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Cytohistopathological Correlation Of Breast Lesion In Konkan Region

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ABSTRACT

Objective: This study aimed to evaluate the diagnostic accuracy of Fine Needle Aspiration Cytology (FNAC) in palpable breast lumps and to correlate FNAC findings with histopathological diagnoses.

Methods: A retrospective observational study was conducted at B.K.L. Walawalkar Hospital and Research Center from January 2021 to October 2023. A total of 100 patients who underwent both FNAC and histopathology were included. Sensitivity, specificity, and diagnostic accuracy were calculated using histopathology as the gold standard.

Results: Of the 100 cases, 70 were benign and 30 were malignant. The sensitivity and specificity of FNAC were found to be 95% and 98%, respectively. The diagnostic accuracy for malignant cases was 97.5%. Most benign lesions were observed in the 31-40 years age group, while malignant lesions peaked in the 41-50 years group. FNAC findings showed strong concordance with histopathology, with 59 cases having biopsy confirmation.

Conclusion: FNAC is an effective, rapid, and minimally invasive diagnostic tool for distinguishing benign and malignant breast lesions. It shows high sensitivity and specificity, making it an invaluable tool in early breast cancer detection.

Keywords: *Fine Needle Aspiration Cytology, Breast Lesions, Malignant, Benign, Histopathology*

1. INTRODUCTION

Palpable breast lumps are among the most common clinical complaints faced in surgical outpatient departments, particularly among women. In India, where breast cancer has emerged as the most prevalent cancer among women, early and accurate diagnosis of breast lesions is vital for timely and effective treatment. Fine Needle Aspiration Cytology (FNAC) has become a cornerstone in the initial diagnostic evaluation of these palpable breast lumps due to its simplicity, cost-effectiveness, minimal invasiveness, and quick turnaround time [1].

FNAC is a cytological technique wherein a fine needle is used to aspirate cells from a breast lesion, which are then evaluated under a microscope. This method has proven particularly effective in differentiating between benign and malignant lesions and guiding clinicians in further management, often eliminating the need for an immediate open surgical biopsy [2]. The high sensitivity and specificity of FNAC, especially in resource-constrained settings like many regions of India, have made it an indispensable tool in the early diagnosis of breast disease [3].

Several studies have validated the diagnostic utility of FNAC in Indian settings. For example, a study conducted at Government Medical College, Thrissur, Kerala, involving 200 patients, reported a diagnostic accuracy of 97.45%, with sensitivity and specificity values exceeding 96% for malignant lesions [1]. Another institutional study from AIIMS Patna highlighted the reliability of FNAC by reporting a diagnostic accuracy of 99.26%, with 100% specificity and 98.11%

sensitivity [2]. These findings strongly support the effectiveness of FNAC as a frontline diagnostic method for palpable breast lesions.

FNAC is particularly advantageous due to its outpatient applicability and quick results. In a five-year review at a tertiary care center in Nigeria, FNAC demonstrated a sensitivity of 95.7% and a specificity of 98.7%, reinforcing its utility in both benign and malignant cases and showing that its performance is globally consistent [3]. Similarly, a study from Karnataka involving 100 patients observed 100% accuracy in diagnosing benign lesions and 95.45% for malignant cases, demonstrating FNAC's precision in a South Indian setting [4].

Importantly, FNAC findings often show strong concordance with histopathological diagnoses—the gold standard in tissue-based diagnosis. A study in Bannu, India, reported a sensitivity of 83.33% and specificity of 100% for FNAC, concluding that it is a nearly accurate diagnostic tool when compared with histopathological confirmation [5]. Additionally, a study in Gujarat based on the UK NHS Breast Cancer Screening Programme classification showed a diagnostic accuracy of 96.5%, with 100% specificity, further reinforcing its practical reliability in structured diagnostic settings [6].

Even in smaller breast lesions (≤1 cm), which pose a greater diagnostic challenge, FNAC has shown promising results. A 20-year retrospective study evaluating over 8,000 small breast lesions revealed an overall diagnostic accuracy of 98.5%, showing that FNAC remains effective even in early-stage disease detection [7].

Furthermore, a study from Amreli, Gujarat, reported that out of 46 breast lump FNACs, a significant number of cases were either benign or suspicious, and FNAC helped guide clinical decisions rapidly without delay [8]. Another study in Uttar Pradesh that reviewed 280 FNAC cases found that the most common benign lesion was fibroadenoma and the most common malignant lesion was ductal carcinoma, demonstrating that FNAC can reliably characterize lesion types and aid in clinical planning [9].

Even in “gray zone” cases, where lesions are cytologically atypical or suspicious, FNAC has shown reasonable predictive accuracy. A study analyzing C3 and C4 category lesions (atypical and suspicious) found a statistically significant difference in their malignancy rates upon histological examination, reinforcing the role of FNAC in triaging these patients for biopsy [10].

In conclusion, Fine Needle Aspiration Cytology stands as a highly valuable diagnostic modality for palpable breast lesions, especially in the Indian healthcare context. Its rapid results, low cost, and high accuracy make it indispensable in distinguishing benign from malignant lesions and planning appropriate patient management. Numerous Indian and international studies have demonstrated its high concordance with histopathology, validating its continued use as an essential tool in breast cancer diagnostics.

2. METHODOLOGY

1. Study Design

This was a retrospective observational study conducted to evaluate the diagnostic accuracy of Fine Needle Aspiration Cytology (FNAC) in palpable breast lumps, with histopathology used as the gold standard for comparison.

2. Study Setting

The study was carried out in the Department of Pathology at B.K.L. Walawalkar Hospital and Research Center, Dervan, a tertiary care center with diagnostic and histopathological facilities.

3. Study Duration

The study covered a period from January 2021 to October 2023, during which eligible cases were identified and included based on the availability of complete records.

4. Participants – Inclusion & Exclusion Criteria

Female patients aged 15 years and above with palpable breast lumps who underwent both FNAC and histopathology were included. non-palpable lesions, and cases with incomplete records were excluded.

5. Study Sampling

Purposive sampling was used to select cases that met inclusion criteria and had complete cytological and histopathological data during the study period.

6. Study Sample Size

A total of 100 cases were included based on availability and completeness of data, allowing meaningful analysis of FNAC performance.

7. Study Groups

Cases were categorized based on FNAC findings—benign, suspicious, or malignant—and were then correlated with corresponding histopathological diagnoses.

8. Study Parameters

Key parameters included patient age, clinical presentation, FNAC findings, histopathological results, and diagnostic metrics such as sensitivity, specificity, and accuracy.

9. Study Procedure

FNAC was performed under aseptic precautions using 10cc syringes and 23–24G needles. Smears were stained using Pap, H&E, and Giemsa stains. Histopathology was conducted on biopsied tissue.

10. Data Collection

Data were extracted from departmental records, including demographic details, FNAC reports, and histopathology findings, and compiled into a structured spreadsheet for analysis.

11. Data Analysis

Statistical analysis was done using Excel/SPSS. Diagnostic values such as sensitivity, specificity, positive predictive value, and accuracy were calculated using histopathology as the reference.

12. Ethical Considerations

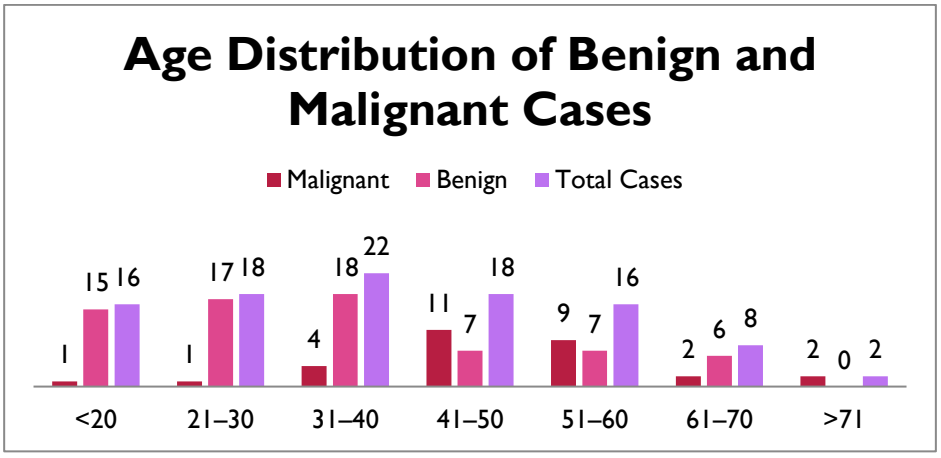
Institutional Ethics Committee approval was obtained. All data were anonymized, and since the study was retrospective, no direct patient interaction or additional consent was required.

3. RESULTS

Benign cases were most frequent in the 31–40 years group, while malignant cases peaked in the 41–50 years group (Table 1).

Table 1 – Age Distribution of Benign and Malignant Cases

Age (years)	Malignant	Benign	Total Cases
<20	1	15	16
21–30	1	17	18
31–40	4	18	22
41–50	11	7	18
51–60	9	7	16
61–70	2	6	8
>71	2	0	2
Total	30	70	100

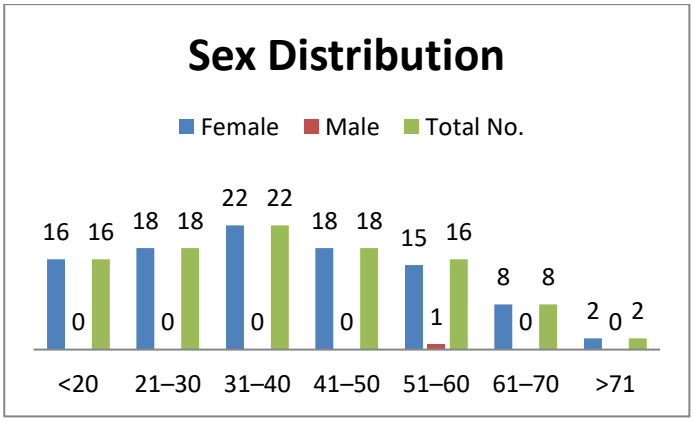


Graph 1: Age Distribution of Benign and Malignant Cases

The study predominantly involved females (99%) and male (1%)case reported (Table 2).

Table 2 – Sex Distribution

Age (years)	Female	Male	Total
<20	16	**0**	16
21–30	18	**0**	18
31–40	22	**0**	22
41–50	18	**0**	18
51–60	15	**1**	16
61–70	8	**0**	8
>71	2	**0**	2
Total	99	1	100

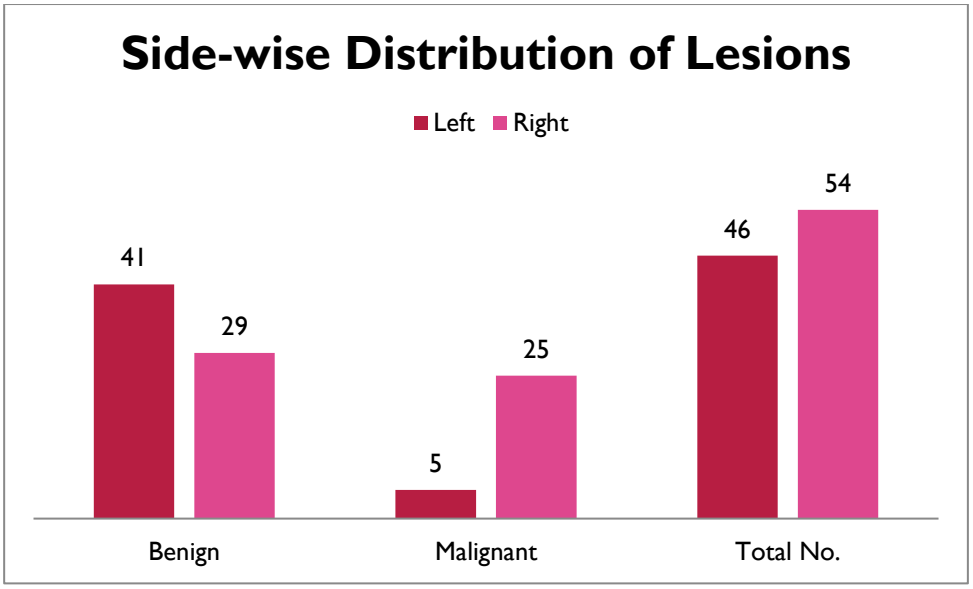


Graph 2: Sex Distribution

Most lesions were found on the right side (54%), with malignant cases significantly higher on the right (Table 3).

Table 3 – Side-wise Distribution of Lesions

Side	Benign	Malignant	Total No.
Left	41	5	46
Right	29	25	54
Total	**70**	**30**	**100**

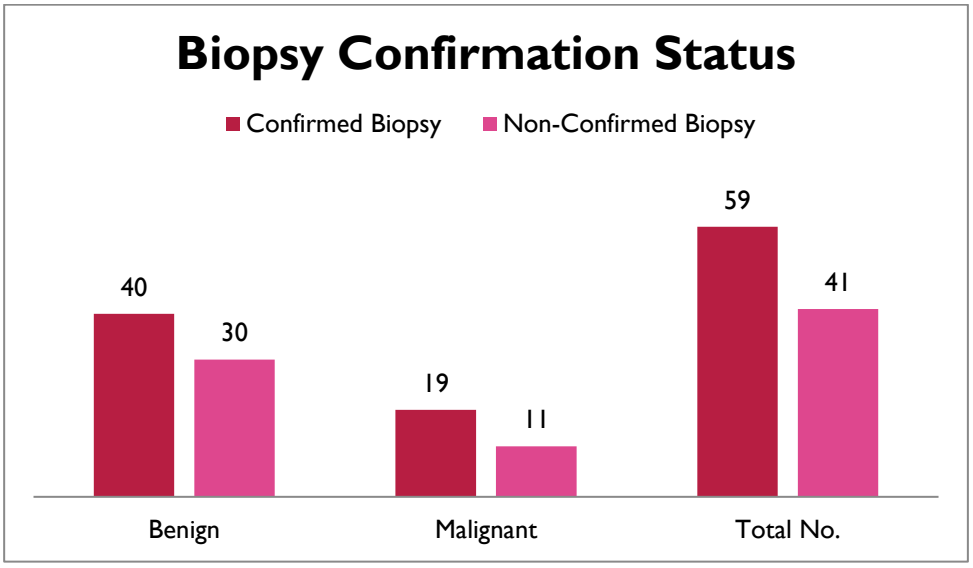


Graph 3: Side-wise Distribution of Lesions

Out of 100 cases, 59 had biopsy confirmation, with 19 of those confirming malignancy (Table 4).

Table 4 – Biopsy Confirmation Status

Biopsy Confirmation	**Benign**	**Malignant**	**Total No.**
Confirmed Biopsy	40	19	59
Non-Confirmed Biopsy	30	11	41
Total	**70**	**30**	**100**

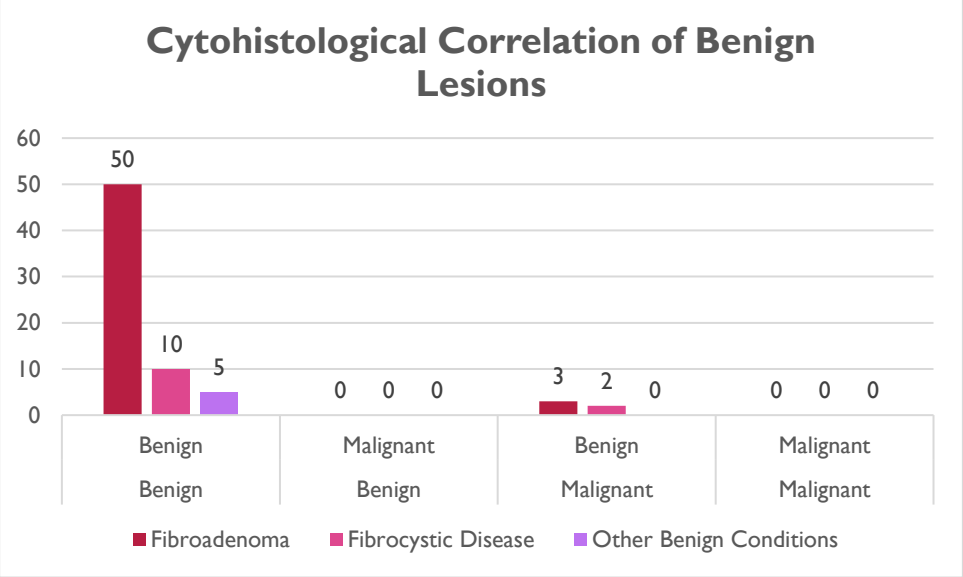


Graph 4: Biopsy Confirmation Status

The cytohistological correlation of benign lesions showed that most cases with benign cytology also had benign histology, primarily fibroadenoma (50 cases), fibrocystic disease (10 cases), and other benign conditions (5 cases). There were 5 false positives (3 fibroadenoma, 2 fibrocystic disease) where cytology suggested malignancy but histology was benign. No false negatives were observed, indicating FNAC's high accuracy in diagnosing benign lesions (Table 5).

Table 5: Cytohistological Correlation of Benign Lesions

Cytology Report	Histology Report	Fibroadenoma	Fibrocystic Disease	Other Benign Conditions	Total
Benign	Benign	50	10	5	65
Benign	Malignant	0	0	0	0
Malignant	Benign	3	2	0	5
Malignant	Malignant	0	0	0	0
Total	**Total**	**53**	**12**	**5**	**70**

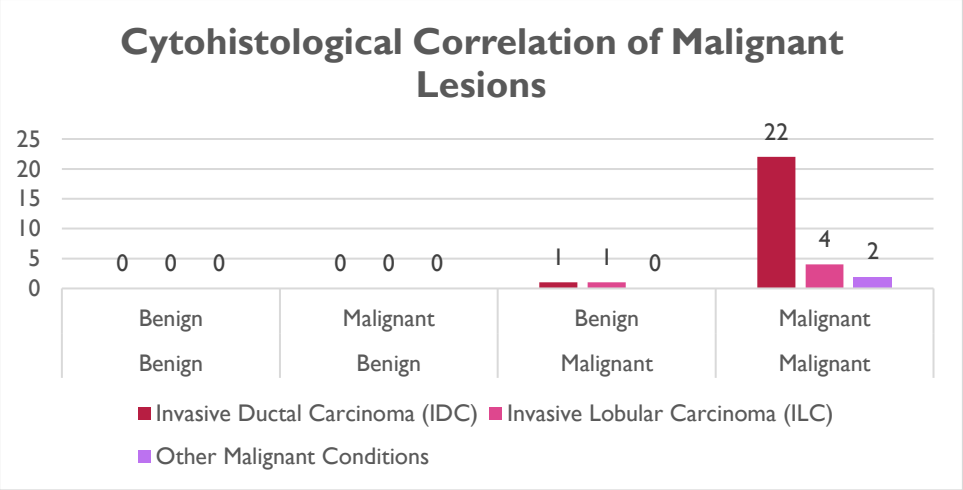


Graph 5: Cytohistological Correlation of Benign Lesions

FNAC accurately diagnosed 28 malignant cases, with 22 being Invasive Ductal Carcinoma (IDC), 4 Invasive Lobular Carcinoma (ILC), and 2 other malignant conditions. There were 2 false negatives, where FNAC showed malignant cytology but histology revealed benign tissue (1 case of IDC and 1 of ILC). No benign lesions were misclassified as malignant, confirming FNAC's high diagnostic accuracy for malignant lesions (Table 6).

Table 6: Cytohistological Correlation of Malignant Lesions

Cytology Report	Histology Report	Invasive Ductal Carcinoma (IDC)	Invasive Lobular Carcinoma (ILC)	Other Malignant Conditions	Total
Benign	Benign	0	0	0	0
Benign	Malignant	0	0	0	0
Malignant	Benign	1	1	0	2
Malignant	Malignant	22	4	2	28
Total	**Total**	**23**	**5**	**2**	**30**

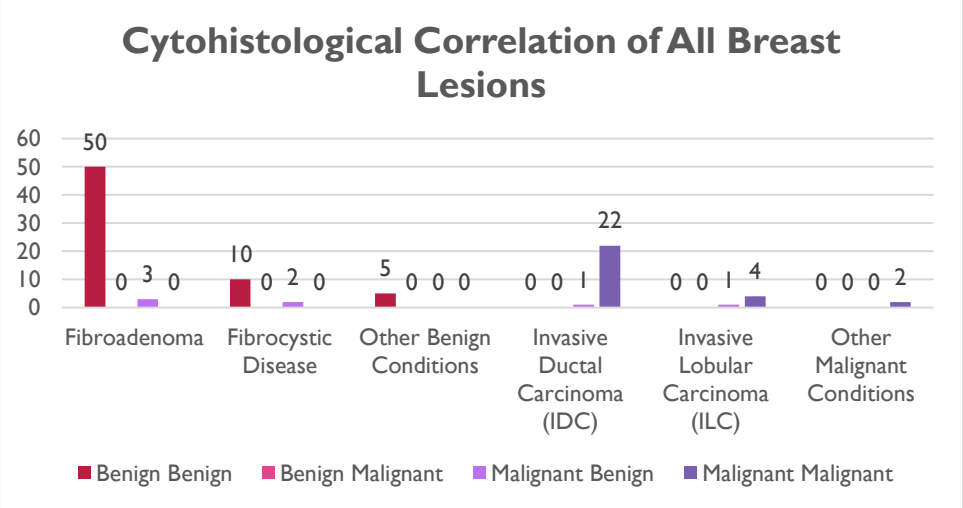


Graph 6: Cytohistological Correlation of Malignant Lesions

FNAC accurately diagnosed 65 benign lesions, including 50 fibroadenomas, 10 fibrocystic diseases, and 5 other benign conditions. There were 3 false positives (2 fibroadenomas, 1 fibrocystic diseases). For malignant lesions, 28 cases were correctly identified, including 22 IDC, 4 ILC, and 2 other malignancies. FNAC showed high accuracy with minimal false positives and no false negatives (Table 7).

Table 7: Cytohistological Correlation of All Breast Lesions

Cytology Report	Histology Report	Fibroadenoma	Fibrocystic Disease	Other Benign Conditions	Invasive Ductal Carcinoma (IDC)	Invasive Lobular Carcinoma (ILC)	Other Malignant Conditions
Benign	Benign	50	10	5	0	0	0
Benign	Malignant	0	0	0	0	0	0
Malignant	Benign	3	2	0	1	1	0
Malignant	Malignant	0	0	0	22	4	2
Total	**Total**	**53**	**12**	**5**	**23**	**5**	**2**



4. DISCUSSION

Fine Needle Aspiration Cytology (FNAC) continues to be a cornerstone in the initial evaluation of palpable breast lesions, especially in resource-constrained settings. In our study of 100 patients, the majority of cases were benign (70%), with 30% being malignant. This distribution aligns with studies by Bhadani et al. (2017) and Thakkar et al. (2014), who also observed benign lesions as the predominant category in Indian populations, especially among younger women [2, 11].

The most affected age group for benign lesions in our study was 31–40 years (18%), consistent with findings by Ahmad et al. (2016) and Paramesh et al. (2015), who reported fibroadenomas as the most common benign lesion in women under 40 [4, 9]. Malignant lesions in our study peaked in the 41–50 years age group (11%), followed by 51–60 years (9%). This pattern reflects the observations of Khattak & Ahmad (2020) and Krishnan (2018), who noted breast cancer incidence rising with age, typically after 40 years [5, 1].

Our study had a striking female predominance (99%), with only one male case, which mirrors national trends, as male breast cancer accounts for less than 1% of all breast cancers. Pailoor et al. (2014) similarly reported minimal male involvement in breast FNAC studies [12].

In terms of laterality, our data showed a higher frequency of right breast involvement (54%), especially in malignant cases (25 out of 30). This trend, while not fully understood, has been noted in earlier studies such as Ambawade & Das (2018), who also reported a slightly higher occurrence in the right breast [13].

Biopsy confirmation was obtained in 59 cases (59%), with 19 malignancies confirmed histopathologically. This high concordance supports the diagnostic reliability of FNAC, aligning with the findings of Cursi et al. (2020) and Odujoko et al. (2016), who emphasized FNAC's high sensitivity (above 90%) and specificity when paired with histology [7, 14].

Our findings are consistent with a wide range of previous studies that highlight FNAC as a reliable diagnostic tool for palpable breast lesions. For instance, Thakkar et al. (2014) reported a sensitivity of 97.05% and specificity of 98.78% for FNAC in diagnosing breast lesions, further emphasizing its high accuracy in both benign and malignant cases [11]. Similarly, Akter et al. (2017) observed a diagnostic accuracy of 92.1% for malignant lesions and 100% for benign lesions, aligning with our findings that FNAC can differentiate well between benign and malignant lesions [12].

Krishnan (2018) reported even higher sensitivity (98.8%) for benign lesions and a false negative rate of just 2.5%, which correlates with our observation that FNAC reliably identifies benign conditions while occasionally presenting with discrepancies in cases of malignant cytology with benign histology [1]. Gupta (2017) also found a similar pattern with FNAC showing strong correlation, reporting sensitivity of 93.8% for malignant cases and 100% for benign cases [16].

Despite the generally strong performance of FNAC, some studies, like the one by Yip et al. (2000), reported a small percentage of false negatives (up to 10.5%) in malignant cases, a result consistent with our own study in malignant cytology but benign histology [17].

The role of Fine Needle Aspiration Cytology (FNAC) in the diagnosis of palpable breast lesions is well-documented, especially in its ability to differentiate between benign and malignant conditions. Studies consistently show that FNAC provides high sensitivity and specificity when compared to histopathology. For instance, one study reported that FNAC had a diagnostic accuracy of 98.7% in identifying malignant and benign lesions, with sensitivity and specificity rates of 98.3% and 98.9%, respectively [18]. Similarly, a study by Krishnan (2018) highlighted FNAC's diagnostic accuracy of 97.45%, confirming it as a reliable primary screening tool for palpable breast lumps with high specificity for malignancies [1]. The study from Pandey (2017) further confirmed that FNAC remains indispensable in clinical settings, demonstrating its effectiveness in triaging patients, particularly those at high risk for malignancy, and helping to guide management decisions [18]. Overall, FNAC plays a pivotal role in detecting malignant lesions and is highly effective when used in conjunction with clinical and imaging evaluations.

5. CONCLUSION

In conclusion, Fine Needle Aspiration Cytology (FNAC) proves to be a reliable, cost-effective, and rapid diagnostic tool for evaluating palpable breast lumps. This study confirms its high sensitivity and specificity, especially in distinguishing benign from malignant lesions. The concordance between FNAC and histopathological findings underscores its clinical value, particularly in settings with limited resources. FNAC remains a cornerstone in breast cancer diagnostics, aiding in early detection and appropriate patient management.

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