

A COMPARATIVE STUDY OF CLINICO- PATHOLOGICAL AND RADIOLOGICAL FEATURES OF PALPABLE BREAST LESIONS

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ABSTRACT

BACKGROUND

Breast cancer is the most common cancer in Indian cities and the second most common cancer in the rural areas. More and more patients are being diagnosed with breast cancer in their thirties and forties. Early diagnosis is therefore very important for reduction of morbidity and mortality associated with breast cancer.

MATERIALS AND METHODS

Currently the triple test (Clinical examination, radiological imaging and FNAC) is used to accurately diagnose all palpable breast lumps. This study was undertaken to assess the sensitivity and specificity of mammography and fine needle aspiration cytology. A total of 172 cases which had a combination of clinical examination, fine needle aspiration cytology, mammography and histopathological examination were analysed.

RESULTS

Benign tumours were common in young women, with incidence peaking at 20-29 years of age. Majority of the malignant breast lesions were seen in the age group of 50-59 years. The mean age of breast cancer was 53.89 years. Breast lump was the most common presenting complaint in both benign and malignant breast lesions. Upper outer quadrant was the most common site of breast lump in both benign and malignant breast lesions. The most common benign lesion was fibroadenoma (58.5%). The most common malignant lesion was invasive carcinoma of no special type (82.3%). The sensitivity and specificity of FNAC were 97.02% and 98.57% respectively. The sensitivity and specificity of mammography were 92.15% and 87.14% respectively.

CONCLUSION

Fine needle aspiration cytology is more sensitive and specific in the diagnosis of palpable breast lesions. Hence fine needle aspiration cytology alone may be sufficient for the accurate diagnosis of palpable breast lesions.

KEYWORDS

Triple Test, Carcinoma Breast, FNAC, Mammography.

HOW TO CITE THIS ARTICLE: Sugathan V, Varghese S, Raji LN. A comparative study of clinico- pathological and radiological features of palpable breast lesions. J. Evolution Med. Dent. Sci. 2017;6(10):770-776, DOI: 10.14260/Jemds/2017/167

BACKGROUND

The rising incidence of carcinoma breast is a major concern worldwide and it is the most common cancer, and the most common cause of cancer deaths in Indian women.¹ Accurate diagnosis is essential for relieving the anxiety of the patient and for appropriate treatment at the earliest. The most common symptom of breast cancer is a lump. Although clinical examination can suggest a carcinoma breast, there is variable degree of suspicion.² The triple test which uses a combination of clinical examination, radiological imaging (mammogram/ultrasound) and Fine needle aspiration cytology remains the gold standard for accurate diagnosis of carcinoma breast.^{2,3,4} The "Triple test," was initially described in the mid-1970s, by Johansen C.

The Triple test has proved a reliable tool for the accurate diagnosis of palpable breast masses, due to its technical

simplicity, and resulted in substantially reduced expense and morbidity compared with open surgical biopsy.^{5,6,7} This study titled "A comparative study of clinico pathological and radiological features of palpable breast lesions" was undertaken for assessment of BIRADS grading of mammography versus fine needle aspiration cytology and determining the sensitivity and specificity of mammography and fine needle aspiration cytology.

MATERIALS AND METHODS

Study Design- Prospective comparative study.

Study Setting- Dept. of Pathology, Government Medical College, Kottayam.

Study Period- June 2014 to September 2015 (16 months).

Study Subjects

Cases of palpable breast lesions who came to the department of pathology for FNAC study, satisfying the inclusion and exclusion criteria;

Inclusion Criteria

1. All female patients who presented with palpable breast lesions to the department of pathology for fine needle aspiration study.
2. Cases in which all the three components of triple test were studied.

Financial or Other, Competing Interest: None.

Submission 08-12-2016, Peer Review 19-01-2017,

Acceptance 25-01-2017, Published 02-02-2017.

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DOI: 10.14260/jemds/2017/167



Exclusion Criteria

1. Patients presenting with breast complaints other than palpable breast lesions and patients in whom no definable mass can be detected on physical examination. Ulcerated and fungating breast growth are excluded.
2. Patients who did not have a combination of physical examination, mammography FNAC and histopathology.

Sample Size

$$\text{Sample size} = \frac{z^2 * \text{Specificity} (1-\text{Specificity})}{W^2 (1-P)}$$

A recent study had shown that mammography had 90.3% specificity and FNAC had 97.2% specificity in diagnosing malignant disease. Assuming a prevalence of the malignant disease in the study population as 20% of all the breast lumps $Z=1.96$ for 95% confidence

Specificity of Mammography as 90.3% from a previous study $W= 0.05$

Sample Size = 172

As the sample size calculated using specificity of FNAC is less than that of mammography, the sample size 172 has been chosen.

(Rahman MZ, Sikder AM, Nabi SR. Diagnosis of breast lump by fine needle aspiration cytology and mammography. Mymensingh Med J. 2011 Oct; 20(4):658-64).

Statistics

The Data were appropriately coded and entered in Microsoft Office Excel. Appropriate statistical tests were used and further analysis was done using Statistical Package for Social Sciences (SPSS) software (Version 16).

Fine Needle Aspiration Cytology Results were classified as

1. Non-diagnostic (Inadequate or unsatisfactory).
2. Negative for malignant cells (No malignant cells seen).
3. Atypical.
4. Suspicious.
5. Positive for malignant cells.

Category 1 was excluded from the study.

Category 2 and 3 were taken as negative for the diagnosis of malignancy.

Category 4 and 5 was taken as positive for the diagnosis of malignancy.

Mammography Results were classified as

- 0- Incomplete.
- 1- Negative.
- 2- Benign.
- 3- Probably benign.
- 4- Suspicious.
- 5- Highly suggestive of malignancy.
- 6- Biopsy proven malignancy.

Categories 1, 2 and 3 were taken as negative for malignancy.

Categories 4, 5 and 6 were taken as positive for malignancy.

The Values were determined by the following Formula

Where TP is true positive, TN–true negative, FP–False Positive and FN–False Negative.

Sensitivity = $TP / (TP+FN)$.

Specificity = $TN / (TN + FP)$.

RESULTS

A Total of 172 Cases were included in the Study

All patients were females. The age ranged from 15 to 88 years. There were a total of 102 malignant lesions and 70 benign lesions.

Benign breast diseases were common in younger age groups (<30 years) with peak incidence in the age group 20-29 years. (Table 1).

Malignant breast lesions were common in older age groups with peak incidence in 50-59 years. (Table 1).

The mean age of breast cancer was 53.89 years.

Breast lump was the most common presenting complaint in both benign and malignant breast lesions.

Upper outer quadrant was the most common site of breast lump in both benign and malignant breast lesions. (Figure 1 and 2).

The most common benign lesion was fibroadenoma (58.5%) followed by fibrocystic disease (20%) (Table 2).

The most common malignant lesion was invasive carcinoma of no special type (82.3%) followed invasive lobular carcinoma and mucinous carcinoma (3.9% each) (Table 2).

The sensitivity and specificity of FNAC was higher (97.02% and 98.57% respectively) compared to mammography (92.15% and 87.14% respectively) in detecting breast malignancy (Table 3 and figure 3).

Mammography had a higher sensitivity (92.39%) in detecting malignancy in older women (>40 years of age) when compared to women below 40 years (Table 4 and table 5).

Age Group (Years)	Benign Lesions	Malignant Lesions
0-19	14	0
20-29	20	0
30-39	14	10
40-49	16	29
50-59	4	33
60-69	1	21
70-79	1	6
80-89	0	3

Table 1. Age wise distribution of benign and malignant breast lesions

Benign	No. of Lesions	Malignant	No. of Lesions
Fibroadenoma	41	Ductal Carcinoma In Situ	2
Fibrocystic Disease	14	Invasive Carcinoma of No Special Type	84
Fibroadenomatoid Hyperplasia	6	Invasive Lobular Carcinoma	4

Tubular Adenoma	1	Mucinous Carcinoma	4
Benign Phyllodes (Figure 3 a, b, c)	4	Invasive Papillary Carcinoma	3
Sclerosing Adenosis	1	Solid Papillary Carcinoma	1
Pseudoangiomatous Stromal Hyperplasia	1	Carcinoma with Medullary Features	1
Breast Abscess	1	Metaplastic Carcinoma	1
Granulomatous Mastitis	1	Malignant Phyllodes Tumor	2

Table 2. Histological types of Lesions

In this study FNAC was found to be more sensitive and specific (97.02% and 98.57%) as compared to mammography (92.15% and 87.14%).

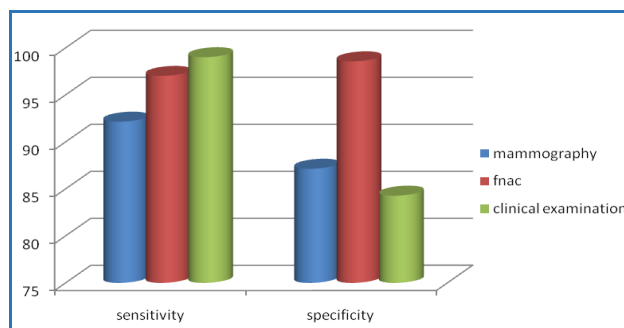


Figure 3. Comparison of sensitivity and specificity of mammography, FNAC and clinical examination

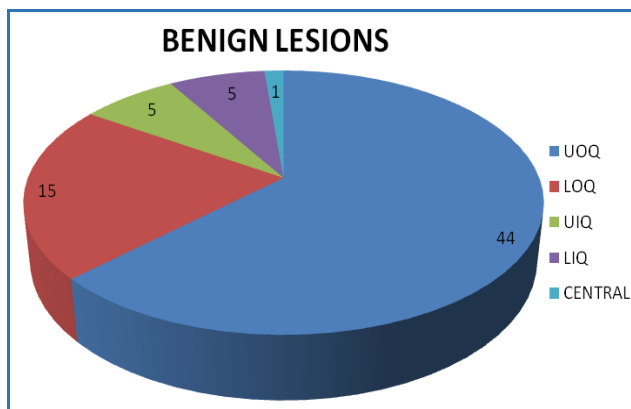


Figure 1. Quadrant wise distribution of benign breast lesions

	Mammogram	FNAC
Sensitivity	92.39%	96.74%
Specificity	77.27%	95.45%

Table 4. Comparison of sensitivity and specificity of mammography and FNAC in women above 40 years of age

	Mammogram	FNAC
Sensitivity	90.00%	100%
Specificity	91.67%	100%

Table 5. Comparison of sensitivity and specificity of mammography and FNAC in women below 40 years of age

Mammogram had a greater sensitivity in detecting breast cancers in women above 40 years of age compared to women below 40.

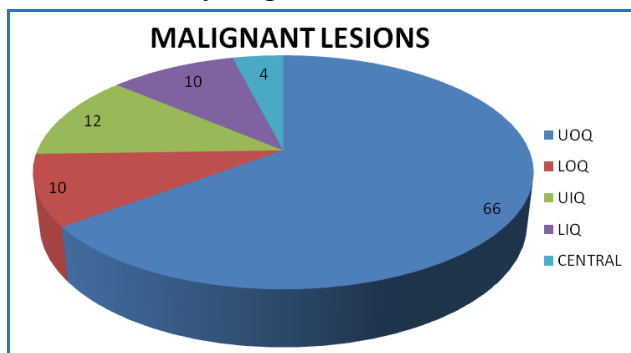


Figure 2. Quadrant wise distribution of malignant breast lesions

Diagnosis	Mammography	FNAC	Clinical Examination
True Positive (TP)	94	98	101
True Negative (Tn)	61	69	59
False Positive (FP)	9	1	11
False Negative (FN)	8	3	1
Sensitivity TP/(TP+FN)	92.15%	97.02%	99.01%
Specificity TN/(TN+FP)	87.14%	98.57%	84.28%

Table 3. Sensitivity & specificity of mammography, FNAC and clinical examination

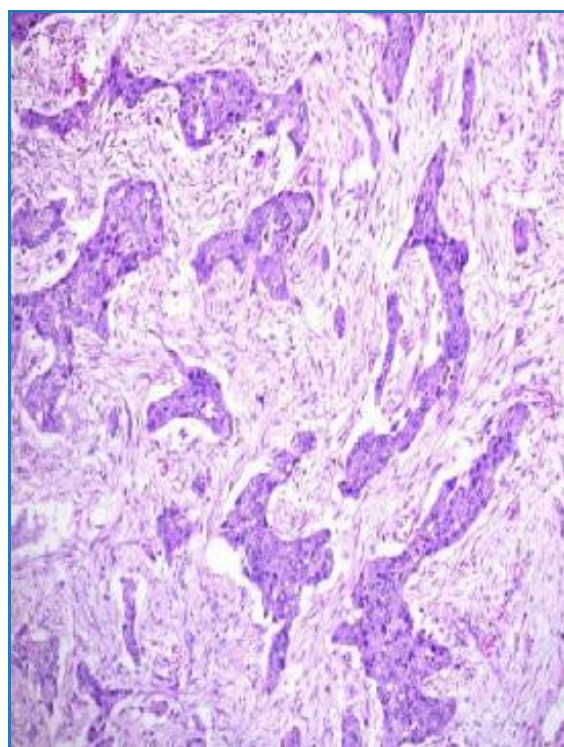


Figure 1a. Invasive carcinoma of no special type, H & E stain, 10X

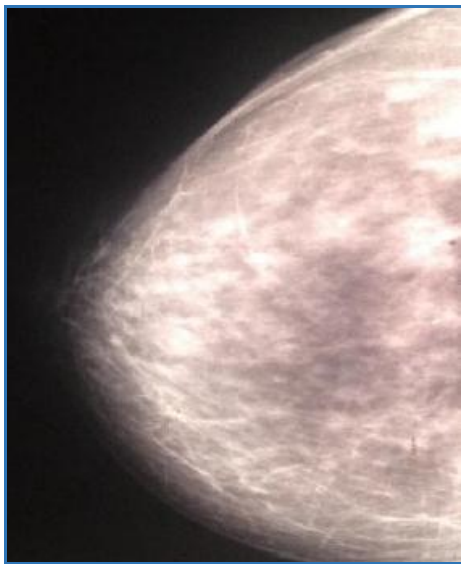


Figure 1b. Mammography BIRADS V. carcinoma breast

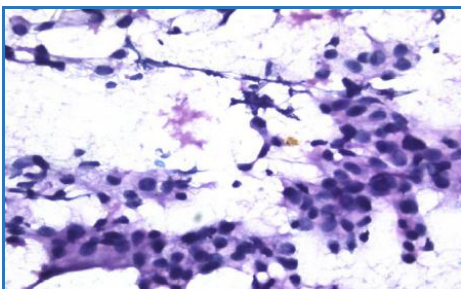


Figure 1c. Carcinoma breast, Papanicolaou stain, 20X

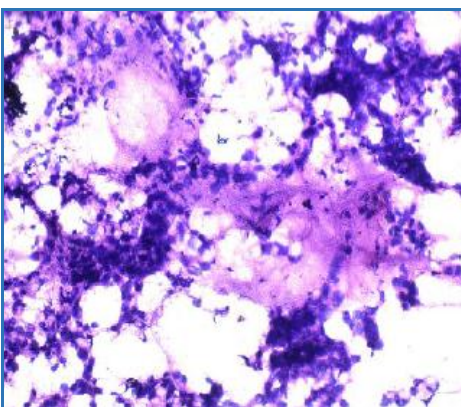


Figure 2a. Mucinous carcinoma, Papanicolaou stain; 20X

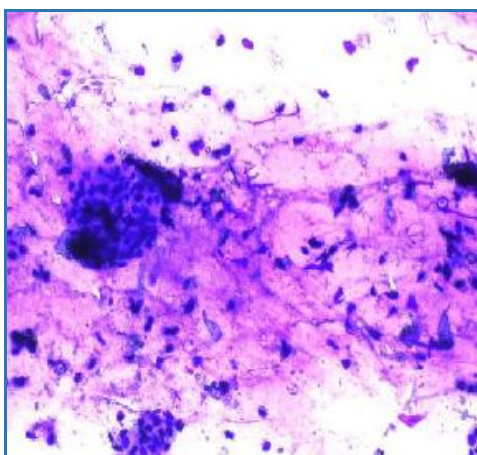


Figure 2b. Mucinous carcinoma, Giemsa stain; 20X

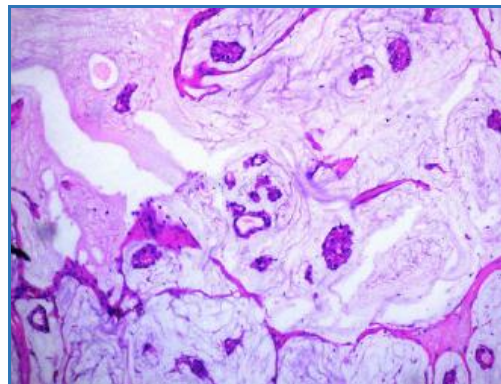


Figure 2c. Mucinous carcinoma, H & E stain; 20X

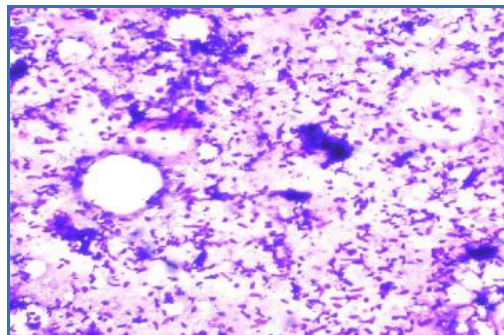


Figure 3a. Phyllodes tumor, Papanicolaou stain, 20X



Figure 3b. Gross phyllodes tumor

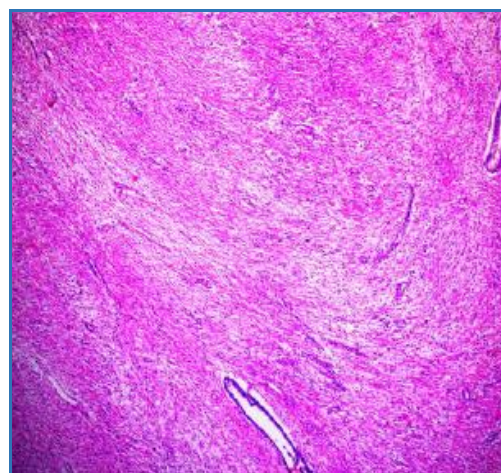


Figure 3c. Benign phyllodes tumor, H & E stain; 20X

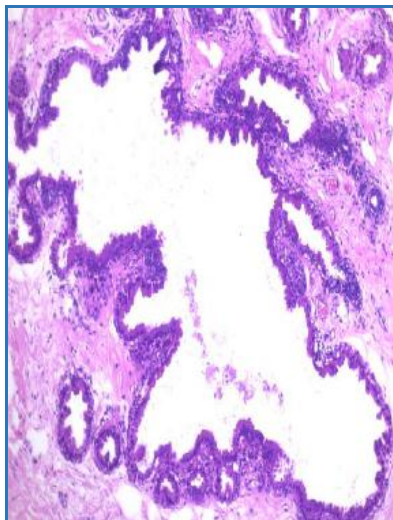


Figure 4a. Fibrocystic disease, H & E stain, 20X

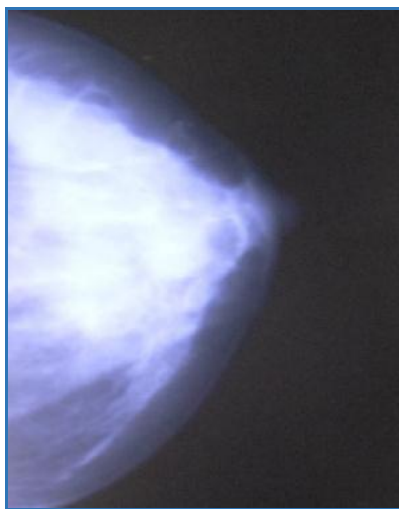


Figure 4b. Mammography cystic lesion breast

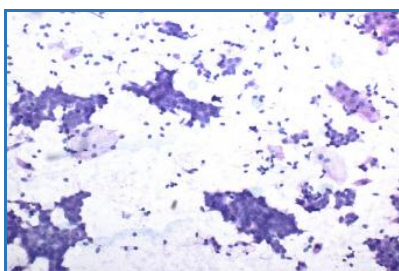


Figure 4c. Fibrocystic disease, Papanicolaou stain; 20X

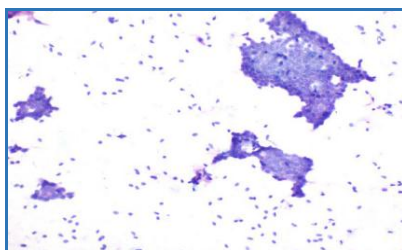


Figure 5a. Fibroadenoma; Papanicolaou stain, 20X

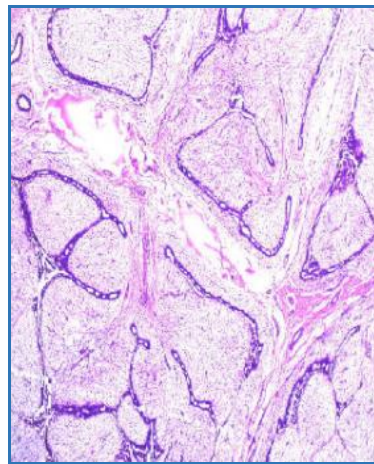


Figure 5b. Fibroadenoma H & E stain; 10X;



Figure 5c. Mammography, lobulated lesion, BIRADS II

DISCUSSION

Age

The youngest patient was 15 years and the oldest was 88 years. There were 70 benign lesions and 102 malignant lesions. The increase in the number of malignant lesions may be due to selection bias. Benign lesions were common in the younger age group, whereas malignant lesions were common in the older age groups. The mean age of breast cancer was 53.89 years. The highest number of malignant lesions were in the age group 40-59 years. The mean age of presentation was 47.8 years in the study done by Sunita Saxena et al⁸ In US white females, the average age of occurrence of breast cancer is 61 years.⁹ The peak age of breast cancer onset is 45-50 years of age in Asia and 55-60 years in the Western countries, according to Stanley P Leong et al¹⁰. The maximum number of cases of breast cancer were between 50 to 54 years of age group in TS Sanal et al study. The mean age of the cases was 45.64 years.¹¹

The mean age of presentation was higher in the present study as compared to the Indian studies and was lower compared to western study. The disease occurs a decade earlier in India as compared to the west. The reasons need to be evaluated further. All lesions in the age group 0-29 were benign lesions. The highest number of benign lesions were seen in the age group 20-29 years.

Symptoms

The most common presenting complaint was a painless lump, followed by lump with pain. Babatunde A Ayoade et al study¹² also showed that breast lump was the most common symptom of patients in benign and malignant breast diseases. Jagdish B. Karia et al study¹³ and MBM Sangma et al¹⁴ studies showed similar results.

Quadrant

Both benign and malignant breast lumps were in the upper outer quadrant. Vishal GM et al ¹⁵and Mohapatra et al ¹⁶studies also give similar results. Darbre P D et al¹⁷ study found that incidence of female breast cancer in the UOQ rose from 47.9% in 1979 to 53.3% in 2000.

Histological Type of Breast Lesions

Invasive carcinoma of no special type was the most common followed by invasive lobular carcinoma and mucinous carcinoma. Sunita Saxena et al study⁸ and Sangeetha K et al study¹⁸ also showed similar results. (Table 6).

The most common benign lesion was fibroadenoma followed by fibrocystic disease. Sangeetha K et al study¹⁸ and AN Olu Eddo et al ¹⁹study showed similar results. (Table 7).

Sensitivity and specificity of FNAC

The reported sensitivity and specificity of FNAC vary depending on how insufficient/non-diagnostic samples and atypical/indeterminate samples are considered (Positive, negative or excluded from the study). In this study, insufficient/non-diagnostic samples were excluded and atypical/indeterminate samples were considered as benign. The sensitivity and specificity of FNAC were 97.02% and 98.57% respectively. The results of the present study were comparable to Rahman MZ et al²⁰ study and showed higher sensitivity and specificity compared to Ying-Hua Yu et al ²¹study and Puja B. Jarwani Et al study²² (Table 8).

Sensitivity and Specificity of Mammography

In the present study sensitivity and specificity of mammography were 92.15% and 87.14% respectively.

The Gurung et al ²³ and Rahman MZ et al study²⁴ showed higher specificities compared to sensitivity. Ahmadinejad et al study²⁵ showed a high sensitivity but had very low specificity compared to the present study. (Table 9).

Sensitivity of Mammography and Age of the Patient

In the present study, mammogram had higher sensitivity in patients above forty years of age (92.39%) compared to those younger than forty. (90.00%). similar observations were made by Saarenmaa et al²⁶ and Houssami et al²⁴ in their studies.

Invasive Papillary Carcinoma	2.9%	-	-
Solid Papillary Carcinoma	0.98%	-	-
Carcinoma with Medullary Features	0.98%	1.1%	-
Metaplastic Carcinoma	0.98%	0.9%	-
Malignant Phyllodes Tumor	1.9%	-	-

Table 6. Comparison of histological types of malignant breast lesions with similar studies

Histological Type	Present Study	Sangeetha k et al Study ¹⁸	AN Olu Eddo et al study ¹⁹
Fibroadenoma	58.5%	62.32%	43.1%
Fibrocystic Disease	20%	11.59%	23.8%
Fibroadenomatoid Hyperplasia	8.6%		
Tubular Adenoma	1.4%		
Benign Phyllodes	5.7%	1.45%	1.8%
Sclerosing Adenosis	1.4%	4.35%	
Pseudoangiomatous Stromal Hyperplasia	1.4%		
Breast Abscess	1.4%	1.45%	
Granulomatous Mastitis	1.4%		1.5%

Table 7. Comparison of histological types of benign breast lesions with similar studies

FNAC	Present Study	Rahman MZ et al Study ²⁰	Ying-Hua Yu et al Study ²¹	Puja B. Jarwani et al Study ²²
Sensitivity	97.02%	97.22%	92.7%	87.1%
Specificity	98.57%	99.46%	92.1%	87.5%

Table 8. Comparison of sensitivity & specificity of FNAC of the present study with similar studies

Mammography	Present Study	Rahman MZ et al Study ²⁰	Ahmadinejad et al Study ²⁵	Gurung et al Study ²³
Sensitivity	92.15%	82.76%	94.1%	88.9%
Specificity	87.14%	90.36%	55.6%	95.53%

Table 9. Comparison of sensitivity & specificity of mammography of the present study with similar studies

CONCLUSION

Timely detection plays a pivotal role in the management and prognosis of patients with carcinoma breast. The triple test continues to be the most reliable tool for the diagnosis of carcinoma breast. Even though in this study all the three components of the triple test are highly sensitive, fine needle aspiration cytology shows higher specificity than mammography and clinical examination. Compared to mammography, FNAC is more sensitive and specific in palpable breast lesions. Hence fine needle aspiration cytology alone may be sufficient for the accurate diagnosis of palpable breast lesions. In case of nonpalpable breast lesions, mammography continues to play a major role in the diagnosis.

Histological Type	Present Study	Sunita Saxena et al Study ⁸	Sangeeta k et al Study ¹⁸
Ductal Carcinoma In Situ	1.9%	1.1%	
Invasive Carcinoma of No Special Type	82.3%	88.2%	84.85%
Invasive Lobular Carcinoma	3.9%	3.7%	3.03%
Mucinous Carcinoma	3.9%	-	3.03%

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