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Original Article

A Prospective Study of Fine Needle Aspiration Cytology of Palpable Breast Lesions with Cytohistopathological Correlation

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ABSTRACT

Background: Breast lesions constitute a significant proportion of surgical pathology cases. Fine Needle Aspiration Cytology (FNAC) is an established, minimally invasive diagnostic tool used in the evaluation of palpable breast lumps as part of the triple assessment approach.
Objectives: To evaluate the diagnostic accuracy of FNAC in palpable breast lesions and to correlate cytological findings with histopathology wherever available.
Materials and Methods: A prospective study was conducted on 70 patients presenting with palpable breast lumps at a tertiary care hospital over 15 months. FNAC was performed in all cases and categorized according to National Cancer Institute (NCI) guidelines. Histopathological correlation and radiological (BIRADS) comparison were done wherever available. Diagnostic indices were calculated using histopathology as the gold standard.
Results: The majority of patients were females (95.7%). Most lesions occurred in the 31–40 year age group. FNAC showed a sensitivity of 92.8%, specificity of 100%, positive predictive value of 100%, negative predictive value of 92.6%, and overall diagnostic accuracy of 96.2%. Fibroadenoma was the most common benign lesion, while invasive ductal carcinoma was the most common malignant lesion.
Conclusion: FNAC is a reliable, accurate, and cost-effective diagnostic modality for the evaluation of palpable breast lesions and shows excellent correlation with histopathology.

Keywords*: FNAC, Breast lesions, Cytohistopathological correlation, Palpable breast lump, Diagnostic accuracy.*

INTRODUCTION

Fine needle aspiration cytology (FNAC) was described and practiced by Martin and Ellis in 1930.[1] It is well accepted procedure and is a valuable tool in the diagnosis and patient management of breast lesions. Breast carcinoma is one of the leading causes of malignancy in females. The diagnosis is often made by FNAC which is considered as first line diagnostic procedure for diagnosis of breast lesions.

Fine needle aspiration cytology is an important part of triple assessment (clinical examination, imaging and FNAC) of palpable breast lump although histopathological diagnosis is a universally accepted confirmatory mode of diagnosis and follows up.[2]

Benign as well as malignant breast lesions are quiet common in Indian population. Aspiration cytology of breast serves various purposes in different clinical setting for clinically benign lesion such as fibrocystic disease; the procedure may result in disappearance of the lesion after aspiration. For clinically malignant disease, aspiration of breast mass and cytological diagnosis enables the physician to assess the disease more effectively.[3]

Fine needle aspiration cytology (FNAC) method was introduced as a primary test in the diagnosis of breast carcinoma. The procedure is safe reliable and time saving outdoor procedure with little discomfort to the patient. FNAC is not only useful in diagnosis and further planning of treatment without need for biopsy, but also helpful in prognostication of the tumor factors such as nuclear grading, mitotic index, hormone receptor status and DNA contents. [4]

A palpable breast mass is the most common symptom associated with both benign and malignant diseases of the breast. Palpable breast masses should accurately be classified preoperatively into benign and malignant masses for proper oncologic surgical management for avoiding unnecessary surgical intervention although benign breast lesions are common, every patient should be evaluated to exclude or confirm malignancy, as malignancy is managed by more radical surgery and adjuvant therapy.[5] The development in the patient education and screening programs has permitted a marked increase in the number of tumours detected.[6]

The present study has been conducted to evaluate the role of FNAC in the diagnosis of palpable breast lesions in terms of sensitivity, specificity, positive predictive value, negative predictive value and accuracy of the procedure using the standard statistical formulas. Thus the efficiency of this procedure to detect benign and malignant lesions will be checked. The results of our study will be compared with similar studies conducted in India and abroad. The study will also be used to find out frequency of various benign and malignant lesions of breasts along with their age and quadrant wise distribution as most of the breast lesions are benign in nature and thus preoperative cytological diagnosis can reduced unwanted surgeries thus reducing the morbidity.[7]

Accuracy of FNAC enables to proceed with or without surgery it bridges the gap between clinical evaluation and final surgical pathological diagnosis in majority of cases. It enables the clinician to obtain a diagnosis in high percentage of cases with minimal expenditure of time, money and often to avoid unnecessary surgery. The present study suggests that FNAC gives good positive correlation with histopathology with high sensitivity and specificity.[8]

AIM AND OBJECTIVES

Aim

To evaluate the accuracy of FNAC in diagnosing breast lesions with histopathological correlation.

Objectives

1. To study the cytomorphological features of palpable breast lesions.
2. To compare FNAC findings with histopathological diagnosis wherever available.

MATERIALS AND METHODS

Study Design and Setting

This prospective study was conducted in the Department of Pathology, Basaveshwara Medical College and Hospital, Chitradurga, over a period of 15 months from October 2019 to December 2020.

METHODOLOGY

Sample Size

The minimum sample size was calculated as 60 based on prevalence data. A total of 70 patients were included in the study.

Inclusion Criteria

- Patients aged 10–70 years
- Both genders
- Clinically palpable breast lumps of any duration

Exclusion Criteria

- Frank malignant masses with skin infiltration

FNAC Procedure

FNAC was performed using a 10-ml syringe and 22–23-gauge needle under aseptic precautions. Smears were prepared and stained using Haematoxylin & Eosin and Papanicolaou stains. Lesions were categorized into C1–C5 categories as per NCI guidelines.

Histopathology

Histopathological examination was performed wherever surgical specimens were available and considered the gold standard.

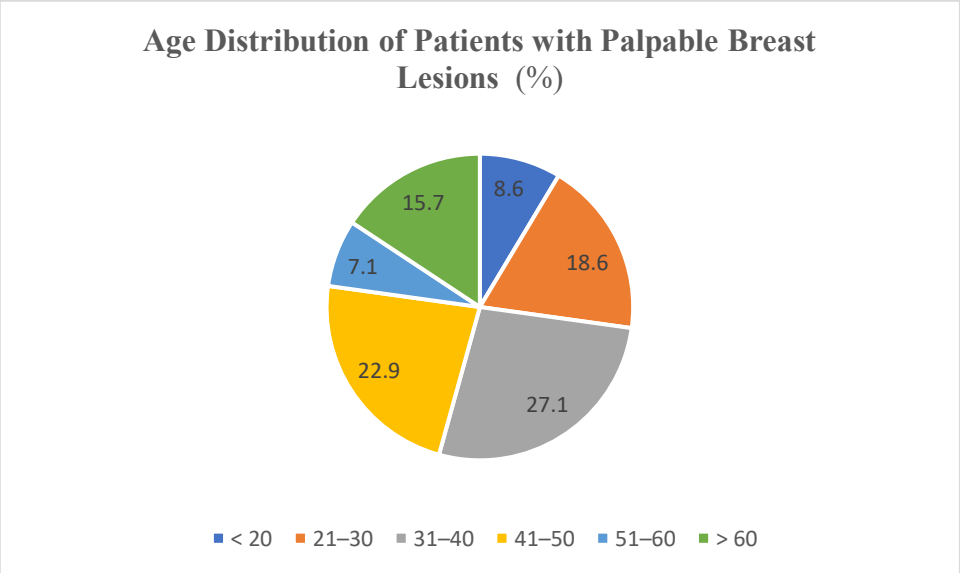
Radiological Evaluation
Ultrasonography or mammography was performed and lesions were categorized according to the BIRADS classification.

Statistical Analysis
Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy were calculated using standard formulas.

RESULTS
A total of 70 patients presenting with clinically palpable breast lumps were included in this prospective study. Fine Needle Aspiration Cytology (FNAC) was performed in all cases. Histopathological correlation was available in 53 cases, which was considered the gold standard for diagnostic accuracy analysis.

Table 1: Age Distribution of Patients with Palpable Breast Lesions (n = 70)

Age group (years)	Number of cases	Percentage (%)
< 20	6	8.6
21–30	13	18.6
31–40	19	27.1
41–50	16	22.9
51–60	5	7.1
> 60	11	15.7
Total	**70**	**100**



Graph 1: Age Distribution of Patients with Palpable Breast Lesions (n = 70)

Interpretation
The highest number of patients belonged to the 31–40 years age group (27.1%), followed by 41–50 years (22.9%), indicating that breast lumps were most commonly seen in women during the reproductive and perimenopausal age groups.

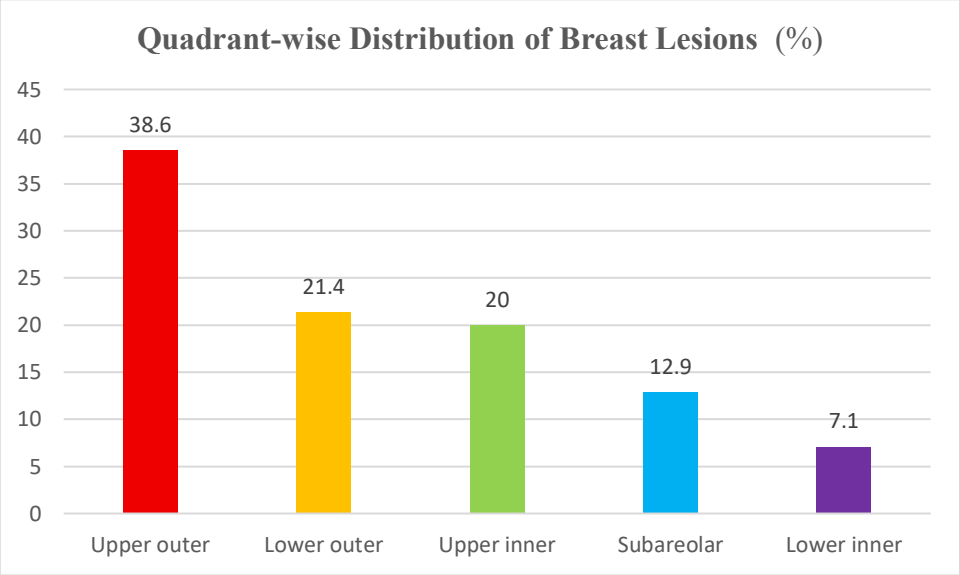
Table 2: Sex Distribution of Study Participants (n = 70)

Sex	Number of cases	Percentage (%)
Female	67	95.7
Male	3	4.3
Total	70	100

Interpretation
Breast lesions were predominantly seen in females (95.7%), with male breast lesions being relatively uncommon (4.3%), highlighting the strong female predominance of breast pathology.

Table 3: Quadrant-wise Distribution of Breast Lesions (n = 70)

Quadrant involved	Number of cases	Percentage (%)
Upper outer	27	38.6
Lower outer	15	21.4
Upper inner	14	20.0
Subareolar	9	12.9
Lower inner	5	7.1
Total	70	100



Graph 2: Quadrant-wise Distribution of Breast Lesions (n = 70)

Interpretation

The upper outer quadrant was the most commonly involved site (38.6%), which may be attributed to the higher concentration of glandular tissue in this region.

Table 4: Cytological Categorization of Breast Lesions According to NCI Guidelines (n = 70)

FNAC Category	Diagnosis category	Number of cases	Percentage (%)
C1	Inadequate	1	1.4
C2	Benign	40	57.14
C3	Atypical / probably benign	3	4.2
C4	Suspicious for malignancy	4	5.5
C5	Malignant	22	31.4
Total		70	100

Interpretation

Most lesions were categorized as benign (C2 – 57.14%), followed by malignant lesions (C5 – 31.4%), demonstrating that benign breast diseases constituted the majority of palpable breast lumps.

Table 5: Diagnostic Accuracy of FNAC Compared with Histopathology (n = 53)

Diagnostic parameter	Value (%)
Sensitivity	92.8
Specificity	100
Positive Predictive Value (PPV)	100
Negative Predictive Value (NPV)	92.6
Diagnostic Accuracy	96.2

Interpretation

FNAC showed high diagnostic performance, with excellent specificity (100%) and accuracy (96.2%), confirming its reliability in differentiating benign and malignant breast lesions when correlated with histopathology.

DISCUSSION

Fine Needle Aspiration Cytology (FNAC) plays a pivotal role in the evaluation of palpable breast lesions and forms an integral component of the triple assessment approach. The present prospective study assessed the diagnostic utility of FNAC by correlating cytological findings with histopathology and radiological evaluation wherever available.

In the present study, the majority of patients belonged to the 31–40 years age group (27.1%), followed by 41–50 years (22.9%), indicating that palpable breast lesions are more common during the reproductive and perimenopausal periods. This age distribution is comparable with studies by Kumar et al. and Chauhan et al., who reported the peak incidence of breast lesions in the third and fourth decades of life, attributing this to hormonal influences and increased glandular activity during these years (9,10). A marked female predominance (95.7%) was observed in the present study, which is consistent with findings from several Indian and international studies where female patients constituted more than 90% of cases (11,12). The low incidence of male breast lesions (4.3%) may be attributed to limited glandular tissue and lower hormonal influence in males.

Quadrant-wise analysis revealed that the upper outer quadrant was the most commonly involved site (38.6%). Similar observations have been reported by Ahmed et al. and Iyer et al., who documented upper outer quadrant involvement in 35–45% of cases, likely due to the greater volume of breast parenchyma in this region (13,14). Cytological categorization according to NCI guidelines showed that benign lesions (C2) formed the majority (57.14%), followed by malignant lesions (C5) accounting for 31.4% of cases. This distribution mirrors the pattern observed in studies by Reddy et al. and Rahman et al., where benign breast lesions constituted 55–65% of palpable lumps, emphasizing that most breast lumps are non-neoplastic in nature (15,16). Fibroadenoma was the most common benign lesion, while invasive ductal carcinoma was the predominant malignant lesion, findings that align well with existing literature.

Histopathological correlation was available in 53 cases, which served as the gold standard for assessing diagnostic accuracy. In the present study, FNAC demonstrated a sensitivity of 92.8%, specificity of 100%, PPV of 100%, NPV of 92.6%, and an overall diagnostic accuracy of 96.2%. These results are comparable to studies by Sharma et al. and Das et al., who reported sensitivity ranging from 90–98% and specificity nearing 100% (17,18).

The high specificity and positive predictive value observed in this study indicate that FNAC is particularly reliable in diagnosing malignant breast lesions, thereby aiding in early treatment planning and avoiding unnecessary surgical procedures in benign cases. Occasional false-negative results may be attributed to sampling errors, cystic degeneration, or overlapping cytomorphological features, which have also been noted in earlier studies.

Overall, the findings of the present study reaffirm that FNAC is a safe, rapid, cost-effective, and highly accurate diagnostic modality for the evaluation of palpable breast lesions, especially in resource-limited settings.

CONCLUSION

Fine Needle Aspiration Cytology (FNAC) is a highly reliable, accurate, and cost-effective diagnostic tool for the evaluation of palpable breast lesions. In the present study, FNAC demonstrated high sensitivity (92.8%), specificity (100%), and overall diagnostic accuracy (96.2%) when correlated with histopathology. The majority of breast lesions were benign, with fibroadenoma being the most common, while invasive ductal carcinoma was the predominant malignant lesion. FNAC allows rapid preoperative differentiation between benign and malignant breast lesions, thereby reducing unnecessary surgical interventions and facilitating early and appropriate patient management.

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