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## Radiological and cytological correlation of breast lesions with histopathology: A study in a tertiary care centre

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**Abstract**

**Background:** Breast cancer is the most common cancer in females all around the world. It is of utmost importance that all positive cases are diagnosed at the earliest to decrease its morbidity and mortality. Different techniques including mammography/sonomammography, fine needle aspiration cytology and biopsy are used to diagnose breast cancers. With an early diagnosis, the management can be early and hence effective.

**Aim:** Analysis of correlation of radiological and cytological findings as initial diagnostic tools with the final histological diagnosis to avoid unnecessary procedures or to alert the need for urgency of early treatment plans of malignancies in breast lesions.

**Objectives:** 1. To compare the individual efficacy of radiology, cytology and histopathology as a diagnostic modality 2. Role of radiology and cytology as initial diagnostic tools in breast lesions and its correlation with histopathological diagnosis.

**Material and Methods:** The study was conducted in 70 female patients with breast lump. In each patient the clinical presentation, cytology findings, radiology findings and biopsy findings were compared with the final diagnosis of histopathology of lumpectomy or mastectomy specimen.

**Conclusion:** Cytological diagnosis is the best way of screening the malignancy compared with radiological and clinical diagnosis. Since, the cytological diagnosis has the high sensitivity, specificity, positive predictive value and negative predictive value.

**Keywords:** breast cancer, FNAC, mammography, sonomammography, biopsy

**Introduction**

Breast diseases are showing an unprecedented increasing trend globally [1]. Approximately five to fifty percent of females suffer from breast diseases [2]. Breast malignancies are most often encountered and the second most common malignancy in Indian women. The incidence rate of breast malignancies in India is around 85 per 10,000 women per year [3, 4]. Benign breast diseases because of their high incidence and cancerous potential of some of the histological subtypes deserve attention [5].

Screening and diagnostic techniques in breast lesions are critical because of the highly successful outcomes with early diagnosis and treatment [6]. Keuzer, Boquoi and Hermansen suggested a triple diagnostic technique which includes clinical examination, mammography and FNAC [7, 8]. Mammography is the commonly used effective imaging method in patients with non-palpable breast carcinoma. USG plays a role in differentiating cystic and solid breast masses.

Martin and Ellis first introduced the application of FNAC in the diagnosis of palpable breast lesions in 1930 and it is now an important minimally invasive and inexpensive diagnostic adjunct which compliments radiological examination. Histopathological evaluation remains the gold standard for diagnosis and acts as an internal quality measure for radiological and cytological findings.

**Material and Methods**

This retrospective study was carried out at the Department of Pathology, Sree Mookambika Institute of Medical Sciences, Kulasekharam from January 2019 to June 2020. A total of 70 cases were studied. The ages of patients included was from 20 to 84. Physical and clinical examination of lesion was performed in all cases.

FNAC was done and stained by PAP and H and E. A couple of slides were air dried and stained with Giemsa stain. The smears were examined by light microscopy and classified as inflammatory, benign and malignant smears. Biopsy specimens obtained after FNAC was fixed, grossed, processed and stained by H and E. Microscopic examination was done. Radiological correlation of the breast lesions during that period was taken from the archives of the Department of Radiology. The radiological and cytological diagnosis was correlated with the histopathology.

**Results**

Statistical analysis was carried out through SPSS software. Fisher’s exact test was used to find the association between histopathological outcome and clinical/cytological/radiological findings. The best screening test was identified based on sensitivity, specificity, PPV and NPV.

**Table 1:** Frequency distribution of tumor affecting breast-side

Side	Frequency	Percent
Right	45	64.3
Left	25	35.7
Total	70	100.0

From the above table, it is observed that the majority of the patients had the tumor on the right side breast (64.3%).

**Table 2:** Descriptive statistics for patients’ age

	Minimum	Maximum	Mean	Std. deviation
Age	20	84	45.27	12.417

The patients’ age was ranging from 20 to 84 years. The mean age of the patients was 45 (±12) years old.

**Table 3:** Association between clinical findings and histopathological diagnosis

Clinical presentation	Histopathological diagnosis		Total	Statistic
	Benign	Malignant		
	n (%)			
Lump without pain	38 (84.4)	7 (15.6)	45 (100.0)	Fisher’s Exact P-value:0.001
Lump with pain	8 (36.4)	14 (63.6)	22 (100.0)	
Fungating growth	0 (0)	2 (100.0)	2 (100.0)	
Nipple discharge	0 (0)	1(100.0)	1 (100.0)	

Fisher’s exact P-value reveals that there was a significant association between clinical findings and histopathological diagnosis ( $P<0.01$ ). In addition, the majority of the patients who had lump without pain, did not have the malignancy (84.4%) whereas the most patients who had lump with pain, had the malignancy (63.6%). All the patients who had fungating growth and nipple discharge, had the strong evidence of malignancy in the histopathological diagnosis.

benign and malignant findings in cytological diagnosis were same in the confirmatory histopathological diagnosis.

**Table 4:** Association between cytological findings and histopathological diagnosis

Cytological diagnosis	Histopathological diagnosis		Total	Statistic
	Benign	Malignant		
	n (%)			
Benign	44 (97.8)	1 (2.2%)	45 (100.0)	Fisher’s Exact P-value:0.001
Suspicious	1 (33.3)	2 (66.7)	3 (100.0)	
Malignant	0 (0)	21 (100.0)	21 (100.0)	
Inadequate	1 (100.0)	0 (0)	1 (100.0)	

Fisher’s exact P-value reveals that there was a significant association between cytological findings and histopathological diagnosis ( $P<0.01$ ). The majority of the

**Table 5:** Association between radiological findings and histopathological diagnosis

Radiological diagnosis	Histopathological diagnosis		Total	Statistic
	Benign	Malignant		
	n (%)			
BIRADS II	38 (100.0)	0 (0)	38 (100.0)	Fisher’s Exact P-value:0.001
BIRADS III	8 (61.5)	5 (38.5)	13 (100.0)	
BIRADS IV	0 (0)	11 (100.0)	11 (100.0)	
BIRADS V	0 (0)	8 (100.0)	8 (100.0)	

Fisher’s exact P-value reveals that there was a significant association between radiological diagnosis and histopathological diagnosis ( $P<0.01$ ). All BIRADS 2 findings in the radiological diagnosis were benign state in the confirmatory histopathological findings. Analogously, all BIRADS 4 and BIRADS 5 findings in the radiological diagnosis were malignant state in the confirmatory histopathological diagnosis.

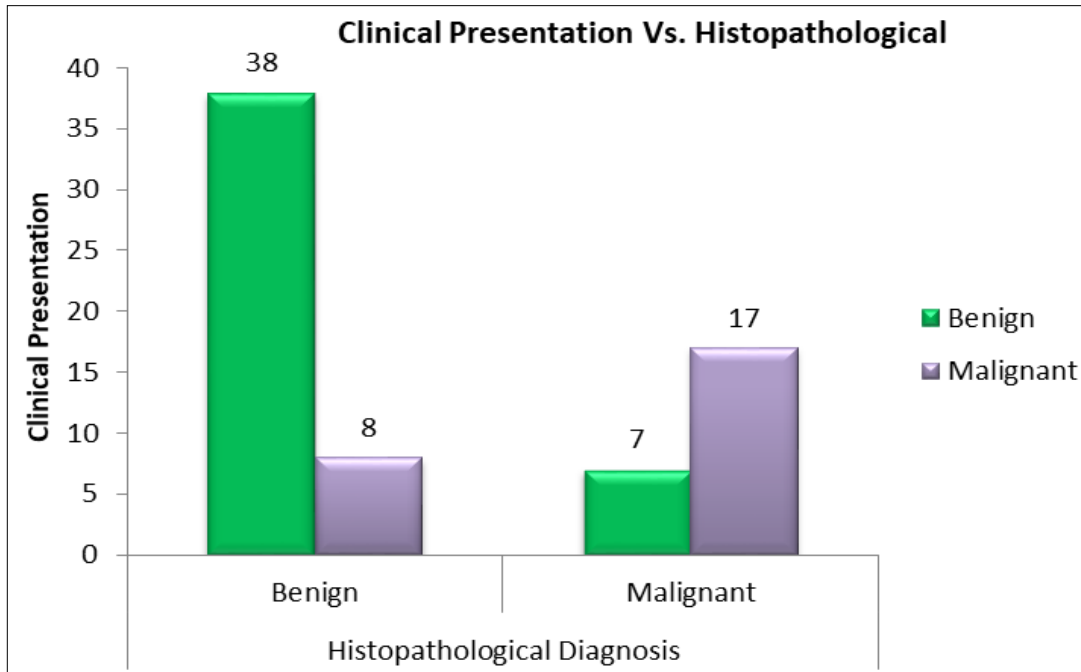
**Table 6:** Sensitivity, specificity, PPV and NPV of clinical findings

Clinical presentation	Histopathological diagnosis		Total
	Benign	Malignant	
Benign	38	7	45
Malignant	8	17	25
Total	46	24	70

Sensitivity =  $(17/24)*100 = 70.83\%$   
 Specificity =  $(38/46)*100 = 82.61\%$   
 PPV =  $(17/25)*100 = 68\%$   
 NPV =  $(38/45)*100 = 84.44\%$

From the above findings, it is concluded that the majority of the benign findings in clinical diagnosis were actually benign in the confirmatory histopathological diagnosis.

Similarly, the majority of the malignant findings in clinical diagnosis were indeed malignant in the confirmatory histopathological diagnosis.



**Fig 1:** Clinical findings Vs. Histopathological diagnosis

**Table 7:** Sensitivity, specificity, PPV and NPV of cytological findings

Cytological diagnosis	Histopathological diagnosis		Total
	Benign	Malignant	
Benign	45	1	46
Malignant	1	23	24
Total	46	24	70

Sensitivity =  $(23/24) * 100 = 95.83\%$

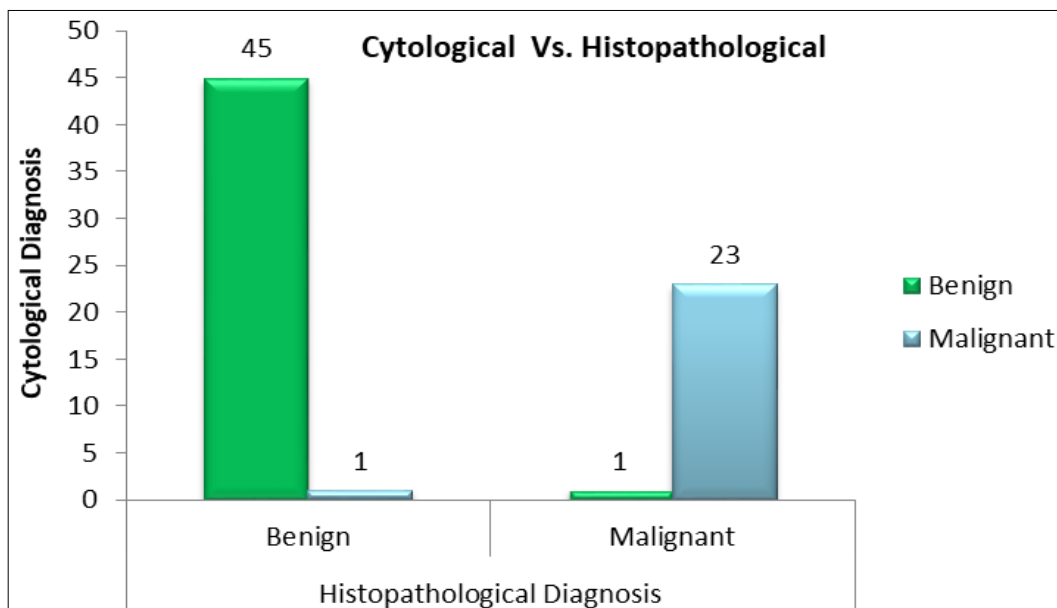
Specificity =  $(45/46) * 100 = 97.83\%$

PPV =  $(23/24) * 100 = 95.83\%$

NPV =  $(45/46) * 100 = 97.83\%$

From the above findings, it is concluded that the majority of the benign findings in cytological diagnosis were actually benign in the confirmatory histopathological diagnosis.

Similarly, the majority of the malignant findings in cytological diagnosis were really malignant in the confirmatory histopathological diagnosis.



**Fig 2:** Cytological findings Vs. Histopathological diagnosis

**Table 8:** Sensitivity, specificity, PPV and NPV of radiological findings

Radiological findings	Histopathological diagnosis		Total
	Benign	Malignant	
Benign	46	5	51
Malignant	0	19	19
Total	46	24	70

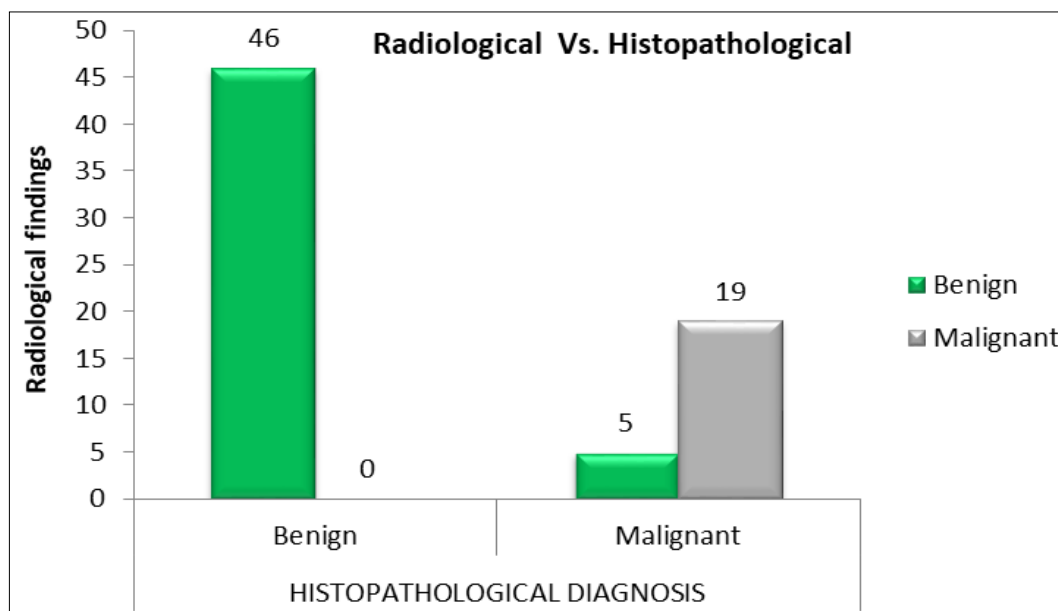
Sensitivity =  $(19/24) \times 100 = 79.2\%$

Specificity =  $(46/46) \times 100 = 100\%$

PPV =  $(19/19) \times 100 = 100\%$

NPV =  $(46/51) \times 100 = 90.2\%$

From the above findings, it is concluded that all of the benign findings in radiological diagnosis were actually benign in the confirmatory histopathological diagnosis. Similarly, the majority of the malignant findings in radiological diagnosis were indeed malignant in the confirmatory histopathological diagnosis.



**Fig 3:** Radiological findings Vs. Histopathological diagnosis

**Conclusion**

Cytological diagnosis is the best way of screening the malignancy compared with radiological and clinical diagnosis. Since, the cytological diagnosis has the high sensitivity, specificity, positive predictive value and negative predictive value.

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