

**Breast Lesions: Histopathological and Cytopathological Correlation**Meeta J. Parikh<sup>1</sup>, Jitendra H. Parikh<sup>2\*</sup><sup>1</sup>Professor and Head, Department of Pathology, GMERS Medical College, Gandhinagar<sup>2</sup>Associate Professor, Department of General Medicine, B. J. Medical College, Ahmedabad

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Conflict of interest: Nil

**Abstract:**

**Background:** In India cancer of Breast is second most common cancer in women following cervical carcinoma. Most of the cases in breast lesions are benign. Early diagnosis of Breast lesions can be done by FNA cytology. The FNA was first introduced by Martin and Ellis in 1930. The aim of this study is to establish utility and accuracy of FNAC by correlating histological and cytological findings and whether accuracy depends on the age of the patient as well. The objective is to study the cytological findings of a clinically palpable tumor by fine needle aspiration cytology, find the incidence of breast cancer in a palpable lump in different age groups and to study the various histopathological features of breast lumps, benign and malignant and correlate with cytological findings.

**Methods:** This study of 300 patients was carried out at B.J. Medical College, Ahmedabad from May 2011 to November 2013. FNAC was done on that patients who had undergone histopathological diagnosis of palpable lump were included in this study.

**Results:** Most of the patients were in age group of 16 to 35 years. Right sided breast lump (59.66%) was more common than left side lump (40.33%). Most common malignant lesion is invasive ductal carcinoma NOS followed by Medullary carcinoma in and lobular carcinoma. In our study FNAC has 96.05 sensitivity and 98.06% specificity and accuracy is 97% in all age group.

**Conclusion:** Incidence of malignancy in the younger age group appears to be rise, through higher awareness and higher degree of detection at early stages due to rise, better availability of expertise may be the reason for the apparent rise in incidence. FNAC is a very useful tool especially in our set up where resources are scarce.

**Keywords:** Brucella melitensis, MALDI TOF SP, PUO.

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**Introduction**

Most of the lumps of breast are benign and early diagnosis can be done by fine needle aspiration cytology. The FNAC is highly sensitive easily to perform and cost effective procedure that can be carried out at outpatient department [4,5].

Benefits of FNA over open tissue biopsy are

1. Rapid, reliable
2. Help in planning of treatment in breast lump.
3. Ability to perform molecular ancillary technique i.e. PR & ER, proliferation antigen (Ki67) & DNA pattern analysis.

Accuracy in the diagnosis can be increased by multiple sampling of appropriate sites[6] by ultrasonography guidance and/or mammographic localization[7]. That is why FNAC is regarded as preliminary diagnostic procedure, as a screening procedure with or without Ultrasonography or stereotactic guidance [8] or as a follow-up procedure for post mastectomy or lumpectomy [9]. Fine needle aspiration cytology can also be used to

diagnose lesions of male breasts such as gynecomastia and carcinoma, accessory axillary breasts and their lesions, and status of the axillary lymph nodes [11,12]. Thus the FNAC have reduced the number of open breast biopsies [13]. We studied the cytology of various breast lumps found in women 16-70 years age groups and to study the fallacies which can occur in diagnosis. We also studied the histology of some rare lesions and learnt in retrospect their cytological findings. We also wanted to determine if age was an important factor in determining the accuracy of FNAC.

**Indication of FNAC Breast [14,15]**

The use of FNAC can be defined according to an increasing scale to suit local experience and requirements. Most important of them are:

1. The preoperative confirmation of clinically suspected cancer.

- The investigation of clinically palpable, clinically benign or malignant, as a guide to clinical management.
- The investigation of suspected recurrence or metastasis in cases of previously diagnosed cancer.
- The confirmation of inoperable locally advanced cancer.
- As a complement to mammography in screening situation.
- The diagnosis of simple cysts.

**Standardized Reporting Of FNAC Breast:**

Five categories of FNB reports are recommended [16]

- Benign
- Atypical/indeterminate
- Suspicious/probably malignant
- Malignant
- Unsatisfactory.

**Limitations of FNAC [14,15]**

- FNAC requires training in the preparation of quality smears and considerable cytology expertise is required to interpret FNA Cytology.
- Cytological examination on its own cannot decide invasion is present or not.
- Definite diagnosis of some lesions can be difficult to make in the basis of cytology. these include: low grade DCIS, Atypical ductal hyperplasia, tubular carcinoma etc.

4. FNAC may not be the sampling technique of choice for the lesions that are relatively sclerotic fibroadenoma, sclerosing ductal carcinoma and infiltrating lobular carcinoma.

**Methodology**

This study was carried out at B.J. Medical College, Ahmedabad from May 2011 to November 2013. FNAC was carried out in 300 patients. (Age group 16-10 years) who had undergone histopathological diagnosis of palpable lump were included.

Patients were divided into three groups:

- Group-I 16-35 years
- Group-II 36-50 years
- Group-III 51-70 years

FNAC was performed using 23 gauge needle attached to a 10 ml syringe. Smears from aspiration were fixed in alcohol and stained with papanicolaou stain. The FNAC smear was received with assessment of cellularity amount of cytoplasm, nuclear grade pressure or absence of cell clusters, single cells and necrosis. The cases were cytopathologically categorized as inadequate, Benign, suspicious of malignancy and malignant.

**Results:** Total cases according to age group : Group I (16-35 years) included 170 cases, in Group II (36-50 yrs) included 100 cases, and in group III (51-70%) included 30 cases.

Right sided breast lump (179 cases – 59.66%) was more common then left side lump (121 cases - 40.33%) mean age of the patients is 35.71 years.

**Table 1: Results of FNAC finding**

<b>Benign</b>	<b>203(67%)</b>
Malignant	90(30%)
Suspicious	7(2.3%)
Inadequate	0(0%)
Total	300(100%)

**Table 2: Cytopathological Findings –Age Distribution**

	<b>Group-I (16-35)</b>	<b>Group-II (36-50)</b>	<b>Group-III (51-70)</b>	<b>Total</b>
Benign	153	41	9	203
Malignant	15	55	20	90
Suspicious	2	4	1	7
Total	170	100	30	300

A total of 203 cases out of the 300 cases Out of the 300 FNA cases were read as benign (67.67%), 90 cases (30%) found as a malignant. A diagnosis of “suspicious” was made in 7 cases (2.33%) out of the 300 cases, Benign lesions are most common, followed by malignant lesion.

**Table 3: Histopathological Findings – Age Distribution**

	<b>Group-I (16-35)</b>	<b>Group-II (36-50)</b>	<b>Group-III (51-70)</b>	<b>Total</b>
Benign	151	36	6	193
Malignant	18	63	23	104
Atypical ductal hyperplasia	1	1	1	3
Total	170	100	30	300

In Group I (16-35 years) patients most common finding was benign 151 (88.82%) cases, while in Group II (36-50 years) and group III (51-70 years) patients malignant finding was most common, 63 (63%) and 23(76%)

cases respectively. A diagnosis of benign was given for 193(64.3%) cases out of 300,m while malignant diagnosis was given for 104 (34.7%) cases and 3(1%) cases were diagnosis as benign with atypical hyperplasia.

**Table 4: Various malignant breast lesions in histopathology**

Histopathological Diagnosis	Number of cases
Invasive ductal carcinoma NOS	56
Poorly differentiated ductal carcinoma	17
Moderately differentiated ductal carcinoma	16
Medullary carcinoma	8
Lobular carcinoma	1
Ductal carcinoma in situ	2
Malignant phyllodes	2
Primary stromal sarcoma	2
Total	104

Table No.4 shows that most common malignant lesion is invasive ductal carcinoma NOS followed by Medullary carcinoma in and lobular carcinoma. We have also seen two cases of Malignant phyllodes tumor and two cases of primary stromal sarcoma are the malignant mesenchymal tumors seen in our study.

**Table 5: Histopathological Finding In Age Group(I) 16-35 years**

Group I (16-35 years)	No. of Patients
Fibroadenoma	126
Fibrocystic diseases/fibroadenosis	2
Abscess	5
Granulomatous abscess	3
Benign phyllodes	7
Nonspecific /abscess	5
Fibroadenomatoid hyperplasia	2
Atypical ductal hyperplasia	1
Invasive ductal carcinoma	8
Poorly differentiated ductal carcinoma	4
Moderately differentiated carcinoma	3
Medullary carcinoma	2
Malignant phyllodes	1

**Table 6: Histopathological Finding In Age Group (II) 36-50 years**

Group II (36-50 years)	No. of patients.
Benign phyllodes	3
Fibroadenoma	20
Fibrocystic changes	2
Abscess	1
Atypical ductal hyperplasia	1
Granulomatous mastitis	5
Nonspecific mastitis	5
Invasive ductal carcinoma	39
Poorly differentiated ductal carcinoma	7
Moderately differentiated ductal carcinoma	8
Medullary carcinoma	6
Primary stromal sarcoma	2
Malignant phyllodes	1

**Table 7: Histopathological Finding In Age Group(III) 51-70 years**

Group III (51-70 years)	No. of patients
Abscess/ Non specific	1
Fibrocystic disease	2
Fibroadenoma	3
Atypical ductal hyperplasia	1
Invasive ductal carcinoma	11
Poorly differentiated ductal carcinoma	6
Moderately differentiated ductazl carcinoma	5
Lobular carcinoma	1

Table No. 5,6,7 shows histopathological diagnosis in various age groups. Fibroadenoma is the most common benign lesion in all age group and invasive ductal carcinoma is the most common malignant tumour. In our study we were also seen one case of lobular carcinoma and two cases primary stromal sarcoma.

**Table 8: Histopathology and cytology correlation of entire series**

Histopathology	Cytology		Total
	Benign	Malignant/suspicious	
Benign/Atypical hyperplasia	195	1	196
Malignancy	08	96	104
Total	203	97	300

In this correlation 203 cases (67.97%) of the 300 FNA cases were benign and from this 195 cases (65%) were true positive. 8 cases diagnosed as benign on FNA were found to be malignant on histopathology and that gave us a false negative rate of 2.67% for the all cases. Only 1 case found to

be false positive whereas 96 cases (32%) were true negative out of 300 cases which were malignant or suspicious on FNA to be found malignant in histopathology.

Accuracy of this correlation is 97% where sensitivity is 96.05% and specificity 98.08%.

**Table 9: Histopathology & cytology correlation in age group (I)**

Histopathology	Cytology		Total
	Benign	Malignant/ suspicious	
Benign/Atypical Hyperplasia	152	0	152
Malignancy	1	17	18
Total	153	17	170

In this correlation 153 cases (90%) of the 170 FNA cases were benign and from this 152 cases (89.41%) were true positive. Only one cases diagnosed as benign on FNA were found to be malignant on histopathology and that gave us a false negative rate of 0.58% for the all cases. None

case was found to be false positive whereas, 17 cases (10%) were true negative out of 170 cases which were malignant or suspicious on FNA to be found malignant in histopathology. Accuracy of this correlation is 99.41% where sensitivity is 94% and specificity 100%.

**Table 10: Histopathology & cytology correlation in age group (II) 36-50 years**

Histopathology	Cytology		Total
	Benign	Malignant/ suspicious	
Benign/Atypical Hyperplasia	36	1	37
Malignancy	5	58	63
Total	41	59	100

In this correlation 36 cases (36%) of the 100 FNA cases were benign and from this 41 cases (41%) were true positive. 5 cases diagnosed as benign on FNA were found to be malignant on histopathology and that gave us a false negative rate of 5% for the all cases. Only one case was found to be false

positive whereas, 58 cases (58%) were true negative out of 100 cases which were malignant or suspicious on FNA to be found malignant in histopathology.

Accuracy of this correlation is 94% where sensitivity is 87.80% and specificity 98.30%

**Table 11: Histopathology and cytology correlation of group (III) 51-79 years**

Histopathology	Cytology		Total
	Benign	Malignant/ suspicious	
Benign/Atypical Hyperplasia	7	0	7
Malignancy	2	21	23
Total	9	21	30

In this correlation 09 cases (30%) of the 30 FNA cases were benign and from this 7 cases (23.33%)

were true positive. Two cases diagnosed as benign on FNA were found to be malignant on

histopathology and that gave us a false us a false negative rate of 6.67% for the all cases. None case was found to be false positive whereas 21 cases (70%) were true negative out of 30 cases which

were malignant or suspicious on FNA to be found malignant in histopathology. Accuracy of this correlation is 93.34% where sensitivity is 77.78% and specificity 100%.

**Table 12: Comparison of statistical results of fine needle aspiration (FNA) in Group I, Group II, Group-III**

Statistical Tests	Group I (16-35)%	Group II (36-50) (%)	Group III (51-70)(%)	Total (%)
Sensitivity	99.34	87.80	78	96.05
Specificity	1-00	98.30	100	98.06
Positive predictive value	100	97.29	100	99.48
Negative Predictive value	94.44	92.06	91.30	92.30
False positive rate	0	2.7	0	0.05
False negative rate	4	7.9	8.6	7.6
Accuracy	99.41	94	93.34	97

Table shows that in our study FNA has 96.05 sensitivity and 98.06% specificity and accuracy is 97% in all age group. Specificity and 98.06% specificity and accuracy is 97% in all age group. Specificity in group I and III is 100% while in group II it is 98.30% with false positive rate 2.7%.

**Discussion:** The value of any diagnostic test lies in its ability to detect the presence of disease when it is present (sensitivity) and reliably verify the absence of disease when it is not present

(specificity). The results of this series of patients confirm that FNAC of palpable breast lesions is an accurate and highly sensitive diagnosing method of diagnosing of breast carcinoma. There was no unsatisfactory specimen in this series. This is because respiration is done if the sample is unsatisfactory in the first attempt.

Fibroadenoma was the most common benign lesion and invasive ductal carcinoma was the most common malignant lesion in.

**Table 13: Comparison of cytological diagnosis with other studies**

Author	Benign	Malignant	Suspicious for malignancy	Inadequate smear	Other	Total
Debra et al (1983)	1019 (60.65%)	131 (7.79%)	300 (8.92%)	230 (13.69%)	0	1680
Feither G et al (1995)	1003 (68.1%)	181 (12.3%)	49 (3.3%)	239 (26.6%)	0	1472
Premila De SR et al (1997)	486 (81.0%)	92 (15.33%)	15 (2.50%)	7 (1.16%)	0	600
Kuldeep Singh (2001)	200 (83.33%)	35 (14.58%)	5 (2.8%)	0	0	2140
Quasim et al (2009)	68 (58.62%)	32 (27.58%)	0	16 (13.79%)	0	116
Sajid (2010)	64 (52.05%)	58 (47.05%)	0	0	0	122
Bukhari et al (2011)	271 (63.70%)	120 (28.23%)	32 (7.52%)	0	2 (0.47%)	425
Shreshta et al (2011)	618 (11.97%)	152 (10.83%)	175 (12.47%)	27 (1.92%)	431	1403
Tohuiddin (2011)	431 (82.25%)	72 (13.74%)	17 (3.24%)	3 (0.57%)	4 (0.76%)	524
Present study	203 (67%)	90 (30%)	7 (2.3%)	0	0	300

In the present study percentage of malignant cases was 30% on cytology this was similar to Bukhari et al (2011).

This percentage was more than Debra et al (1983), Premila De SR (1997), Feitcher G et al (1995), Kuldeep singh et al (2001, Quasim et al (2009), and less common than Sajid et al (2010). On cytology

percentage of benign was 67% (203 cases). This was similar to Bukhari et al (2011) and Feither G et al (1995). This percentage was more than Debra et

al (1983). Quasim et al (2009), Sajid et al (2010), Shreshta et al (2011).

**Table 14: Shows that comparisons of the our study with previous series**

	<b>Our series (300) 2013</b>	<b>O'Neil 12 (697) 1997</b>	<b>Ariga21 (1,158) 2002</b>	<b>Zhang Qin (2004)</b>	<b>Arjun Singh et al (2011)</b>	<b>Khema a et al (2011)</b>	<b>Bukhari et al (2011)</b>
Inadequate	0	5(0.7%)	0	0	0	0	0
True positive	195(65%)	485(69% <sup>^</sup> )	-	-	-	-	-
True negative	96(32%)	153(24%)	-	-	-	-	-
False positive	01(0.33%)	44(6%)	-	-	-	-	-
False Negative	08(2.67%)	13(1.9%)	-	-	-	-	-
Sensitivity	96.05%	97%	98%	97.1%	84.6%	98%	96.66%
Specificity	98.06%	78%	98%	97.3%	100%	100%	98.66%
Positive predictive value	99.48%	92%	99%	-	-	100%	96.77%
Negative predictive value	92.30%	92%	91%	-	-	95.12%	98.66%
Accuracy	97%	92%	98%	92.3%	92.3%	-	98.11%

Bukhari et al (2011) reported sensitivity 96.66%, specificity 98.66% accuracy 97%, khema et al (2011) reported 98% sensitivity and 100% specificity while in arjun singh et al (2011) reported sensitivity 84.6%, specificity 100% and accuracy 92.3%. Zhang Quin et al (2004) reported 97.1% sensitivity and 97.3% specificity. In our

series sensitivity 96.05%, specificity 98.06% and accuracy 97% which is almost similar to others.

O'Neil et al reported 97% sensitivity, 78% specificity and 92% accuracy while ariga et al reported 98% sensitivity, 98% specificity and 98% accuracy.

**Table 15: Comparison of results in Below 40 years.**

<b>Statistical analysis</b>	<b>Our series (&lt;40 years)(%)</b>	<b>Ariga et al (&lt;40 years) (%)</b>
Sensitivity	99.34	99
Specificity	100	99
Positive predictive value	100	99
Negative predictive value	94.44	99
False positive rate	0	1
False negative rate	4	1
Accuracy	99.41	99

Statistical results with previous studies are comparable but our series shows a high false negative rate in below 40 years age group reiterating the fact for a high suspicious of malignancy in the younger age group patients. The incidence of malignancy in the younger age group appears to be rise, though higher awareness and higher degree of detection at early stages due to rise, better availability of expertise may be the reason for the apparent rise in incidence.

**Table 16: Comparison of results in above 40 years age group**

<b>Statistical analysis</b>	<b>Our series (&lt;40 years)(%)</b>	<b>Ariga et al (&lt;40 years) (%)</b>
Sensitivity	80%	98
Specificity	98.11%	97
Positive predictive value	95.83%	99
Negative predictive value	89.95%	86
False positive rate	4	<1

False negative rate	10.34	14
Accuracy	92%	98

Our series showed a high false positive rate compared to previous studies. Accuracy is comparable to previous studies.

### Conclusion

Our series showed a very high sensitivity (96.05%), specificity (98.06%) positive predictive value (99.48%) and negative predictive value. (92.30%). In our study we concluded that a total of 203 cases out of the 300 malignant. A diagnosis of suspicious was made in 7 cases (2.33%) out of the 300 cases. Benign lesions are most common, followed by malignant lesion. In our study showed that in histology diagnosis of benign was given for 193 (64.3%) cases out of 300, while malignant diagnosis was given for 104 (34.7%) cases and 3 (1%) cases were diagnosis as benign with atypical hyperplasia. In our series we also showed that Fibroadenoma is the most common benign lesion in all age group and invasive ductal carcinoma is most malignant lesion followed by medullary carcinoma and lobular carcinoma. In our series incidence of malignancy in the younger age group appears to be rise, through higher awareness and higher degree of detection at early stages due to rise, better availability of expertise may be the reason for the apparent rise in incidence. FNAC is a very useful tool especially in our set up where resources are scarce. It's a test which can be done on an outdoor basis and even helps in reducing the anxiety of the patients and her family members and her relatives. We can go for additional tests in the suspicious cases thus maximizing the utility of available resource.

The high sensitivity and specificity suggested that FNAC as simple, safe, cost-effective and accurate method in the initial diagnosis of a palpable breast lump. Though it is confirmed that FNAC is a very useful diagnostic modality in assessment of breast cancers, the fact cannot be underscored that regular practice and developing expertise is necessary to maintain the sensitivity and accuracy. Hence in any set up, regular studies regarding the effectiveness of reporting is essential to maintain the usefulness of this diagnostic utility.

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