

# Accuracy of FNA Cytology for Detection of Palpable Breast Lesions

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## ABSTRACT

**Background:** Breast diseases cause noteworthy morbidity and mortality in females. The lesions range from benign to malignant. Majority of the lesions are confused clinically with malignancy.

**Aim:** To determine the accuracy of FNAC as a pre operative diagnostic procedure in palpable breast lesions in comparison with histopathology

**Place and duration of study:** During a period of 6 months in the year 2009 fifty cases of palpable breast lumps who presented to pathology department of King Edward Medical University (KEMU) in collaboration with all four surgical units of Mayo Hospital Lahore.

**Methods:** Study was conducted on fifty female patients who presented with palpable breast lump to pathology department KEMU for FNAC and their tissue biopsies including core needle, lumpectomy and mastectomy done in surgical units of Mayo Hospital were included in this Cross sectional validation study.

**Results:** Among 50 cases 30 were benign lesions whereas 20 were malignant. Out of 30 benign 21 were fibroadenoma, 4 were fibrocystic, 1 case of benign phyllodes, granulomatous inflammation and atypical hyperplasia each and 2 cases of inflammatory lesions. Infiltrating ductal carcinoma was the commonest malignant lesion constituting 18 cases followed by 1 case each of lobular carcinoma and medullary carcinoma. The mean age for malignant lesions was Mean  $\pm$ SD 48 $\pm$ 7.91 and for benign lesions was Mean  $\pm$ SD 25.82 $\pm$ 7.6. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy were 96%, 100%, 100%, 96% and 100% respectively.

**Conclusion:** FNA cytology is an accurate and simple preoperative method for diagnosing palpable breast lesions

**Keywords:** FNAC, palpable Breast lesions, histopathology.

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## INTRODUCTION

Lump breast is one of the most common problems in females. Breast cancer represents a field of active research. This problem has gained great deal of global attention due to increased mortality and morbidity caused by breast cancer<sup>1</sup>. Breast cancer has the highest mortality rate throughout the world and is the commonest cancer in females<sup>2</sup>. The diseases of breast can be broadly divided into benign and malignant. Clinically the patient can present with palpable mass, nipple discharge, pain or mammographically detected abnormality. Majority of these conditions are clinically confused with malignancy. Over the recent years in the western countries there has been a decline in the mortality rate, 37% attributed to early diagnosis and better treatment modalities. Data from the western countries showed that about 70.4% have benign breast

disease with fibroadenoma being the commonest (39.4%) followed by fibrocystic (19.3%), proliferative breast disease without atypia (6.9%), complex fibroadenoma (2.6%) and atypical ductal hyperplasia (0.4%). Women having malignant pathology were 23.4% with IDC being the commonest, constituting 69.5% of the malignant lesions. In Pakistan the data available about the frequency of breast disease is different from that of western countries because of lack of awareness, painless nature of lump, socioeconomic conditions and religious reasons. Pakistan carcinoma breast occurs in relatively younger age group and at the time of presentation the tumor size is large with axillary lymph node metastasis<sup>3</sup>. Most of the patients present to out patient's department when the size of the lump is more than 5cm or they have a fungating mass. Usually they seek help from local quacks and after failure of treatment present late to the doctor.

The risk factors for carcinoma breast in Pakistan are consanguineous marriage, late age at menarche, late age at full term pregnancy, high parity and a history of abortion<sup>4</sup>. In one of the studies the frequency of breast disease in Pakistan, carcinoma breast was the commonest (37%) followed by

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fibroadenoma (16.95), fibrocystic disease (13.96%), mastitis (6.83%) and duct ectasia (5.33%)<sup>5</sup>. Malignant lesions were common in patients during the fourth to sixth decade of life. Fibroadenoma was more frequent in the relatively younger age group. Lesions of breast if diagnosed early can save many lives. For this purpose many strategies are in practice. Some of the diagnostic procedures are mammography, FNA, core needle biopsy, incisional, excisional biopsy, frozen section and imprint cytology. Some diagnostic modalities are used preoperatively like core needle biopsy and FNA cytology. Diagnosis is ultimately confirmed by histopathological correlation. In the assessment of breast lesions the most important role of diagnostic cytology is in making the binary decision between benign and malignant. The procedures like core needle biopsy, imprint cytology and FNA cytology are revolutionized by the use of imaging techniques like USG and stereotactic technique which enhance visualization and sampling of lesions that are not easily localized by older methods. Due to the advent of neo-adjuvant therapy Prognostic markers like steroid receptor ER/PR and HER-2 new studies can be done on FNAC smears<sup>6</sup>. These prognostic markers were previously done on tissue biopsies only, due to which histopathological diagnosis was mandatory. FNA cytology is an integral part of triple diagnosis regime consisting of clinical assessment, mammography and FNA. FNA cytology is a rapid, cheap, accurate, simple, easy, safe and reliable procedure which has been used for diagnosing breast lesions. The breast lesions are common clinical presentation in the surgical outpatient clinics of Mayo Hospital Lahore, where patients are referred from all over the Punjab for opinion and surgical expertise. The present work was focused to determine the accuracy of FNA cytology in breast lesions preoperatively. This technique is inexpensive and rapid and was later compared with the histopathology results. The test was done on patients with palpable breast masses referred from surgical outpatients of Mayo Hospital Lahore to Pathology Department King Edward Medical University.

Early diagnosis by FNAC can save many lives and reduce the incidence of death by breast carcinoma in a developing country like Pakistan which has limited resources and where patients present usually at a late stage. In the western countries over the recent years there has been a decline in the mortality due to early diagnosis, neo-adjuvant therapy and better cure. FNAC can be used as a first line pre-operative procedure.

## PATIENTS AND METHODS

A cross-sectional validation study was conducted on fifty female patients with breast lump who came to the pathology department of King Edward Medical University in collaboration with all four surgical units of Mayo Hospital Lahore. FNAC of the patients were performed and compared with histological diagnosis of the same patient. All specimens including core biopsy, lumpectomy and mastectomy were included in the study. Non probability, purposive sampling was done. FNAC was reported by using UK-NHS-BPS 5 tier scheme for differentiating benign and malignant lesions. C1-inadequate/non-diagnostic C2-benign C3-atypical probably benign, C4-suspicious probably malignant and C-5 malignant. Whereas Benign and malignant lesions were compared in the light of gold standard which is histopathology. Infiltrating Ductal Carcinoma was graded according to modified Bloom Richardson grading system. The results were subsequently compared with similar international and local studies. Samples of patients with previous history of chemo and radiotherapy and lactation and pregnancy were excluded. Data was entered and analyzed on SPSS version 18. The quantitative variables were evaluated through their frequencies and percentages. The qualitative variables were expressed as mean and standard deviation.

Table I: Cytological diagnosis of FNAC of benign lesions

Diagnosis	n	C1	C2	C3	C4	C5
Fibroadenoma	21	0	18	3	0	0
Fibrocystic change	04	0	3	1	0	0
Benign phyllodes	01	0	01	0	0	0
Inflammatory	02	0	02	0	0	0
Granulomatous	01	0	02	0	0	0
Atypical hyperplasia	01	0	0	01	0	0

Table II: Cytological diagnosis of FNAC of malignant lesions

Diagnosis	N	C1	C2	C3	C4	C5
IDC	18	0	0	0	1	18
Lobular carcinoma	1	0	0	0	1	01
Medullary carcinoma	1		0	0	0	01

Table III: Histopathological diagnosis of benign lesions

Diagnosis	N	%age
Fibroadenoma	22	76
Fibrocystic	03	10
Phylloides	01	3.5
Acute abscess	01	3.5
Chronic mastitis	01	3.5
Granulomatous	01	3.5

Table IV: Histological diagnosis of malignant lesions

Diagnosis	n	%age
IDC	19	90.48
Lobular carcinoma	1	4.76
Medullary carcinoma	1	4.76

Table V: Age distribution of malignant /benign breast lesions

Age (years)	Malignant	Benign
18-23		17(58%)
24-28		1(4%)
29-33		5(17%)
34-38	3(14%)	5(17%)
39-43	3(14%)	1(4%)
44-48	4(19%)	
49-53	5(24%)	
54-58	4(19%)	
59-63	2(10%)	
Mean ±SD 48±7.91		Mean ±SD 25.82±7.6
Total age Mean ± SD 35±13.6		

Table VI: Screening test

Test results	Diseased	Not diseased
Test positive	TP True positive	FP False positive
Test negative	FN False negative	TN True negative

Table VII: Comparison of FNAC and histopathology

FNAC	Histopathology (Gold standard)		Total
	Positive	Negative	
Positive	49 (TP)	00 (FP)	49
Negative	01 (FN)	00 (TN)	01

Table VIII: Sensitivity, specificity and accuracy of FNAC breast

$\text{Sensitivity} = \frac{\text{True Positive}}{\text{True Positive} + \text{False Negative}} \times 100$ $= \frac{49}{49 + 1} \times 100 = 98.0\%$	
$\text{Specificity} = \frac{\text{True Negative}}{\text{True Negative} + \text{False Positive}} \times 100$ $= \frac{29}{29 + 00} \times 100 = 100.0\%$	
$\text{Diagnostic Accuracy} = \frac{\text{True +ve} + \text{True -ve}}{\text{True +ve} + \text{True -ve} + \text{False +ve} + \text{False -ve}} \times 100$ $= \frac{49 + 0 + 0 + 1}{49 + 0 + 0 + 1} \times 100 = 98\%$	

Table IX: Positive predictive value and negative predictive value of fine needle aspiration cytology

$\text{Positive Predictive Value} = \frac{\text{True Positive}}{\text{True +ve} + \text{False +ve}} \times 100$ $= \frac{49}{49 + 0} \times 100 = 100.0\%$	
$\text{Negative Predictive Value} = \frac{\text{True Negative}}{\text{True -ve} + \text{False +ve}} \times 100$ $= \frac{29}{29 + 1} \times 100 = 96.6\%$	

## RESULTS

The study included thirty benign and twenty malignant lesions on FNAC. The breakup of these lesions has been given in table i & ii. It was seen that

fibroadenoma was the commonest lesion and consisted of 22 cases out of 30 benign cases. It was seen in a younger age group i.e., 18-32 years with a mean age of 22.8±4.8 We studied twenty malignant cases on FNAC. It included eighteen cases of invasive ductal carcinoma (no special type) along with 1 each of medullary carcinoma and lobular carcinoma. (Table II). Microscopically it consisted of class IV and V smears.

The age of the patients for all breast lesions ranged from 18-63 years (table v). Cytological diagnosis was divided into five classes from C1 to C5. Smears were adequate in all the cases. FNAC was co-related with histopathological diagnosis. (Table VII) In one patient in which FNAC did not match histopathology was class III on FNAC and on histopathology it turned out to be ductal carcinoma (grade ii).

On comparison of FNAC with histopathology taken as gold standard, out of 50 patients, true positive were 49 and false negative was 1. No false positive or true negative seen. In our study, only females with a palpable lump were selected. Therefore in purely statistical terms, there were no normal individuals. Hence true negatives could not be calculated. To give a wider spectrum to our interpretation of the results we calculated the specificity of FNAC for malignant lesions against benign lesions i.e., "How specific is FNAC as a test in the diagnosis of malignancy in a breast lump?"

The sensitivity, specificity, accuracy, PPV and NPV were calculated to be 98%, 100%, 98%, 100% and 96.6%.

## DISCUSSION

Fine needle aspiration cytology is a well established technique for pre-operative diagnosis of breast lesions. The technique is non invasive, cost effective and efficient method of differentiating benign and malignant breast lesions<sup>7</sup>. The expansion of FNAC in the primary diagnosis of cancer in the last 30 years has been enormous and highly successful. Its use in detecting the presence of cancer before surgery and as a guide to rationale treatment has been well documented. There has been increase in the use of FNAC in Saudia as compared to core needle biopsy. In our study we had 50% cases of C2, 10% cases of C3, 4% cases of C4 and 36% cases of C5. In the study by Hussain MT he had C2 lesions (52%), C3 lesion in (4%) patients, C4 in (2%) patient and C5 in (40%) patients<sup>8</sup>. In my study on FNAC, benign lesions consisted of 60% of the total cases, with fibroadenoma being the commonest lesion 44% followed by fibrocystic in 8% patients, 4% had

inflammatory lesion, 2% had granulomatous and 2% had benign Phylloides.

Stojacic-Djenic and colleagues have also found fibroadenoma being the commonest pathology in 40.68% cases in a study conducted at Beograd<sup>1</sup>. The intermediate findings were the main pitfalls of FNAC breast. A risk of false positive results exists in small or complex proliferative lesions as well in ductal and lobular hyperplasia. (1) In our study one case reported as fibrocystic (C3) later turned out to be IDC (C5). This result is similar to the study conducted at Khyber Teaching Hospital, where Hikmatullah and his colleagues diagnosed fibrocystic on FNAC which turned out to be IDC on histopathology<sup>11</sup>.

Malignant cases were 20 (40%) on FNAC and 21(42%) on histopathology. The distribution of C5 lesions confirmed on histopathology was IDC (90.4%) followed by lobular 1(4.7%) and medullary carcinoma 1(4.7%).

These results are comparable to a study conducted at Armed Forces Institute Rawalpindi where C5 lesions consisted of IDC 90.14%, lobular 5.63%, mucinous 2.82% and medullary 1.41%<sup>12</sup>.

Expertise of the person performing and interpreting the fine needle aspiration often influences results. Experience and technique are the most important factors in obtaining satisfactory aspirate from breast lumps. We found the age of the patients ranged from 18-63 years with mean age 35±13.6 years. The highest number of patients with benign disease were aged between 18-23 years and for malignant it showed two peaks i.e. 34-38 and 44-48 years. In his study Hussain had, the age distribution between fifteen and sixty-five years and the maximum patients were seen in the thirty one to forty one year age group.

After comparison of our results of FNAC with histopathology, overall sensitivity of FNAC was 98%, specificity 100%, positive predictive value 100% and negative predictive value 98%. The overall accuracy was 98%. In a study done by Day C et al conducted in Nigeria the sensitivity, specificity, positive and negative predictive value were 83%, 92%, 83% and 92%<sup>13</sup>.

## CONCLUSION

Fine needle aspiration cytology is more specific than sensitive. FNAC is easy, less invasive, patient friendly, reliable and time saving, cost effective diagnostic test. When performed by expert pathologist, the diagnostic accuracy of FNAC is very

high. A high sensitivity and high positive predictive value proved that FNAC breast is as good as histopathology in diagnosing breast lesions. The risk of false negative and false positive can be reduced if it is combined with clinical assessment and radiological findings. With the addition of immunomarkers FNAC is even much better a technique than before.

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