

# Spectrum of Salivary Gland Lesions in Western Odisha with the Diagnostic Value of F.N.A.C. Correlating with Histomorphology.

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## ABSTRACT

**Background:** Salivary gland tumour accounts for less than 5 % of all head and neck tumours. Fine needle aspiration cytology (FNAC) is a useful method for evaluating suspicious salivary gland lesions due to its low cost, minimum morbidity, rapid turnaround time, high specificity, and high sensitivity. On the basis of cytological examination, lesions can be divided into inflammatory, benign, or malignant. If possible, specific diagnosis is given which helps the clinicians in planning the management of the lesion. The objective of the present study is to evaluate spectrum of salivary gland lesions in our set up and to assess the diagnostic accuracy and efficacy of FNAC with correlation to histomorphology in spectrum salivary gland lesions. **Methods:** Present study being both prospective and retrospective, was carried out in department of pathology, VIMSAR, Burla, Odisha. The patients who came to cytology -preoperatively were subjected to FNAC to establish preoperative diagnosis. Postoperatively, the histomorphology was correlated with cytological diagnosis. The study was conducted over 3-year period (December 2014 to November 2017) in which 100 patients were observed. In the present study, 100 cases of salivary gland swelling are included. Salivary gland lesions were studied under the three groups, including non-neoplastic lesions, benign and malignant tumours. **Results:** In the present study, non-neoplastic lesions accounted for 56%(56/100), followed by benign tumour 29%(29/100) and malignant 15%(15/100). The most common gland involved was parotid (72%), followed by submandibular gland (25%) and minor salivary glands (03%), whereas no case of sublingual salivary gland lesion was observed in the present study. Chronic sialadenitis was the most common lesion (71.4%, 40/56). In benign tumours, pleomorphic adenoma accounted for maximum number of cases (86.21%, 25/29). In malignant lesions, mucoepidermoid carcinoma was the most common malignant tumour (66.67%, 10/15). In the present study, both cytology and histology were carried out in 73 cases out of 100 in which correlation was done for sensitivity, specificity, and diagnostic accuracy. The diagnostic accuracy of FNAC for the non-neoplastic lesions, benign tumours, and malignant tumours was 97.5%, 84.2%, and 85.71%, respectively, and overall diagnostic accuracy was 91.78%. **Conclusion:** The FNAC technique is accurate, technique sensitive, and specific especially when used as screening method. Preoperative cytology is a useful, quick and reliable diagnostic technique for rapid diagnosis which helps in early diagnosis and can prevent unnecessary surgeries on patient.

**Keywords:** Salivary Gland, FNAC, Histomorphology

## INTRODUCTION

Salivary glands are exocrine glands, which produce saliva under parasympathetic control in oral cavity through duct system. There are three paired major salivary glands that comprise of parotid, submandibular and sublingual glands. There are hundreds of minor salivary glands distributed in oral

cavity and oropharynx. Parotid is the largest salivary gland which secretes serous secretions and contains ptyalin which aids in starch digestion. Parotid secretes 20% of total salivary secretions. Submandibular gland has mixed secretions (serous and mucinous both), though it is smaller than parotid gland but its secretions contribute to 65 to 70 % of total salivary secretions. Sublingual secretions are purely mucous in nature. Unlike that of other two major salivary glands, the ductal system of the sublingual glands does not have intercalated ducts and usually does not have striated ducts, thus saliva from sublingual exits directly from 8-20 excretory ducts known as the Rivinus ducts.

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Approximately 5% of saliva entering the oral cavity comes from these major salivary glands. Salivary gland tumour account for less than 5% of all head and neck tumour.<sup>[1]</sup> Fine needle aspiration cytology (FNAC) is a useful method for evaluating suspicious salivary gland lesions due to its low cost, minimum morbidity, rapid turnaround time, high specificity, and sensitivity.<sup>[2]</sup> On the basis of cytological examination, lesions can be divided into non-neoplastic, benign, or malignant. Specific diagnosis is given on the basis of the classification of the tumours which helps the clinicians in planning the management of the lesion.<sup>[3]</sup> Meta-analysis and comparative systematic review confirm that FNAC is effective in head and neck masses.<sup>[4]</sup> This method is applicable to palpable lesions.

### **Aims and objectives**

To evaluate spectrum of salivary gland lesions in our set up and to access the diagnostic accuracy and efficacy of FNAC in correlation to histomorphology of spectrum salivary gland lesions.

## **MATERIALS AND METHODS**

Present study being both prospective and retrospective, was carried out in department of pathology, VIMSAR, Burla, Odisha. The patients who came to cytology -preoperatively were subjected to FNAC to establish preoperative diagnosis. Postoperatively, the histomorphology was correlated with cytological diagnosis. The study was conducted over 3-year period (December 2014 to November 2017) in which 100 patients were observed. In the present study, 100 cases of salivary gland swelling are included which involves cytological and histological studies. Salivary gland lesions were studied under the three groups, including non-neoplastic lesions, benign and malignant tumours.

### **Exclusion criteria**

1. The histopathological examination confirmed salivary gland lesions for which prior FNAC report was not available/not done.
2. The patients with unsuitable smears (scanty inadequate inconclusive) on cytological examination were not considered.

In the present study, 100 cases of salivary gland swelling reported, out of which 73 cases were in which both cytological and histological studies were conducted.

FNA was performed from different sites of the salivary gland swelling using a 10 mL disposable syringe and 23/24-gauge needle without local anaesthesia. We consider it necessary to adequately re-aspirate the solid portion after cystic fluid aspiration has been done, or re-perform the FNA at a later date so as to improve the diagnostic accuracy.

FNA air dried smears were stained with Diff quick stain and wet smears fixed in 95% ethyl alcohol were stained with Papanicolaou stain. Paraffin embedded tissue sections obtained from salivary gland tissue were stained with haematoxylin and eosin and few special stains were performed whenever required. Salivary gland lesions were studied under the three groups including non-neoplastic lesions, benign and malignant tumours

## **RESULTS**

In the present study, non-neoplastic lesions accounted for 56% (56/100), followed by benign tumour 29% (29/100) and malignant 15%. [Table 1] The most common gland involved was parotid (72%), followed by submandibular gland (25%) and minor salivary glands (03%) whereas no case of sublingual salivary gland lesion was observed in the present study. [Table 2] Age range for non-neoplastic lesions was 25 to 35 years. Male: female ratio was 3.1: 1. Age range for neoplastic lesions was 30 to 40 years, and, for malignant neoplasms, it was 60 to 70 years. Male: female ratio was 2 : 1. In non-neoplastic lesions- 35 lesions involved the submandibular gland (62.6%), 20 lesions involved the parotid gland (35.7), and 01 lesions involved the minor salivary gland (1.79%). [Table 3] Chronic sialadenitis was the most common lesion (71.4%, 40/56) followed by suppurative sialadenitis (17.85%, 10/56) and benign cysts (10.71%, 6/56). [Table 4] In benign tumours- pleomorphic adenoma accounted for maximum number of cases (86.21%, 25/29), followed by Warthin's tumour (10.34%, 3/29), basal cell adenoma (3.45%, 1/29). [Table 5] [Figure 1,2,5,6]. In malignant lesions- mucoepidermoid carcinoma was the most common malignant tumour (66.67%, 10/15) followed by adenoid cystic carcinoma (20,3/15), and malignant mixed tumours (13.33%, 2/15). [Table 6] [Figure 3,4] In the present study, both cytology and histology were carried out in 73 cases, in which a correlation was done for sensitivity, specificity, and diagnostic accuracy. The diagnostic accuracy of FNAC for the non-neoplastic lesions, benign tumours, and malignant tumours was 97.5%, 84.2%, and 85.71%, respectively, and overall diagnostic accuracy was 91.78%.

### **Statistical analysis:**

A true positive (TP) FNA is defined as a malignant cytological diagnosis from a lesion determined to be malignant after histopathological study.

A false positive (FP) is defined as a malignant FNA diagnosis found to be benign on histopathological examination.

A true negative (TN) FNA is defined as benign cytological results from a lesion proven to be benign on histopathology.

A false negative (FN) FNA is defined as a benign cytological diagnosis turned out to be malignant on histomorphology.

Sensitivity = TP/TP+FN X 100=80%  
 Specificity = TN/TN+FP X 100=88.23%

Predictive value for benign tumour: TN/TN+FN X 100=83.33%

Predictive value for malignant tumour: TP/TP+FP X 100=85.71%

**Table 1: Type and Number of Cases.**

Cases	Number Of Cases	Percentage Of Cases
Non Neoplastic	56	56%
Benign	29	29%
Malignant	15	15%
	100	100%

**Table 2: overall percentage of glands involved in order**

Overall glands involved in order	Percentage of involvement
Parotid gland	72%
Submandibular gland	25%
Sublingual gland	00%
Minor salivary glands	03%
	100%

**Table 3: Non Neoplastic Lesion (56 Cases) Distribution.**

Glands	Numbers	%
Submandibular	35	62.6
Parotid	20	35.7
Minor salivary glands	01	1.79
Sublingual glands	00	00
Total	56	99.96

**Table 4: Types Of Non Neoplastic Lesions.**

Non Neoplastic Cases	Numbers	%
Chronic Sialadenitis	40	71.4
Suppurative Sialadenitis	10	17.85
Benign Cysts	06	10.71
	56	

**Table 5: Distribution Of Benign Neoplastic Lesions**

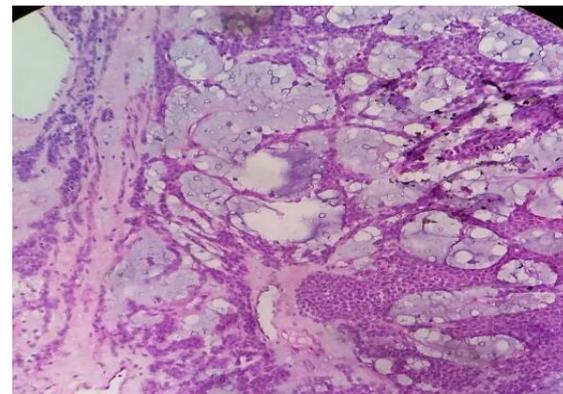
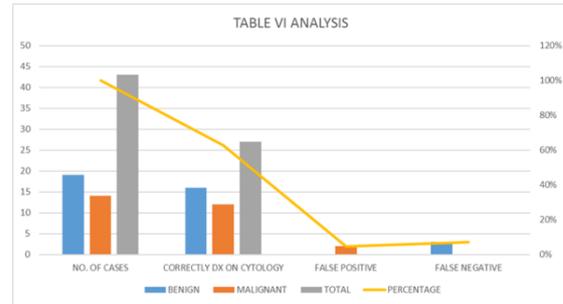
Benign neoplastic lesions	Numbers	%
Pleomorphic adenoma	25	86.21%
Warthin's tumor	03	10.34%
Basal cell adenoma	01	3.45%
	29	

**Table 6: distribution of malignant lesions**

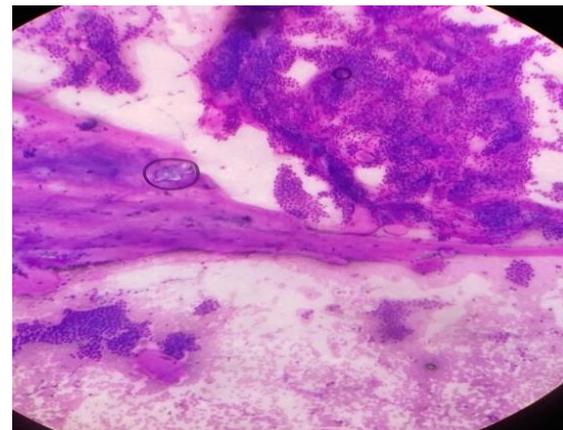
Malignant neoplastic lesion	Numbers	%
Mucoepidermoid carcinoma	10	66.67%
Adenoid cystic carcinoma	03	20%
Malignant mixed tumors	02	13.33%
	15	

**Table 7: Overall CYTO Histologic Correlation In Both Benign And Malignant Cases.**

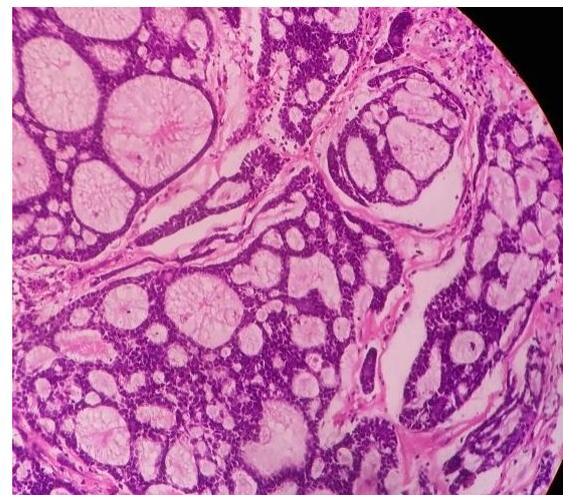
Type Of Case	No. Of Cases	Correctly Dx On Cytology	False Positive	False Negative
Benign	19	16	00	03
Malignant	14	12	02	00
Total	43	27		
Percentage	100%	62.79%	4.65%	6.97%



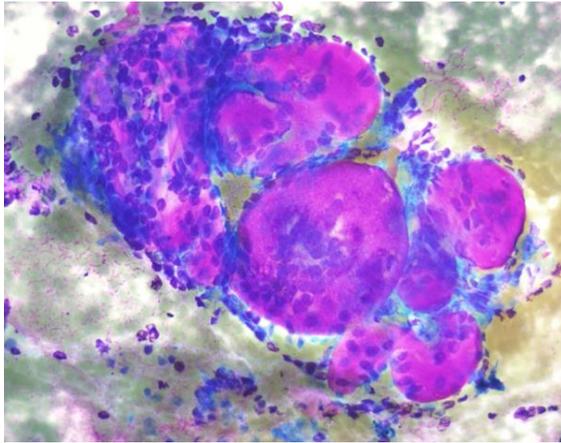
**Figure 1: (H&E PLEOMORPHIC ADENOMA 100X)**



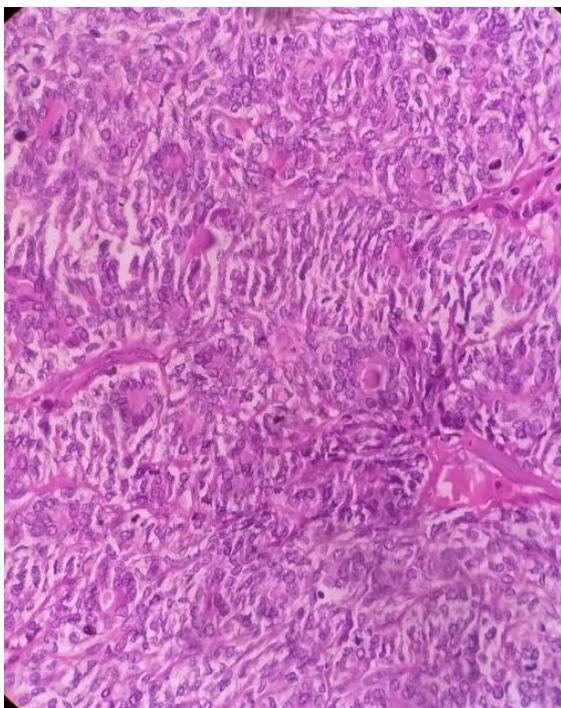
**Figure 2: (FNAC DIFF QUIK PLEOMORPHIC ADENOMA 100X)**



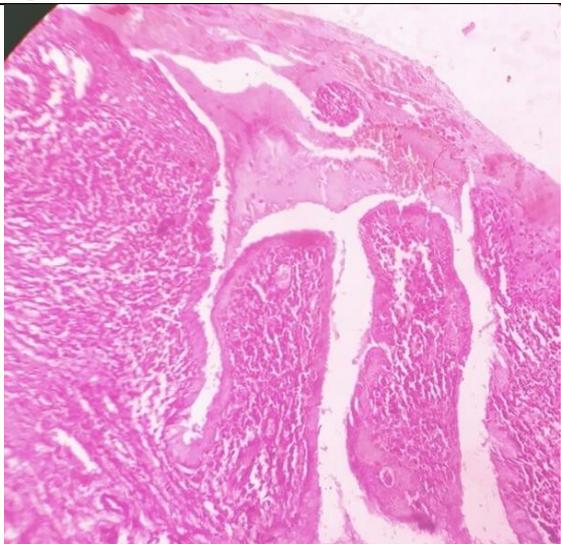
**Figure 3: (H&E ADENOID CYSTIC CARCINOMA 100X)**



**Figure 4: (FNAC DIFF QUIK ADENOID CYSTIC CARCINOMA 400X)**



**Figure 5: (H&E BASAL CELL ADENOMA 200X)**



**Figure 6: (H&E WARTHIN'S TUMOR 100X)**

## DISCUSSION

Salivary gland masses are commonly encountered in clinical practice and often pose diagnostic difficulties. For decades' accurate assessment of these tumours has relied on histopathological examination only; which requires operative procedure, which is time consuming and expensive. In contrast, FNAC is safe, accurate, quick, and inexpensive procedure for an early diagnosis. It also aids the clinicians in management planning.<sup>[3]</sup> A total of 100 cases underwent cytology of salivary gland masses which were categorised into non neoplastic and neoplastic (benign and malignant) groups. The most common gland affected in the study was parotid (72%) which is similar to study done by Eveson JW and Cawson RA.<sup>[5]</sup>

In present study 56/100 cases were non-neoplastic, 29/100 were benign and 15/100 were malignant. In the present study, most common age group for non-neoplastic lesions was 25 to 35 years and male to female ratio was 3.1: 1. Most common non-neoplastic lesion was chronic sialadenitis followed by suppurative sialadenitis and benign cysts. Most of the nonneoplastic lesions involved the submandibular gland as was observed by Atula et al,<sup>[6]</sup> and Omhare A et al.<sup>[7]</sup> In the present study, benign neoplasms accounted for 29 cases (29%) similar to Omhare A et al,<sup>[7]</sup> which was lower than other reports which ranged from 49 to 83%.<sup>[8-9]</sup> We observed the pleomorphic adenoma as the most common benign neoplasm followed by Warthin's tumour and basal cell adenoma and the predominance of these two benign neoplasms was similar to number of studies.<sup>[10-11]</sup> Various authors have reported that the incidence of malignant tumours ranged from 15% to 32%,<sup>[12]</sup> and in the present study it accounted for 15% whereas Nguansangiam et al, have found the lower rate of malignant neoplasms.<sup>[9]</sup> In our study, the most common malignant salivary gland tumour was mucoepidermoid carcinoma, which accounted for 66.67% of all malignant neoplasms followed by adenoid cystic carcinoma. In comparison to our study, Nguansangiam et al. have found that lymphoma to be the most common primary malignant salivary gland tumour followed by mucoepidermoid carcinoma.<sup>[9]</sup> Parotid gland was observed as the most commonly involved site of salivary gland neoplasms- 72% of all salivary gland neoplasms. Almost similar distribution of salivary gland neoplasms in the parotid gland has also been described by Omhare et al.<sup>[7]</sup> The present study showed a false positive rate of 4.65%; similar to those of other studies, ranging from 0 to 4.7%.<sup>[13,14]</sup> The false negative rate in the present study was also 6.97%, which was in concordance with other studies, reporting a range of 2.2% to 24.5%.<sup>[8,9]</sup> Out of 29/100 benign cases, 19 were operated and 16 were histologically correlated; remaining 3 cases, 2 were

found to be malignant mixed tumours and 1 was mucoepidermoid carcinoma. There were 15/100 malignant cases, 14 were operated, out of which 12 were histologically correlated; rest 2 cases turned out to be benign (one mixed malignant turned out to be pleomorphic adenoma with squamous metaplasia and another thought to be mucoepidermoid carcinoma was pleomorphic adenoma with squamous metaplasia on histology). [Table 7] In our study, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of preoperative FNA cytology of salivary gland tumours were 80%, 88.23%, 83.33%, and 85.71%, respectively; however, overall diagnostic accuracy for all salivary gland lesions was 91.78%, indicating good results compared to various other studies.<sup>[7,8,15]</sup>

## CONCLUSION

The FNAC technique is accurate, sensitive, and specific especially when used as screening method. Preoperative cytology is a useful, quick, reliable diagnostic technique for rapid diagnosis and help in early diagnosis which can prevent unnecessary surgeries on patient. There can be few false positive and negative cases on FNAC for which histomorphology is confirmatory test modality.

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