

## Study on diagnostic accuracy of fine needle aspiration cytology in different breast lesion and histopathological correlation

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### Abstract

**Introduction** -FNAC is being performed as a pre-operative test to evaluate breast lump. FNAC is cost effective and can prevent unnecessary surgery. As FNAC became more reliable in diagnosing malignancy. Confirmation of breast diseases by clinical examination and pathological confirmation by fine needle aspiration cytology (FNAC) and histopathologic examination has been found to be an important part of diagnostic workup in breast diseases. **Material and method**-A retrospective study done on 119 cases presented with history of palpable breast lump during November 2019 to October 2020 in department of pathology Government Medical College Shivpuri, India. All female patients were included of age 11-70 year, irrespective of their, religion, marital status, occupation or social status. Every patient underwent a FNAC done on OPD basis by a trained pathologist from the Pathology Department, histopathology was available in 54 cases for correlation with cytology. **Result**- Results of all patients were collected and tabulated. Statistical analysis was performed on the tabulated data and sensitivity and specificity with positive and negative predictive value were obtained. Maximum cases (54.1%) of benign lesion as fibroadenoma were diagnosed in age group of 21-30 years and malignant cases (80%) were diagnosed 51-60 years. The sensitivity and specificity and diagnostic accuracy for malignancy were found to be 95%, 97% and 94.5%, respectively. **Conclusion**- FNAC serves as a rapid, economical, and reliable tool for the diagnosis of palpable breast lesions because the cytopathological examination of these lesions before operation or treatment, serves as an important diagnostic tool. Most common breast lesion in this study is fibroadenoma.

**Key words:** Cytology, Breast lump, Malignancy, Fibroadenoma.

**Study Design:** Observational Study.

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### Introduction

Breast carcinoma is the most common malignant neoplasm and the leading cause of death from cancer in women, with more than 1 million cases occurring worldwide annually [1]. However, in some regions of the world (North America, Western Europe and Australia) breast cancer mortality is finally beginning to fall, presumably because of the combined action of earlier diagnosis and improved therapy [2]. Now-a-days, FNAC is being performed as a pre-operative test to evaluate the breast lump.

A study in the year 2000 evaluated the accuracy of FNAC on patients presented with palpable breast lumps showed a very high sensitivity, specificity and accuracy [3]. 95% accuracy in preoperative diagnosis of mammary cancer by clinico-cytological combination was reported in a study [4].

The FNA first introduced by the Martin and Ellis in 1930 [5]. In India cancer of breast is the most common cancer in women [6]. Breast mass in women causes anxiety to herself and her family member, which can be reduced by giving assurance that most of breast lumps are benign and early diagnosis by fine needle aspiration cytology. The FNAC is highly sensitive, easy to perform and cost effective that can be carried out at outpatient department. [7][8]. In addition to its high diagnostic accuracy, FNAC offers advantages such as minimal invasiveness, minimal discomfort, cost-effectiveness, rapidity of result and help in planning of treatment and definitive treatment plan can be discussed with the patient in advance, when compared with core needle biopsy [9,10,11].

FNAC can prevent unnecessary surgery also. FNAC is therefore an extremely useful method in the evaluation of palpable breast lump in resource limited settings.

The aim of our study to find out diagnostic accuracy and usefulness of FNAC in diagnosis of different breast masses, and histopathological correlation.

### Material and Method

It is retrospective study done on 119 cases presented with history of palpable breast lump during November 2019 to October 2020 in department of pathology Government Medical College Shivpuri, India. All patients presenting with history of breast lump referred from surgery OPD for FNAC are included in the study. The patients were counseled about the procedure and informed consent was taken. Detailed clinical history with duration of lump, physical examination including size, consistency, mobility, tenderness, ulcerated lesion and nipple discharge were taken in to consideration.

FNAC was done by palpating the breast lump, and immobilizing it between thumb & forefinger. After disinfecting the skin with methylated spirit, a 22 gauge needle applied to a 5ml/10 ml syringe, introduced into lump and a negative pressure was created. Several passes were made in all direction without removing the needle from the mass. The aspirated material was expressed on to clean glass slide and spread with another slide in horizontal motion. The prepared slide fixed immediately with 95% ethanol, one slide remain dry. Fixed slide stained with Papanicolaou and examined under microscope. Histopathological examination was done on lump ectomy and mastectomy specimens. Paraffin embedded section were stained with H&E (Haematoxylin and Eosin) and were examined.

### Inclusion criteria

1. All female with unknown primary diagnosis of breast mass.

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2. Patient aged 11-70 years having palpable breast lump of different size.

#### Exclusion criteria

1. Age of patient <11 and >70 years.
2. Patient not giving consent.
3. Patient with recurrent malignancy.
4. Male patient with breast lump.

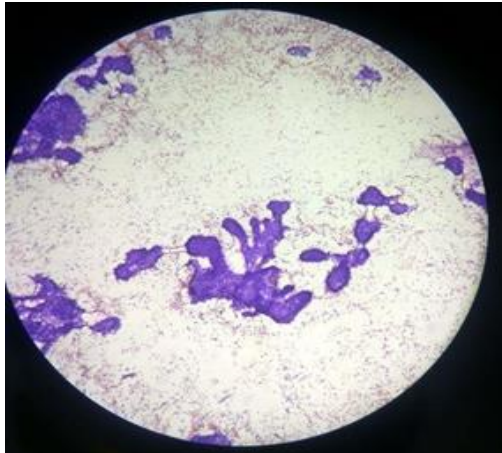


Fig 1: Fibroadenoma 10x view( cytology)

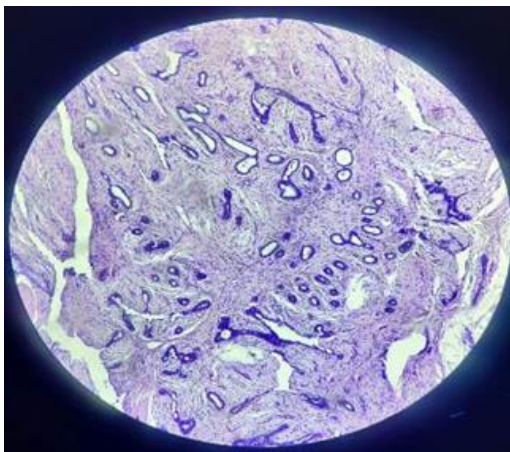


Fig 2: Fibroadenoma 10 X VEIW (histology)

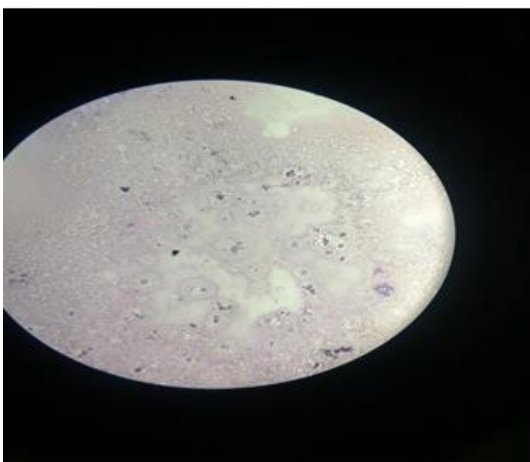


Fig 3: Fibrocystic disease 10x view( cytology)

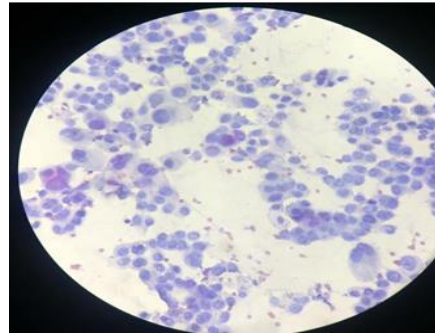


Fig 4: Ductal carcinoma 40x view( cytology)

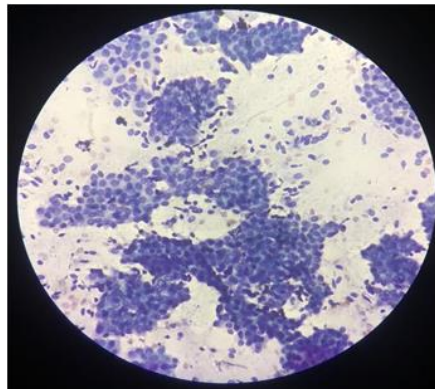


Fig 5: Medullary carcinoma 10x view (cytology)

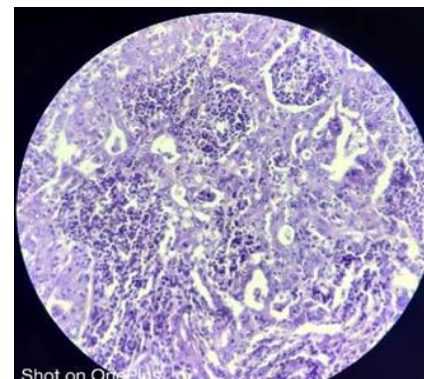


Fig 6: Medullary carcinoma 10x view( histology)

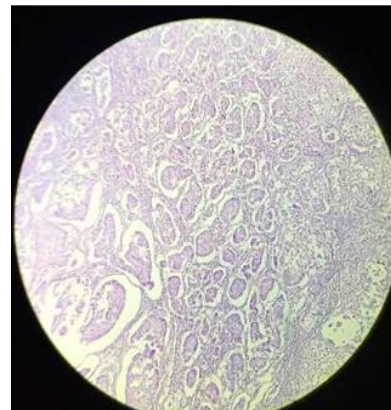


Fig 7: Ductal carcinoma 10x view ( histology)

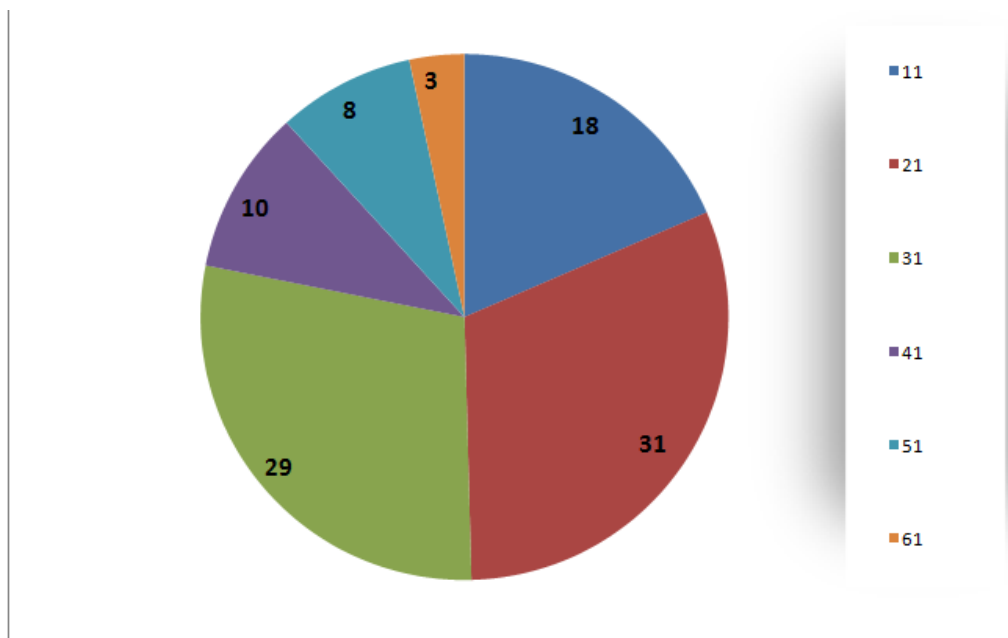
### Results

A total 119 case were obtained in one year study duration from October 2019 to 2020. In our study only female patients were included. Age of the patient included ranged from 11-70 years. Maximum cases of breast lump(31%) were in age group of 21- 30 years. Maximum cases (54.1%) of benign lesion as fibroadenoma were diagnosed in age group of 21-30 years and malignant cases (80%) were diagnosed 51-60 years. Left side of the breast was more commonly involved (51.2%) than right side (41.1%) and bilateral (7.5%). Upper-outer quadrant was involved in maximum cases

(37.8%) and inner outer quadrant least commonly involved (0.84%). Out of total number of cases, 75 cases (63%) were benign on cytology, with maximum being fibroadenoma 45 cases (37.8%), followed by fibrocystic disease (12.6%) and 24 cases (20%) were malignant (22 malignant and 2 suspicious for malignancy) maximum (18%) being ductal carcinoma, 4% cases were atypical and remaining 11 cases were inflammatory. Among inflammatory lesion commonest were cases of Abscess 4(3%) followed by acute mastitis 3(3%) and one case of granulomatous mastitis.

**Table-1: Distribution of breast masses in different age group**

Distribution of breast masses in different age group		
Age Group	No of cases	%age
11to20	22	18%
21to30	37	31%
31to40	34	29%
41to50	12	10%
51to60	10	8%
61to 70	4	3%
<b>Grand Total</b>	<b>119</b>	<b>100%</b>



**Table-2: Distribution of Breast Masses in different Category**

Distribution of Breast Masses in different Category		
Category	No of cases	%age
Atypical	5	4%
Benign	75	63%
Inflammatory	11	9%
Malignant	24	20%
Nonneoplastic	2	2%
Suspicious	2	2%
<b>GrandTotal</b>	<b>119</b>	<b>100%</b>

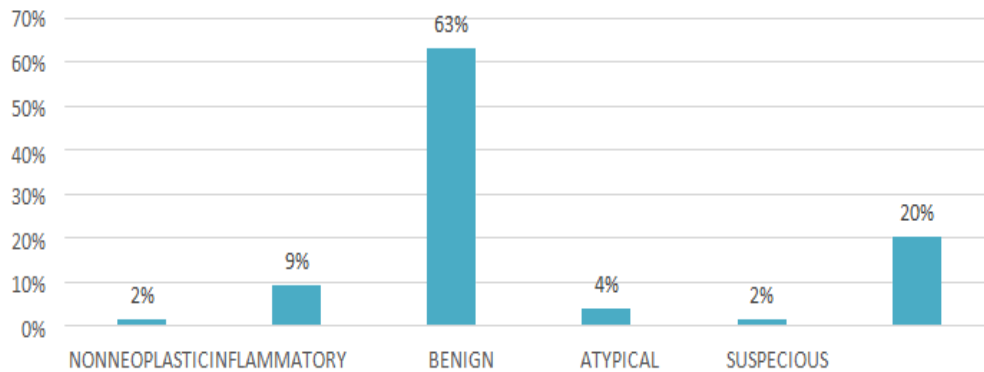


Table-3: Distribution of different breast lesion according to age group

Age Grp	Diagnosis	Number of cases	%age
11 to 20	Abscess	2	9%
	Fibroadenoma	19	86%
	Fibrocysticdesease	1	5%
11 to 20Total		22	18%
21 to 30	Abscess	1	3%
	Apocrinemetaplasia	1	3%
	Fibroadenoma	20	54%
	Fibrocysticdesease	5	14%
	Galactocoele	3	8%
	Granulomatous	1	3%
	Inflammatory	1	3%
	Lactatingadenoma	2	5%
	Lipomatous	1	3%
	Mastitis	1	3%
	Nonneoplasticglandularbreasttissue	1	3%
21 to 30 Total		37	31%
31 to 40	Abscess	1	3%
	Apocrinemetaplasia	1	3%
	Atypicalhyperplasia	1	3%
	Ductectasia	2	6%
	Ductectasiawithatypia	1	3%
	Ductalcarcinoma	6	18%
	Fatnecrosis	2	6%
	Fibroadenoma	6	18%
	Fibroadenomawithapocrinechanges	1	3%
	Fibrocysticdesease	7	21%
	Galactocoele	1	3%
	Lipomatous	3	9%
	Mastitis	1	3%
	Nonneoplasticglandularbreasttissue	1	3%
31 to 40Total		34	29%
41 to 50	Ductalcarcinoma	5	42%
	Ductalhyperplasiawithatypia	1	8%
	Fatnecrosis	1	8%
	Fibroadenomawithatypia	1	8%
	Fibrocysticdesease	1	8%
	Fibrocysticdeseasewithatypia	1	8%
	Lipomatous	1	8%
	Medullarycarcinoma	1	8%
41 to 50Total		12	10%
51 to 60	Benignphylloid	1	10%
	Ductalcarcinoma	8	80%
	Medullarycarcinoma	1	10%

<b>51 to 60Total</b>		<b>10</b>	8%
<b>61 to 70</b>	Ductalcarcinoma	3	75%
	Fibrocysticdesease	1	25%
<b>61 to 70Total</b>		<b>4</b>	3%
<b>Grand Total</b>		<b>119</b>	100%

Table-4: Side wise distribution of breast lump

Side	Number of cases	%age
Bilateral	9	8%
Left	49	41%
Right	61	51%
<b>Total</b>	<b>119</b>	100%

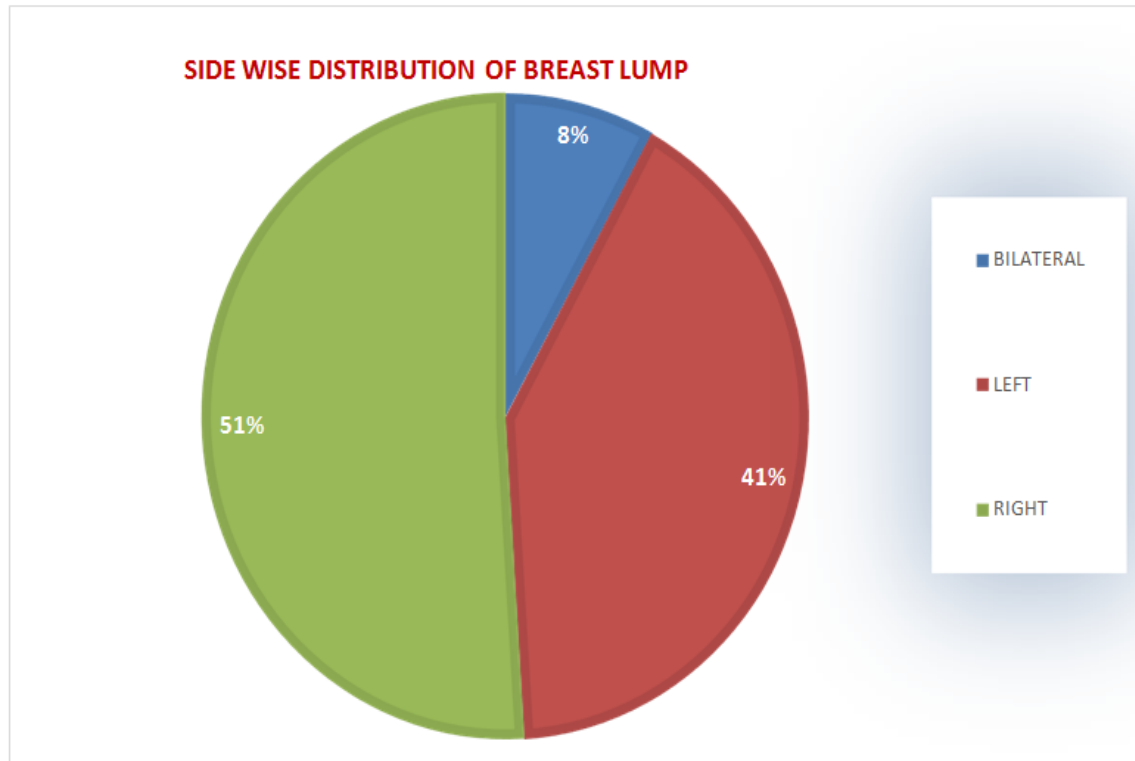


Table-5: Distribution of Breast lump in different Quadrant

Quadrant	Number of cases	%age
Central	11	9%
Lower-inner	12	10%
Lower-outer	17	14%
Upper-inner	33	28%
Upper-outer	46	38%
<b>Total</b>	<b>119</b>	100%



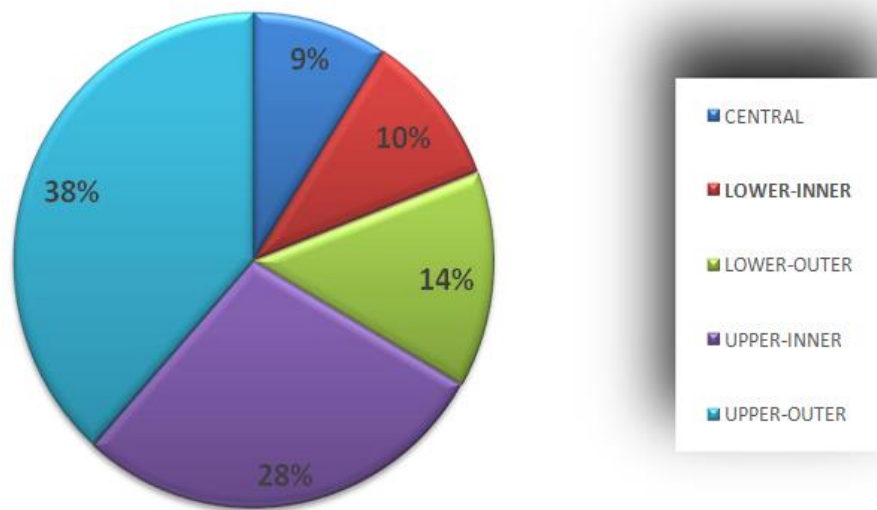
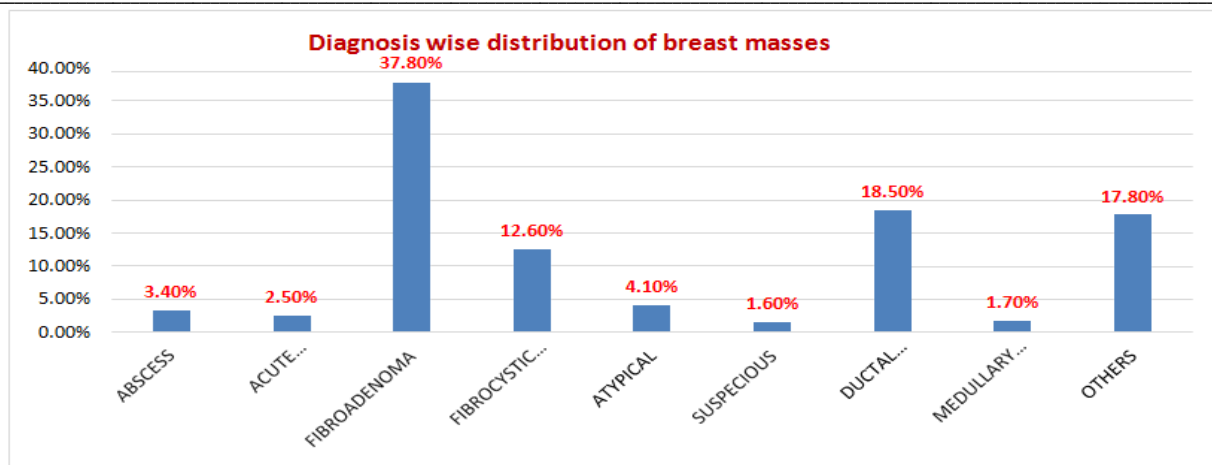


Table-6: Diagnosis wise distribution of breast masses

Table 6: Diagnosis wise distribution of breast masses				
S.NO	Category	Diagnosis	No of Cases	%age
1	Nonneoplastic	Non-neo plastic glandular breast tissue	2	1.7%
2	Inflammatory	Abscess	4	3.4%
		Ductectasia	2	1.7%
		Fatnecrosis	3	2.5%
		Granulomatous	1	0.8%
		Acutesuppurativemastitis	3	2.5%
3	Benign	Apocrinemetaplasia	1	0.8%
		Benignphylloid	1	0.8%
		Fibroadenoma	45	37.8%
		Fibrocysticdesease	15	12.6%
		Galactoceles	4	3.4%
		Lactatingadenoma	2	1.7%
		Lipomatous	5	4.2%
4	Atypical	Ductectasiawithatypia	1	0.8%
		Fibroadenomawithatypia	1	0.8%
		Fibrocysticdeseasewithatypia	1	0.8%
		Epithelialhyperplasiawithatypia	2	1.7%
5	Suspicious	Apocrinemetaplasia	1	0.8%
		Fibroadenomawithapocrine changes	1	0.8%
6	Malignant	Ductalcarcinoma	22	18.5%
		Medullarycarcinoma	2	1.7%
Grand Total			119	100.0%



Histological correlation of 54 cases was done and out of which 34 cases were cytologically benign, 33 cases were found benign on histology and one cytologically benign case turned out to be malignant. Out of 20 cases that were malignant on cytology, 19 cases were found to be malignant in histology and one came out benign. False positive case was found in the suspicious lesion.

**Table-7: Histopathological correlation of cytologically diagnosed breast lesion**

Histopathological Correlation of cytological Diagnosed breast lesion					
S.NO	Category	Diagnosis	No of cases in FNAC	Histpathological correlation	
				Benign	Malignant
1	Benign	Fibroadenoma	24	24	0
		Fibrocysticdisease	7	7	0
		Benignphyllode	1	1	0
		Fibroadenomawith atypia	1	0	1(IDC)
		Lactatingadenoma	1	1	0
	Malignant	Ductalcarcinoma(IDC)	16	00	16
		Medullarycarcinoma	2	00	2
3	SuspiciousProbablyMalignant		2	1(fibroadenoma)	1
	TOTAL		54	34	20

Out of 19 malignant cases maximum case (89.4%) were of infiltrative ductal carcinoma, and remaining cases were (10.5%) of medullary carcinoma. Total histological and cytological correlation was found to be 96.5%, and two cases not show similar result on histology.

Following histopathological correlation we calculated sensitivity, specificity of FNAC as a diagnostic procedure for breast masses, positive predictive value (PPV) and negative predictive value (NPV) and diagnostic accuracy of FNAC as a diagnostic procedure for entire study.

#### Statistical analysis

Sensitivity is ability of test to correctly identify patients with disease. In our study FNAC test for malignancy is 95% sensitive. Specificity is ability of test to correctly identify patients without disease. In our study FNAC test for malignancy is 97% specific.

The positive predictive value (PPV) of FNAC was calculated as probability that the patient with a positive test has the disease in question. In our study PPV is 95%. And negative predictive value (NPV) of FNAC is probability of a patient with negative test not having the disease in question (malignancy). In our study NPV is 97%.

Diagnostic accuracy of test is to detect the actual result of test in all cases. In our study diagnostic accuracy of FNAC was 94.5%.

#### Discussion

Breast FNAC is commonly used as part of the diagnostic riad, which includes FNAC, clinical breast examination and radiological evaluation (mammography and ultra-sonography). The diagnostic accuracy is close to 100% when all three modalities favour a benign normalignant diagnosis[12].

Open surgical excision biopsy remains the diagnostic “gold standard” to which other methods must be compared, with almost 100% sensitivity[13]. However, compared to FNAC and CNB, excision biopsy is expensive and associated with a greater degree of patient morbidity. Open biopsy leaves a visible scar that is cosmetically undesirable and may complicate mammographic follow up. In addition, open biopsy is associated with a significantly longer “turn-around” time than that which accompanies FNAC[14].

If the initial FNAC is inadequate, CNB can be a useful second line method of pathological diagnosis. Excision biopsy should be the last option to obtain a pathological diagnosis[14].

The present study shows more number of benign cases compared to malignant cases, similar result are found in study of Mohammed et al[10], Yeoh and Cha et al[15], Park and Ham et al[16], Rocha et al[17] and Dominguez et al[18]. Incidence of a typical, suspicious are approximately same in present study as in other study.

In present study cytologically benign lesion are seen in the age group ranging from 18-40 years. Khemka

et al [19], Rocha et al[17], had cytologically benign cases in the age groups 15-44 years and 14-40 years respectively. Macintosh et al.[20] had majority of benign cases in the age group 27-77 years. In present study malignant lesion were common in the age group of 41-70 years, similar result was present in study of Khemka et al[19] in 35-84 years of age group, 41-75 years in the study by Rocha et al[17]. So with present study and other studies found that benign lesion are seen in younger age group and malignant in older age group.

In present study upper outer quadrant (37.8%) and left side of breast are most commonly involved, similar finding were present in studies of Reddy and Reddy[21] (54.2%), and Clegg-Lamptey and Hodasi[22] (42.40%).

In present study fibro adenoma (37.8%) followed by fibrocystic

disease (12.6%) ,mastitis(2.5%)were the most common breast lesions on cytology, which is correlated with Dominguez et al.,[18] (34.49%, 32.17%,and 1.55% respectively). Where as in study by Tiwari [23] and Qasim et al.,[24] fibroad enoma (56.25%and82.14%) followed by mastitis/breast abscess (20.31%) and 10.71%) and fibrocystic disease (7.81% and3.57%)were the most common breast lesions.

In present study 24(20.1%)malignant lesions were seen. While in study of Dominguwz et al.,[18] 149(10.6%) cases were seen. Duct cell carcinoma is most common with (18.5%) cases in this study, similar result in study of Dominguez et al.,[18].Other malignant lesion was medullary carcinoma 2 cases(1.7%) ,similar study was done by Chandanwale et al[25] ,whoreported2casesofmedullary carcinoma.

Present study observed (96.5%)cases shows cytological and histological correlation. Same observation observed by Kujur P(84.9%)[26]. Handa et al[27](78%) in breast lump.

The sensitivity and specificity of FNAC is helpful to the surgeon for management of breast lumps. There are some difficulties and limitations that need to be mentioned about FNAC. Both false-negative and false-positive results can occur.

In the present study sensitivity, specificity and diagnostic accuracy of FNAC were noted as95%, 97%and 94.5%, respectively. Mohammed et al reported the range of sensitivity 79-99% and specificity 60-100% in their study(10). And Hammod et al reported sensitivity (94%), specificity (98%), and diagnostic accuracy(96%).[28].

### Conclusion

The cytopathological examination of breast masses before surgical procedure serves as a rapid, reliable, economical diagnostic measure. Benign breast lesions are more common than malignant lesions, fibroad enoma and fibrocystic disease are most common in benign diseases, whereas IDC is commonest in malignant lesions. Due to rapid and accurate early diagnosis we can reduce morbidity and mortality caused by breast cancer and prevent further complications. FNAC followed by excisional biopsy or cellblock study are recommended for confirmation in our institution.

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