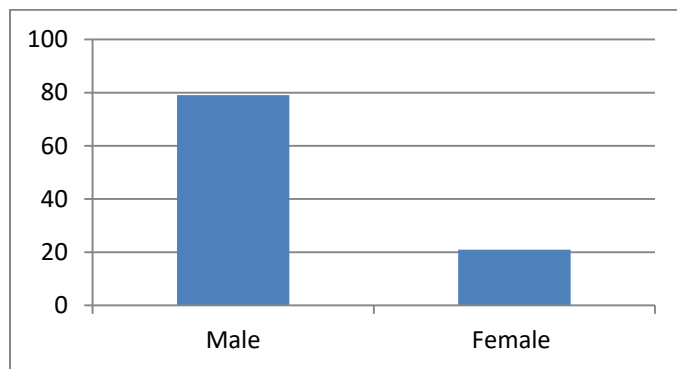


Figure 2: Gender distribution

In the majority of the participants the swelling was seen on the right side (70.4%) compared to the left side (29.5%) as depicted in table no. 03.

Table 3: Side involved

Side involved	No. of cases	Percentage
Right	74	70.4%
Left	31	29.5%

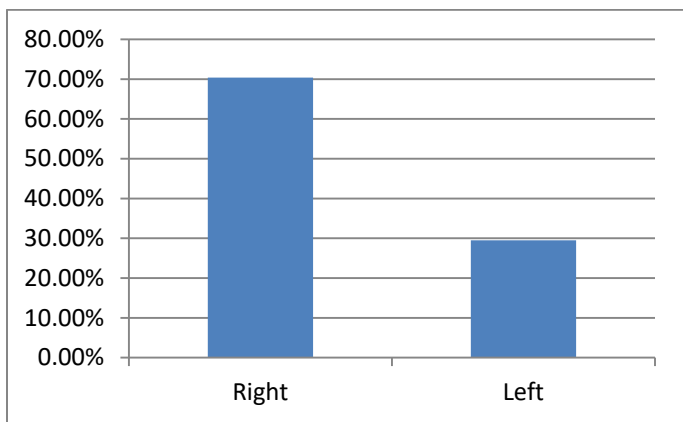


Figure 3: Side involved

Present study showed parotid gland as the most frequent site of involvement in all categories of salivary gland lesion (64.76%) followed by submandibular gland (21.9%) while minor salivary gland contributed less (13.33%) as depicted in table 4.

Table 4: Site involved

Site involved	No. of cases	Percentage
Parotid gland	68	64.76
Submandibular gland	23	21.9
Minor salivary gland	14	13.33

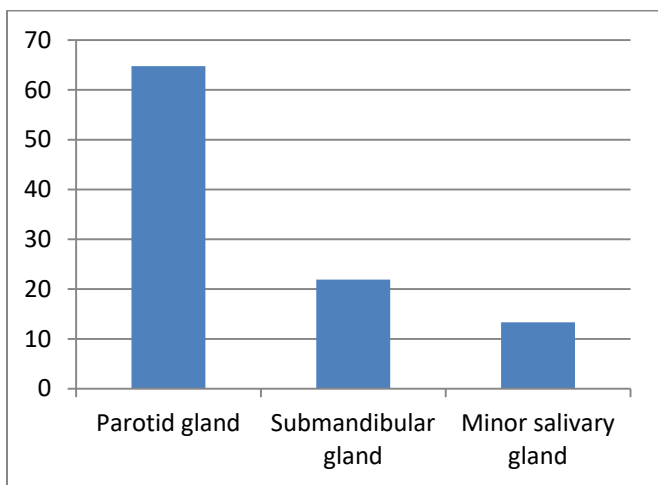


Figure 4: Site involved

Present study revealed that out of 105 cases, 26 were non neoplastic lesions and 79 cases were neoplastic lesions as depicted in table 5.

Table 5: Type of lesions

Type of lesions	No. of cases	Percentage
Neoplastic	79	75.2
Non-Neoplastic	26	24.76

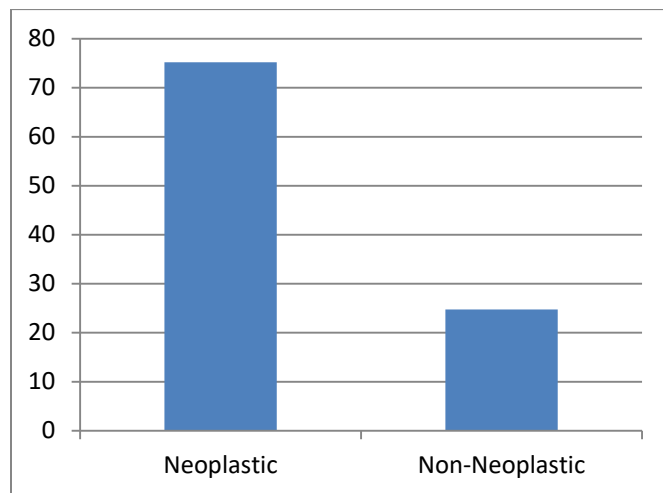


Figure 5: Type of lesions

Among neoplastic lesions, benign were 65.8 % and 34.17% were malignant as shown in table 6.

Table 6: Characteristics of lesions

Characteristics of lesions		No. of cases	%age
Neoplastic	Benign	52	65.8
	Malignant	27	34.17

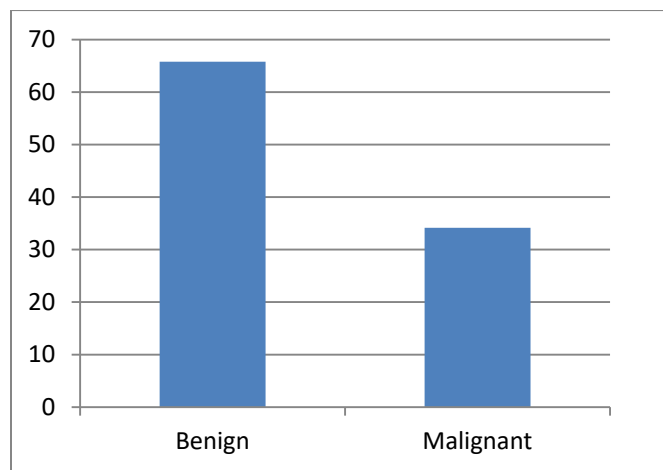


Figure 6: Characteristics of lesions

Findings further revealed that chronic sialadenitis was the most common non-neoplastic lesion (57.69%) in the present study, and among neoplastic lesions, pleomorphic adenoma was the commonest lesion 51.9% as depicted in table 7.

Table 7: Commonest neoplastic and non-neoplastic lesion

Non –Neoplastic		
	No. of cases	Percentage
Chronic sialadenitis	15	57.69
Neoplastic		
	No. of cases	Percentage
Pleomorphic adenoma	27	51.9

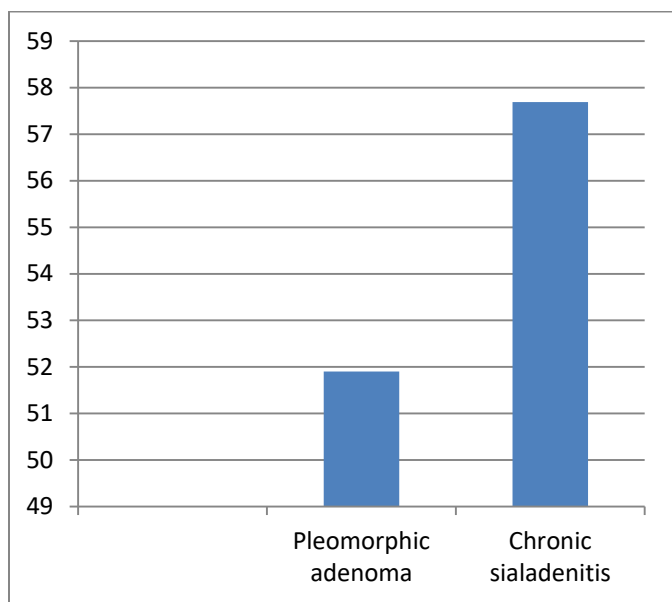


Figure 7: Commonest neoplastic and non-neoplastic lesion

Table 8: Frequency and distribution of diagnosed lesions

Lesions	Cases	%age
Non-neoplastic		
Acute sialadenitis	6	23.07
Chronic sialadenitis	15	57.69
Cystic lesions	4	15.38

Chronic sialadenitis	granulomatous	1	3.84
Neoplastic			
Benign	Pleomorphic denoma	27	51.9
	Monomorphic adenoma	11	21.15
	Warthin’s tumor	9	17.3
	Myoepithelioma	4	7.69
	Oncocytoma	1	1.92
Malignant	Mucoepidermoid CA	2	7.40
	Adenoid Cystic CA	4	14.81
	Myoepithelial CA	3	11.11
	Duct CA	5	18.51
	Epothelial myoepithelial CA	3	11.11
	Poorly differentiated CA	2	7.40
	Suspicious of malignancy	0	0
	Adenoma	4	14.81
	Acinic cell CA	3	11.11
	CA –Ex- pleomorphic adenoma	1	3.70

Most common non-neoplastic lesions 57.69% were chronic sialadenitis followed by 23.07% acute sialadenitis, 15.38 cystic lesions and chronic granulomatous sialadenitis 3.48%. The most common benign neoplastic lesion were Pleomorphic denoma 51.92% followed by Monomorphic adenoma 21.15%, 17.3% warthin’s tumor, myoepithelioma 7.69% and 1.92% oncocytoma. Most common malignant neoplastic lesions were duct CA 18.51% followed by adenoid cystic CA and adenoma 14.81% each, myoepithelial CA, epithelial myoepithelial CA and acinic cell ca 11.11% each, Mucoepidermoid CA, poorly differentiated CA 7.40% each and Oncocytoma and CA-Ex-pleomorphic adenoma 3.70% each.

## Discussion

In this study 105 patients with salivary gland swelling referred for cytological examination were included. Detailed clinical examinations followed by routine haematological and biochemical investigations were carried out in all cases. Fine-needle aspiration in the salivary gland was done and results were discussed.

In the present study the patients age ranges was from 12 to 79 years; the youngest patient was 12 years old and the oldest was 79 years old with maximum cases (56.19%) were found in the age range of 31-40 years and male female ratio was 3.77:1. Findings are correlated with the study conducted by Khandekar M.M. et al. (2006) reported that the majority of participants were in the age group of 21-40 years (50%). Similarly it was observed by Kakoty Sneha et al. (2017) the male female ratio was 1.17:1 and the incidence of the salivary gland lesions were high in the age group of 31-40 years.

Findings further revealed that the majority of the participants had swelling on the right side (70.4%) compared to the left side (29.5%) and parotid gland as the most frequent site of involvement in all categories of salivary gland lesion (64.76%) followed by submandibular gland (21.9%) while minor salivary gland contributed less (13.33%). Findings are in accordance with the study conducted by Kakoty Sneha et al. (2017), parotid gland was the most commonly involved gland with an incidence of 62% followed by the submandibular glands with almost equal involvement over both sides. Similarly Chrabanska M. et al. (2021) observed that parotid gland was the commonest involved site and the majority of lesions were at right side.

Further it was reported that out of 105 cases, 26 were non neoplastic lesions and 79 cases were neoplastic lesions and among neoplastic lesions, benign were 65.8

% and 34.17% were malignant. Findings are consistent with the study conducted by Chrabanska M. et al. (2021) found that majority of cases 60.72% salivary gland lesions were neoplastic among them 90% were benign neoplasm, 10% were malignant neoplasm and 39.27% were non-neoplastic. Similarly observed by S Vaidya et al. (2011), 45.79% was benign neoplasm and 54.2 was malignant neoplasm.

The present study revealed that chronic sialadenitis was the most common non-neoplastic lesion (57.69%) in the present study, and among neoplastic lesions, pleomorphic adenoma was the commonest lesion 51.9%. Findings are correlated with the study conducted by S Vaidya et al. (2011), reported that the most common benign salivary gland lesion was pleomorphic adenoma i.e, 41%. Similarly Naz S. et al. (2015) demonstrated that most of the lesions 64.5% were pleomorphic adenoma.

The present study further elucidated the most common non-neoplastic lesions 57.69% were chronic sialadenitis followed by 23.07% acute sialadenitis, 15.38 cystic lesions and Chronic granulomatous sialadenitis 3.48%. The most common benign neoplastic lesion were Pleomorphic adenoma 51.92% followed by Monomorphic adenoma 21.15%, 17.3% Warthin's tumor, myoepithelioma 7.69% and 1.92% oncocytoma. Most common malignant neoplastic lesions were duct CA 18.51% followed by adenoid cystic CA and adenoma 14.81% each, myoepithelial CA, epithelial myoepithelial CA and acinic cell ca 11.11% each, Mucoepidermoid CA, poorly differentiated CA 7.40% each and Oncocytoma and CA-Ex-pleomorphic adenoma 3.70% each. Findings are consistent with the study conducted by Z Ghassan et al. (2021), reported 13.5% pleomorphic adenoma, 5.5% benign lesions, 5.4% suspicious

malignancy, Mucoepidermoid carcinoma 27% followed by Adenoid cystic carcinoma 18.9%, Acinic cell carcinoma 5.4%, Squamous cell carcinoma 5.4%, Undifferentiated carcinoma 5.4%, Poorly differentiated carcinoma, Epithelial-myoepithelial carcinoma, Hemangiopericytoma, Neuroblastoma and Rhabdomyosarcoma 2.7% each respectively.

### Conclusion

The present study shows that the fine needle aspiration cytology (FNAC) of the salivary gland is a safe and reliable technique in diagnosis of salivary gland lesions which distinguish the benign and malignant lesions and further helped in planning appropriate treatment for the patient. Present study reveals that the parotid gland was the commonest site of involvement and majority of lesions were neoplastic.

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