

Correlation of FNAC with Histopathology of breast lesions

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Abstract

Background: Breast cancer is a commonest malignancy of women globally. A palpable breast lump is common diagnostic dilemma to surgeons. Fine needle aspiration cytology (FNAC) is simple rapid, accurate diagnostic tool for evaluating palpable breast lumps. Mammography is other screening modality for a breast lump which is routinely used method with simple, low cost with high accuracy. **Aim & Objective:** 1. Correlation of FNAC with Histopathology of breast lesions. **Methods:** Retrospective study, Study setting: Pathology Department of tertiary care centre **Study population:** All FNAC and Histopathology slides were retrieved and reviewed. All the slides were observed and findings recorded. Mammography findings were retrieved and recorded **Sample size:** 125 **Results:** The present study includes 125 cases out of which 101 cases (80.8%) were benign and 24 cases (19.2%) were malignant. Most common benign breast lesion was fibroadenoma (52.4%) and malignant lesion was infiltrating ductal carcinoma (75%). Frequencies of left breast lesions were high compare to right breast lesions. Out of 125 cases FNAC, 123 cases (98.4%) correlated with histopathology with sensitivity of 91.66%, specificity of 100%, positive predictive value (PPV) of 100%, negative predictive value (NPV) of 98% and accuracy of 98.4%. Out of 125 cases, mammography of 25 cases were retrieved with sensitivity of 87.5% and specificity of 94.11% with diagnostic accuracy of 92% **Conclusions:** FNAC is a valuable diagnostic tool; provide rapid and reliable diagnosis in breast lesions

Keywords: FNAC, histopathology, sensitivity, specificity, PPV, NPV, Diagnostic accuracy

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Introduction

Breast cancer is a commonest malignancy of women globally.^[1] The incidence of breast carcinoma in worldwide is 10.4%, developed countries have higher incidence.^{2,3} It is the second most common type of non-skin malignancy (after carcinoma of lung) and fifth most common cause of cancer death. 2A palpable breast lump is a common diagnostic dilemma to surgeons, so it is important to differentiate a benign from malignant breast lesions for surgical pathologist.^{1,4}

FNAC (fine needle aspiration cytology) is simple, reliable, cost effective diagnostic tool with excellent patient acceptance.⁵ It helps in differentiating malignant from benign breast lesions, and it plays an important role in Triple test along with clinical and mammography examination in assessment of breast lumps.⁶ Mammography is other screening diagnostic modality for a breast lump which is routinely used method with simple, low cost with high accuracy.³ Benign breast lesions are round to oval in shape with regular, linear margin, homogenous echo texture and hypoechoic.

Whereas malignant breast lesions are irregular in shape with ill defined speculated margins and microcalcification present.⁷ Due to increase in public awareness and advancement in screening led to early detection and planning of treatment in breast carcinoma. Consequently, decreased morbidity and mortality rate particularly in younger women.^[2]

Material and Methods

Study design: Retrospective study, **Study setting:** Pathology Department of tertiary care centre

Study population: All FNAC and Histopathology slides were retrieved and reviewed. All the slides were observed and findings recorded. Mammography findings were retrieved and recorded

Sample size: 125

Inclusion criteria:

1. All cases of breast lesions irrespective of age and sex were included.

Exclusion criteria:

1. Not willing to participate
2. Loss to follow up

Study procedure:

One and half year retrospective study carried out in department of pathology. FNAC was done with 23 gauge needle following standard procedure under aseptic precautions. Slides were air dried, fixed, with ethylalcohol and stained by field, Giemsa and haematoxylin and eosin. Specimen received for histopathological study was processed and stained by H&E technique, followed by microscopic examination. FNAC and histopathology slides were retrieved and reviewed. All the slides were observed and findings recorded. The mammography findings were retrieved and recorded. The ethical clearance was obtained from the institutional ethical committee. Statistical analysis carried out.

Results

The present study includes 125cases out of which 101 cases (80.8%) were benign and 24 cases (19.2%) were malignant. Fibroadenoma 53 cases (52.4%) constituted the largest disease group in benign breast lesion with a maximum incidence in the third decade of life, followed by Fibrocystic disease (Figure 2A,B) 23 cases, Chronic granulomatous mastitis 8 cases, Benign Phylloides 5 cases, Lactating adenoma 4 cases and Atypical ductal hyperplasia 3 cases (Tables 1 and 2).

Infiltrating ductal carcinoma 18 cases (75%) was most common malignant breast lesion, followed by Medullary carcinoma 2 cases, Intraductal carcinoma (Figure 6A,B) 2 cases, Mucinous carcinoma 1case and Papillary carcinoma (Figure 8A,B) 1case. Frequency of left breast lesions were high (75%) compare to right breast lesions. There were 2 bilateral cases of benign breast lesions. Majority of benign breast lesions were seen within the age bracket of 10 to 40 years and malignant lesions were seen within the age bracket of 30 to 70 years. The earliest malignant lesion was detected at the age of 30 years (Table 2).

This suggests that breast malignancy can occur in young women. In present study, Benign breast lesions clinically presented with freely mobile small size(2-3cm)breast lump, majority of cases without any associated symptoms, few cases had localize pain. Malignant breast lesions clinically presented as large breast lump (5-6cm) which was adherent to underlying tissue with nipple retraction, many cases had axillary lymphadenopathy. Out of 125 cases, FNAC of 123 cases (98.4%) were correlate with histopathology. In one case of breast lump in a 38 years old female, which was diagnosed as fibrocystic disease with atypia on FNAC. On excisional biopsy of that breast lump histopathology confirmed as an infiltrating ductal carcinoma. In another case of 35years female with breast lump was diagnosed as

fibroadenoma on FNAC with mild nuclear atypia with few myoepithelial cells. On excisional biopsy histopathology confirmed as infiltrating ductal carcinoma. The statistical analyses of FNAC with respect to breast malignancy were done (Table 3). The sensitivity of FNAC was found to be 91.66%, specificity of 100%, positive predictive value (PPV) of 100% and negative predictive value (NPV) of 98%.

The accuracy rate was calculated as 98.4%. Out of 125 cases of breast lumps, mammography of 25 cases were retrieved. In that 23(92%) cases correlated with Histopathology. One case on mammography was reported as benign breast lesion (BIRAD 2), On FNAC it turned out as malignant, which was confirmed by histopathological examination. Second case on mammography reported as malignant (BIRAD 4), on FNAC it turned out as cellular fibroadenoma, later on excisional biopsy for histopathology confirmed as cellular fibroadenoma. In present study, on mammography benign breast lesions showed well defined oval, hypoechoic lesions with smooth, regular margins. No associated architectural distortions.

Nipple, areola complex and underlying pectoral muscles appear normal(BIRAD 1,2 AND 3). Malignant lesions showed radiodense mass with irregular margins with mild increase in vascularity and tiny calcifications noted, associated with distortion of normal architecture(BIRAD 4 AND 5). The sensitivity of mammography for detecting breast malignancy was 87.5% and specificity was 94.11% with diagnostic accuracy of 92%.

Table 1: Diagnostic table of benign and malignant lesions as per FNAC and Histopathology

Breast lesions	No. of cases diagnosed on FNAC	No. of cases diagnosed on histopathology	Percentage as per histopathological diagnosis
I. Benign Group			
1. Fibroadenoma	54	53	42.4%
2. Fibrocystic disease	29	28	22.4%
3. Chronic granulomatous mastitis	8	8	6.4%
4. Benign Phyllodes	5	5	4%
5. Lactating adenoma	4	4	3.2%
6. Atypical Ductal hyperplasia	3	3	2.4%
Total	103	101	80.8%
II. Malignant group			
1. Infiltrating ductal carcinoma	16	18	14.4%
2. Medullary carcinoma	2	2	1.6%
3. Intraductal carcinoma	2	2	1.6%
4. Mucinous carcinoma	1	1	0.8%
5. Papillary carcinoma	1	1	0.8%
Total	22	24	19.2%

Table 2: Age range among benign and malignant breast lesions

Breast lesions	Age groups							
	10-20 Years	21-30 Years	31-40 Years	41-50 Years	51-60 Years	61-70 Years	71-80 Years	81-90 Years
Fibroadenoma	17	25	8	2	1	Nil	Nil	Nil

Fibrocystic disease	1	8	13	3	3	Nil	Nil	Nil
Granulomatous mastitis	Nil	5	Nil	1	2	Nil	Nil	Nil
Benign Phyllodes	Nil	1	2	2	Nil	Nil	Nil	Nil
Lactating adenoma	1	3	Nil	Nil	Nil	Nil	Nil	Nil
Atypical Ductal hyperplasia	Nil	Nil	Nil	Nil	Nil	3	Nil	Nil
Malignant								
Infiltrating ductal carcinoma	Nil	1	6	2	2	6	1	Nil
Medullary carcinoma	Nil	Nil	Nil	2	Nil	Nil	Nil	Nil
Intraductal carcinoma	Nil	Nil	Nil	Nil	Nil	1	Nil	1
Mucinous carcinoma	Nil	Nil	Nil	Nil	Nil	1	Nil	Nil
Papillary carcinoma	Nil	Nil	Nil	1	Nil	Nil	Nil	Nil

Table 3: Cyto-histological correlation of breast lesions

Cytological diagnosis	Histopathological diagnosis		Total
	Malignant lesions	Benign lesion	
Malignant lesions	22(True positives)	0(False positives)	22
Benign Lesion	2(False negatives)	101(True negatives)	103
Total	24	101	125

Table 4: Comparative analysis of FNAC in breast lesions by different authors.

Study	Sensitivity	Specificity	PPV	NPV	Accuracy rate
Patel A et al ⁵ (2018)	97.46	100	100	100	99.02
Ibikunle DE et al ⁴ (2017)	99.4	100	100	66.7	-
Khageshan AP et al ⁸ (2015)	96.97	100	100	98.63	99.05
Sankaye SB et al ⁹ (2014)	88.37	96.42	97.43	84.37	91.54
Khemka A et al ¹⁰ (2008)	96	100	100	95.12	-
Muhammed AZ et al ¹¹ (2005)	90.6	100	100	99	-
Ishikawa T et al ¹² (2007)	86.3	98.2	97.9	-	-
Present study	91.66	100	100	98	98.4

PPV = Positive predictive value, NPV = Negative predictive value

Discussion

The incidence of breast malignancy has increased worldwide due to advancement in screening, diagnosis and changes in life style of women.⁶ Early detection and screening can decrease breast carcinoma mortality around 18-29%.¹³ FNAC of palpable breast lumps is a well accepted and established diagnostic tool for determining the benign or malignant breast lesions with high degree of accuracy. Further this is helpful in early detection and accurate

management.¹⁴

The goal of present study is to correlate the results of breast lesion on FNAC with histopathological diagnosis and to assess its diagnostic accuracy. Early screening and accurate diagnosis is very necessary for categorization of breast lesions and management.

In present study fibroadenoma was most common benign breast lesion which is in agreement with Dominguez et al,¹⁵ Tiwari,¹⁶ Qasim et al,¹⁷ Srikanth¹⁸ and Yalavarthi et al.¹⁹

In our study majority of benign breast lesions were seen within the age bracket of 10 to 40 years, which is in agreement with Khemka et al.¹⁰ (15-44 years) and Rocha et al²⁰ (14-40 years). However, MacIntosh et al.²¹ had majority of benign cases within the age bracket 27-77 years. In present study most common malignant breast lesion was infiltrating ductal carcinoma 18 cases (75%), similar findings were seen in Domingues et al¹⁵ and Srikanth.¹⁸

In our study malignant lesions were in the age bracket of 30-70 years, which is in agreement with other studies like Srikanth¹⁸ (31-70 years), Khemka et al¹⁰(35-84 years), MacIntosh et al²¹(63-79 years) and Rocha et al²⁰ (41-75 years).

This suggests that breast malignancy can occur as early as 4th decade of life. In present study distribution of breast lesions were more in the left breast (75%) compared to right breast. Similar findings were seen by Meena et al,²² Reddy and Reddy²³ and Clegg-Lampthey and Hodasi.²⁴ However Sankaye et al⁹ has found equal distribution on both side and Srikanth¹⁸ and Rupom et al¹ has found more in right breast.

The BIRAD reporting system of mammography was introduced in 1993, since then it has become important diagnostic tool in predicting the likelihood of breast carcinoma.²⁵ In present study sensitivity and specificity of mammography for detecting malignancy in breast lesion was 87.5% and 94.11% respectively which correlates well with Richie et al²⁵ had sensitivity of 90.6% and specificity of 97.8% and shanibi et al²⁶ sensitivity of 88.8%.

The present study had almost 98.4% of well correlation of cytology to histopathology which correlates well with Rupom et al,¹ and Chiemchanya et al.²⁷ The sensitivity of 91.66% in our study is comparable with that of various authors shown in Table 4, where sensitivity ranges from 86% to 99%. In present study, there was no false positive case, hence positive predictive value (PPV) and specificity calculated as 100% which is similar to Patel A et al,⁵ Ibikunle DE et al,⁴ Khageshan AP et al,⁸ Khemka A et al¹⁰ and Muhammed AZ et al.¹¹ Sankaye SB et al⁹ had specificity of 96.42% and PPV of 97.43%, and Ishikawa T et al¹² had specificity of 98.2% and PPV of 97.9%. Thus false positive diagnosis is relatively rare in breast FNAC.

Conclusion

The present study concludes that FNAC is a valuable diagnostic tool; provide rapid and accurate diagnosis in breast lesions and it eliminates the need of surgical procedure for the diagnosis. FNAC help us to differentiate malignant from benign breast lesions with high specificity, sensitivity and accuracy. Furthermore, Establishment of newer diagnostic modalities like immunohistochemistry, mammography, and doppler in sonomammography may increase their accuracy. However histopathological examination remains gold standard for the diagnosis.

References

1. Rupom TU, Choudhury T, Banu SG. Study of Fine Needle Aspiration Cytology of Breast Lump: Correlation of Cytologically Malignant Cases with their Histological Findings. *Bangabandhu Sheikh Mujib Med Univ J.* 2011;4(2):60–4. doi:10.3329/bsmmuj.v4i2.8631.
2. Sharma GN, Dave R, Sanadya J, Sharma P, Sharma KK. Various types and management of breast cancer: an overview. *J Adv Pharm Technol Res.* 2010;1(2):109–26.
3. Li H, Zhang S, Wang Q, Zhu R. Clinical value of mammography in diagnosis and

- identification of breast mass. *Pak J Med Sci*. 2016;32(4):1020–5.
4. Ibikunle DE, Omotayo JA, Ariyibi OO. Fine needle aspiration cytology of breast lumps with histopathologic correlation in Owo, Ondo State, Nigeria: a five-year review. *Ghana Med J*. 2017;51(1):1– 5. doi:10.4314/gmj.v51i1.1.
 5. Patel A, Bhuyan T, Mohanty RC, Mohanty R. Diagnostic Utility of FNAC in breast lesions and its correlation with histopathology. *IOSR J Dent Med Sci (IOSR-JDMS)*. 2018;17(2):31–40.
 6. Siddegowda MS, Ara T. Correlation of Fine Needle Aspiration Cytology with Histopathology of Malignant Breast Lesions in a Tertiary Care Hospital- Mandya. *J Evid Based Med Healthc*. 2019;6(41):2697–2701. doi:10.18410/jebmh/2019/559.
 7. Raj JR, Rahman SNK, Anand S. Preliminary evaluation of differentiation of benign and malignant breast tumors using non- invasive diagnostic modalities. *Biomed Res*. 2016;27(3):596–603.
 8. Khageshan AP, Wali S, Andola SK. Diagnostic Utility Of Fnac In Evaluation Of Breast Masses. *Int J Recent Scientific Res* . 2015;6(8):5827–31.
 9. Sankaye SB, Dongre SD. Cytological study of palpable breast lumps presenting in an Indian rural setup. *Indian J Med Paediatric Oncol*. 2014;35(2):159–64. doi:10.4103/0971-5851.138993.
 10. Khemka A, Chakrabarti N, Shah S, Patel V. Palpable breast lumps: Fine-needle aspiration cytology versus histopathology: A correlation of diagnostic accuracy. *Internet J Surg*. 2009;18:1.
 11. Muhammed AZ, Edino ST, Ochicha O, Alhasan SU. The value of fine- needle aspiration biopsy in preoperative diagnosis of palpable breast lumps in resource-poor countries: a Nigerian experience. *Ann Afr Med*. 2005;4:19–22.
 12. Ishikawa T, Hamaguchi Y, Tanabe M, Momiyama N, Chishima J, Nakatani Y, et al. False positive and false negative cases of fine needle aspiration cytology for breast lesions. *Breast Carcinoma*. 2007;14:388–92.
 13. Balasundaram, Nilavazhagan A. Comparative study with clinico- pathological correlation between ultrasonography, mammography and fine needle aspiration cytology in evaluation of breast lumps in coastal population of Karaikal. *IAIM*. 2019;6(9):21–7.
 14. Begum F, Kumar PR. Diagnostic correlation of palpable breast masses by cytology and histopathology: A prospective study. *IAIM*. 2018;5(11):44–9.
 15. Domínguez F, Riera JR, Tojo S, Junco P. Fine needle aspiration of breast masses. An analysis of 1,398 patients in a community hospital. *Acta Cytol*. 1997;41:341–7.
 16. Tiwari M. Role of fine needle aspiration cytology in diagnosis of breast lumps. *Kathmandu Univ Med J (KUMJ)*. 2007;5:215–7.
 17. Qasim M, Ali J, Akbar SA, Mustafa S. Lump breast: Role of FNAC in diagnosis. *Prof Med J*. 2009;16:235–8.
 18. Srikanth S. Cytological & Histopathological correlation of Breast lesions –A study of one hundred cases. *Indian J Pathol Oncol*. 2017;4(2):273–7.
 19. Yalavarthi S, Tanikella R, Prabhala S, Tallam US. Histopathological and cytological correlation of tumors of breast. *Med J Dr DY Patil Univ*. 2014;7(3):326–31. doi:10.4103/0975-2870.128975.
 20. Rocha PD, Nadkarni NS, Menezes S. Fine Needle Aspiration Biopsy of Breast Lesions and Histopathologic Correlation. *Acta Cytologica*. 1997;41(3):705–12. doi:10.1159/000332689.
 21. MacIntosh RF, Merrimen JL, Barnes PJ. Application of the Probabilistic Approach to Reporting Breast Fine Needle Aspiration in Males. *Acta Cytologica*. 2008;52(5):530–4. doi:10.1159/000325593.
 22. Meena SP, Hemrajani DK, Joshi N. A comparative and evaluative study of cytological

- and histological grading system profile in malignant neoplasm of breast - An important prognostic factor. *Indian J Pathol Microbiol.* 2006;49:199–202.
23. Reddy DG, Reddy CRR. Carcinoma of the breast, its incidence and histological variants among South Indians. *Indian J Med Sci.* 1958;12:228–34.
 24. Clegg-Lamprey J, Hodasi W. A study of breast cancer in korle bu teaching hospital: Assessing the impact of health education. *Ghana Med J.* 2007;41:72–7.
 25. Richie AJ, Mellonie P. Radiological and Cytological Correlation of Breast Lesions with Histopathological Findings in a Tertiary Care Hospital in Coastal Karnataka. *Int J Contemp Med Res [IJCMR].* 2019;6(2):B1–4.
 26. Shanibi S, Rajamma CK. Mammography Correlated with Histopathology in the Diagnosis of Mass Lesions of the Breast in a Tertiary Teaching Hospital: An Analytical Study. *Int J Sci Stud.* 2017;5(3):252–6.
 27. Chiemchanya S, Mostafa MG. Fine Needle Aspiration Cytology in the Diagnosis of Breast lump. *J Bangladesh Coll Physicians Surg.* 2000;18:61–5.