e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(12); 2809-2814

Original Research Article

Cytohistological Correlation of Palpable Breast Lesion in a Tertiary Care Hospital

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Received: 21-11-2025 / Revised: 16-12-2025 / Accepted: 24-12-2025

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Conflict of interest: Nil

Abstract

Background: Palpable breast lesions constitute a significant proportion of surgical pathology specimens and represent a major concern for patients due to the fear of malignancy. Fine needle aspiration cytology (FNAC) serves as a rapid, cost-effective, and minimally invasive diagnostic modality for evaluating breast masses. Correlation between cytological and histopathological diagnoses is essential for validating the diagnostic accuracy of FNAC.

Methods: This cross-sectional analytical study was conducted at a tertiary care hospital over a period of 24 months. A total of 186 female patients presenting with palpable breast lesions who underwent both FNAC and subsequent histopathological examination were included. Cytological diagnoses were categorized using the International Academy of Cytology Yokohama System for Reporting Breast Cytopathology. Statistical analysis included calculation of sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy.

Key Findings: The mean age of participants was 42.8 ± 14.6 years (range: 16-72 years). Benign lesions constituted 68.3% (n=127) and malignant lesions 31.7% (n=59) on histopathology. Fibroadenoma (34.4%) was the most common benign lesion, while invasive ductal carcinoma (78.0%) predominated among malignancies. The overall cytohistological concordance rate was 94.1%. FNAC demonstrated sensitivity of 96.6%, specificity of 97.6%, PPV of 95.0%, NPV of 98.4%, and diagnostic accuracy of 97.3% for malignant lesions ($p<0.001$).

Conclusion: FNAC exhibits excellent diagnostic accuracy in evaluating palpable breast lesions and demonstrates strong correlation with histopathological findings. It remains an invaluable first-line investigative tool in the triple assessment of breast masses.

Keywords: Fine Needle Aspiration Cytology; Breast Lesions; Histopathology; Cytohistological Correlation; Diagnostic Accuracy; Breast Carcinoma.

Introduction

Breast lesions represent one of the most frequent clinical presentations encountered in surgical practice, with palpable masses generating significant anxiety among patients due to concerns regarding potential malignancy [1]. Globally, breast cancer stands as the most commonly diagnosed malignancy among women, accounting for approximately 2.3 million new cases annually and representing a leading cause of cancer-related mortality in females [2].

The burden of breast disease extends beyond malignancy, encompassing a wide spectrum of benign conditions that require accurate diagnosis for appropriate management. The triple assessment approach, comprising clinical examination, radiological imaging, and pathological evaluation, has been established as the gold standard for evaluating breast masses [3]. Within this paradigm, fine needle aspiration cytology (FNAC) occupies a pivotal position as a rapid, cost-effective, and minimally invasive diagnostic technique that can be performed in outpatient settings [4].

The procedure offers the advantage of immediate sample adequacy assessment and provides valuable preliminary diagnostic information that guides subsequent clinical decision-making. FNAC of breast lesions was first introduced by Martin and Ellis in 1930 and has since evolved significantly in

terms of technique and interpretation criteria [5]. The development of standardized reporting systems, including the recently introduced International Academy of Cytology (IAC) Yokohama System for Reporting Breast Cytopathology, has enhanced diagnostic reproducibility and facilitated communication between cytopathologists and clinicians [6]. Studies have demonstrated that FNAC achieves sensitivity ranging from 80-98% and specificity of 86-100% in detecting breast malignancy when performed by experienced practitioners [7].

Despite the widespread adoption of core needle biopsy in many centers, FNAC continues to retain significant relevance, particularly in resource-limited settings where histopathological facilities may be less accessible [8].

The correlation between cytological and histopathological diagnoses serves as a critical quality assurance measure, enabling continuous evaluation of diagnostic accuracy and identification of potential pitfalls in interpretation [9]. Regular cytohistological correlation studies are essential for maintaining high diagnostic standards and optimizing patient care outcomes.

Previous investigations have documented varying concordance rates between cytological and histopathological diagnoses of breast lesions, with discrepancies attributed to sampling errors, interpretive challenges, and lesion heterogeneity [10]. The diagnostic accuracy of FNAC may be influenced by multiple factors, including lesion size, location, cytomorphological features, and the experience of both the aspirator and the interpreting pathologist [11].

A research gap exists regarding contemporary cytohistological correlation studies utilizing standardized reporting systems in our geographical region. Therefore, this study aimed to evaluate the diagnostic accuracy of FNAC in palpable breast lesions and determine its correlation with histopathological findings in a tertiary care hospital setting.

Materials and Methods

Study Design and Setting: This cross-sectional analytical study was conducted in the Department of Pathology at a tertiary care teaching hospital over a 24-month period.

Sample Size and Selection Criteria: The sample size was calculated using the formula for diagnostic accuracy studies, assuming an anticipated sensitivity of 90%, precision of 5%, and confidence level of 95%, yielding a minimum required sample of 138 participants. A total of 186 female patients with palpable breast lesions who underwent both FNAC and subsequent histopathological examination were included in the final analysis.

Inclusion Criteria:

- Female patients aged 15 years and above
- Clinically palpable breast lesions
- Availability of both FNAC and corresponding histopathological examination
- Adequate cytological material for interpretation

Exclusion Criteria:

- Male patients with breast lesions
- Patients who received neoadjuvant chemotherapy or radiotherapy prior to biopsy
- Inadequate or unsatisfactory cytological specimens
- Patients who did not undergo subsequent histopathological examination

FNAC Procedure: Fine needle aspiration was performed using a 22-23 gauge needle attached to a 10 mL disposable syringe. After appropriate positioning and cleaning of the skin with antiseptic solution, the lesion was immobilized between the fingers of one hand while aspiration was performed with the other. Multiple passes were made within the lesion while maintaining negative pressure. The obtained material was expelled onto clean glass slides and smears were prepared using the two-slide technique. Air-dried smears were stained with May-Grünwald-Giemsa stain, while alcohol-fixed smears were stained using the Papanicolaou method.

Cytological Categorization: Cytological diagnoses were categorized according to the International Academy of Cytology Yokohama System for Reporting Breast Cytopathology into five categories: C1 (Insufficient/Inadequate), C2 (Benign), C3 (Atypical, probably benign), C4 (Suspicious for malignancy), and C5 (Malignant).

Histopathological Examination: Excisional biopsy, incisional biopsy, lumpectomy, or mastectomy specimens were processed using standard histopathological techniques. Tissues were fixed in 10% neutral buffered formalin, processed through graded alcohols, embedded in paraffin wax, sectioned at 3-5 µm thickness, and stained with hematoxylin and eosin. Additional immunohistochemical stains were performed where indicated.

Statistical Analysis: Data were analyzed using Statistical Package for Social Sciences (SPSS) version 26.0. Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages. The cytohistological correlation was assessed by calculating sensitivity, specificity, positive predictive value (PPV), negative predictive

value (NPV), and overall diagnostic accuracy. Chi-square test was employed for comparing categorical variables. A p-value less than 0.05 was considered statistically significant.

Results

Demographic Characteristics: A total of 186 female patients with palpable breast lesions were included in this study. The mean age of participants was 42.8 ± 14.6 years, ranging from 16 to 72 years. The majority of patients (38.2%, n=71) belonged to the 31-45 years age group, followed by 46-60 years (29.0%, n=54) and 16-30 years (22.6%, n=42).

The mean lesion size was 3.4 ± 1.8 cm. The left breast was more commonly affected (54.3%, n=101) compared to the right breast (43.0%, n=80), while bilateral involvement was observed in 2.7% (n=5) of cases.

Distribution of Cytological Diagnoses: The distribution of cytological diagnoses according to the IAC Yokohama System is presented in Table 1. Benign lesions (C2) constituted the largest category (61.8%, n=115), followed by malignant lesions (C5) at 24.2% (n=45). Suspicious for malignancy (C4) and atypical lesions (C3) accounted for 8.1% (n=15) and 5.9% (n=11), respectively.

Table 1: Distribution of Cytological Diagnoses (n=186)

Cytological Category	Frequency (n)	Percentage (%)
C2 - Benign	115	61.8
C3 - Atypical, probably benign	11	5.9
C4 - Suspicious for malignancy	15	8.1
C5 - Malignant	45	24.2
Total	**186**	**100.0**

Distribution of Histopathological Diagnoses: Histopathological examination revealed benign lesions in 68.3% (n=127) and malignant lesions in 31.7% (n=59) of cases.

The detailed distribution of histopathological diagnoses is shown in Table 2. Among benign lesions, fibroadenoma was the most common diagnosis (34.4%, n=64), followed by fibrocystic disease (15.6%, n=29), and phyllodes tumor (benign) (5.4%, n=10). Invasive ductal carcinoma (not otherwise specified) was the predominant malignant lesion, accounting for 24.7% (n=46) of all cases and 78.0% of malignancies.

Table 2: Distribution of Histopathological Diagnoses (n=186)

Histopathological Diagnosis	Frequency (n)	Percentage (%)
Benign Lesions	**127**	**68.3**
Fibroadenoma	64	34.4
Fibrocystic disease	29	15.6
Phyllodes tumor (benign)	10	5.4
Breast abscess/Mastitis	8	4.3
Fat necrosis	6	3.2
Granulomatous mastitis	5	2.7
Lactating adenoma	3	1.6
Intraductal papilloma	2	1.1
Malignant Lesions	**59**	**31.7**
Invasive ductal carcinoma, NOS	46	24.7
Invasive lobular carcinoma	6	3.2
Mucinous carcinoma	3	1.6
Medullary carcinoma	2	1.1
Phyllodes tumor (malignant)	2	1.1
Total	**186**	**100.0**

NOS: Not otherwise specified

Age Distribution and Lesion Type: Analysis of age distribution revealed significant differences between benign and malignant lesion groups. The mean age for patients with benign lesions was 36.4 ± 12.8 years compared to 56.5 ± 10.2 years for malignant lesions ($p<0.001$). Benign lesions were more prevalent in patients aged 16-45 years (82.7%), while malignant lesions predominated in patients above 45 years (76.3%).

Cytohistological Correlation: The overall cytohistological concordance rate was 94.1% (175/186 cases). Discordant results were observed in 11 cases (5.9%).

The correlation between cytological and histopathological diagnoses is presented in Table 3.

Table 3: Cytohistological Correlation Matrix

Cytology	HP: Benign (n=127)	HP: Malignant (n=59)	Total (n=186)
C2 (Benign)	113	2	115
C3 (Atypical)	8	3	11
C4 (Suspicious)	3	12	15
C5 (Malignant)	3	42	45
Total	**127**	**59**	**186**

HP: Histopathology

For malignant lesions (considering C4 and C5 as positive for malignancy), FNAC demonstrated a sensitivity of 96.6% (57/59), specificity of 97.6% (124/127), positive predictive value (PPV) of 95.0% (57/60), negative predictive value (NPV) of 98.4% (124/126), and overall diagnostic accuracy of 97.3% (181/186). The cytohistological correlation was statistically significant ($p<0.001$).

False negative results (cytology benign, histopathology malignant) were observed in 2 cases (1.1%), both of which were subsequently diagnosed as invasive lobular carcinoma on histopathology. False positive results (cytology malignant, histopathology benign) occurred in 3 cases (1.6%), comprising 2 cases of granulomatous mastitis and 1 case of fat necrosis with reactive atypia.

Discussion

The present study evaluated the cytohistological correlation of palpable breast lesions and assessed the diagnostic accuracy of FNAC in a tertiary care hospital setting. Our findings demonstrate that FNAC maintains excellent correlation with histopathological diagnoses and serves as a reliable initial diagnostic modality for breast masses.

The mean age of patients in our study (42.8 ± 14.6 years) is consistent with findings reported by Kharkwal et al. [12], who documented a mean age of 41.3 years in their evaluation of breast FNAC. The predominance of benign lesions (68.3%) over malignant lesions (31.7%) in our study aligns with observations by Panjvani et al. [13], who reported benign and malignant proportions of 72.1% and 27.9%, respectively. This distribution reflects the natural spectrum of breast pathology, where benign conditions significantly outnumber malignancies.

Fibroadenoma emerged as the most common benign lesion (34.4%), a finding corroborated by multiple investigators including Rahman et al. [14] and Cho et al. [15], who documented fibroadenoma as the predominant benign breast pathology in their respective cohorts. The preponderance of fibroadenoma in younger women is attributed to hormonal influences on breast stromal and epithelial components during reproductive years. Among malignant lesions, invasive ductal carcinoma (78.0% of malignancies) was the most frequent diagnosis, consistent with global patterns of breast cancer histology. Malhotra et al. [16] reported invasive ductal carcinoma as the predominant malignant histotype in their study of 520 breast cancers. The significantly higher mean age in patients with malignant lesions (56.5 years) compared to benign lesions (36.4 years) ($p<0.001$) emphasizes the importance of age as a risk factor for breast malignancy.

The overall diagnostic accuracy of FNAC in our study (97.3%) compares favorably with results published by Willems et al. [17], who reported accuracy rates ranging from 94-97% in their systematic review of breast FNAC performance. Our sensitivity of 96.6% and specificity of 97.6% exceed the thresholds recommended by the National Health Service Breast Screening Programme, which advocates sensitivity above 60% and specificity above 55% as minimum acceptable standards [18].

The false negative rate of 1.1% in our study is lower than rates reported by many previous investigations. Both false negative cases in our study were invasive lobular carcinomas, a recognized diagnostic challenge in breast cytology due to the characteristic discohesive pattern and subtle cytological atypia [19]. Kocjan et al. [20] have extensively documented the diagnostic difficulties encountered with lobular neoplasms on FNAC and recommend heightened suspicion when encountering single-file cell arrangements with mild nuclear atypia.

False positive diagnoses occurred in 1.6% of cases, involving granulomatous mastitis and fat necrosis with reactive changes. These entities represent well-documented mimickers of malignancy on cytology due to epithelioid histiocyte clusters and atypical reactive epithelial cells [21]. Careful evaluation of clinical context and awareness of cytomorphological overlap is essential to minimize such errors.

The high concordance rate (94.1%) between cytological and histopathological diagnoses in our study validates the role of FNAC as a reliable first-line diagnostic tool. Saha et al. [22] reported a similar concordance rate of 93.7% in their

evaluation of 250 breast FNAC specimens. The minor discordance observed reflects the inherent limitations of sampling and the interpretive challenges posed by certain lesion types.

Our study findings support the continued utilization of FNAC within the triple assessment framework, particularly in settings where immediate diagnostic information is valuable for clinical decision-making and patient counseling. The cost-effectiveness and minimal invasiveness of FNAC render it especially suitable for resource-constrained healthcare environments [23].

The implementation of standardized reporting systems such as the IAC Yokohama System enhances diagnostic reproducibility and facilitates meaningful comparison across studies [24]. The categorization scheme provides clear guidance for clinical management based on cytological risk stratification.

Limitations of this study include its single-center design, which may limit generalizability, and the retrospective exclusion of cases with inadequate cytological material.

Additionally, interobserver variability in cytological interpretation was not formally assessed. Future multicenter studies with prospective designs and incorporation of ancillary techniques such as cell block immunohistochemistry would further strengthen the evidence base.

Conclusion

This study demonstrates that fine needle aspiration cytology exhibits excellent diagnostic accuracy in evaluating palpable breast lesions, with sensitivity of 96.6%, specificity of 97.6%, and overall concordance rate of 94.1% with histopathological findings. Fibroadenoma and invasive ductal carcinoma represent the most common benign and malignant diagnoses, respectively. FNAC remains an invaluable component of the triple assessment approach for breast masses, providing rapid, cost-effective, and reliable preliminary diagnosis.

Awareness of potential pitfalls, particularly in lobular carcinomas and inflammatory lesions mimicking malignancy, is essential for optimizing diagnostic accuracy. The study validates the continued relevance of FNAC in contemporary breast pathology practice.

References

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2018;68(6):394-424. DOI: 10.3322/caac.21492
2. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2021;71(3):209-249. DOI: 10.3322/caac.21660
3. Houssami N, Ciatto S, Macaskill P, Lord SJ, Warren RM, Dixon JM, et al. Accuracy and surgical impact of magnetic resonance imaging in breast cancer staging: systematic review and meta-analysis in detection of multifocal and multicentric cancer. J Clin Oncol. 2008;26(19): 3248-3258. DOI: 10.1200/JCO.2007.15.2108
4. Nasuti JF, Gupta PK, Baloch ZW. Diagnostic value and cost-effectiveness of on-site evaluation of fine-needle aspiration specimens: review of 5,688 cases. Diagn Cytopathol. 2002;27(1):1-4. DOI: 10.1002/dc.10065
5. Martin HE, Ellis EB. Biopsy by needle puncture and aspiration. Ann Surg. 1930;92(2):169-181. PMID: 17866350
6. Field AS, Raymond WA, Rickard M, Arnold L, Brachtel EF, Chaiwun B, et al. The International Academy of Cytology Yokohama System for Reporting Breast Fine-Needle Aspiration Biopsy Cytopathology. Acta Cytol. 2019;63(4):257-273. DOI: 10.1159/000499509
7. Dey S, Mishra A, Krishnan G, Shruthi P, Kumar A. Diagnostic accuracy of fine needle aspiration cytology in breast lesions. J Clin Diagn Res. 2019;13(6):EC15-EC19. DOI: 10.7860/JCDR/2019/41103.12935
8. Yu YH, Wei W, Liu JL. Diagnostic value of fine-needle aspiration biopsy for breast mass: a systematic review and meta-analysis. BMC Cancer. 2012;12:41. DOI: 10.1186/1471-2407-12-41
9. Zagorianakou N, Firvida M, Zagorianakou P, Mihailidis D, Manolakaki A, Makrydimas E, et al. FNAC: Its role, limitations and perspective in the preoperative diagnosis of breast cancer. Eur J Gynaecol Oncol. 2005;26(2):143-149. PMID: 15857016
10. Rosa M, Mohammadi A, Masood S. The value of fine needle aspiration biopsy in the diagnosis and prognostic assessment of palpable breast lesions. Diagn Cytopathol. 2012;40(1):26-34. DOI: 10.1002/dc.21497
11. Chaiwun B, Settakorn J, Ya-In C, Wisedmongkol W, Rangdaeng S, Thorner P. Effectiveness of fine-needle aspiration cytology of breast: analysis of 2,375 cases from northern Thailand. Diagn Cytopathol. 2002;26(3):201-205. DOI: 10.1002/dc.10075
12. Kharkwal S, Mukherjee A, Agarwal A, Jain M. Diagnostic accuracy of fine needle aspiration cytology of breast lesions: a tertiary care hospital experience. J Cytol. 2020;37(4):196-202. DOI: 10.4103/JOC.JOC_249_19

13. Panjvani SI, Parikh BJ, Parikh SB, Chaudhari BR, Patel KK, Gupta GS, et al. Utility of fine needle aspiration cytology in the evaluation of breast lesions. J Clin Diagn Res. 2013;7(12):2777-2779. DOI: 10.7860/JCDR/2013/6222.3755
14. Rahman MZ, Sikder AM, Nabi SR. Diagnosis of breast lump by fine needle aspiration cytology and mammography. Mymensingh Med J. 2011;20(4):658-664. PMID: 22081186
15. Cho N, Moon WK, Kim HY, Chang JM, Park SH, Lyou CY. Ultrasonographic characteristics of breast hemangiomas. J Ultrasound Med. 2006;25(10):1267-1271. DOI: 10.7863/jum.2006.25.10.1267
16. Malhotra GK, Zhao X, Band H, Band V. Histological, molecular and functional subtypes of breast cancers. Cancer Biol Ther. 2010;10(10):955-960. DOI: 10.4161/cbt.10.10.13879
17. Willems SM, van Deurzen CH, de Wilt JH, van der Wall E, van Diest PJ. Assessment of breast cancer cytology: a comparison between well-defined criteria and the Yokohama system. Breast Cancer Res Treat. 2020;181(1):83-91. DOI: 10.1007/s10549-020-05605-6
18. Ellis IO, Humphreys S, Michell M, Pinder SE, Wells CA, Zakhour HD. Best Practice No 179. Guidelines for breast needle core biopsy handling and reporting in breast screening assessment. J Clin Pathol. 2004;57(9):897-902. DOI: 10.1136/jcp.2003.010983
19. Lakhani SR, Ellis IO, Schnitt SJ, Tan PH, van de Vijver MJ. WHO Classification of Tumours of the Breast. 4th ed. Lyon: IARC Press; 2012. ISBN: 978-92-832-2433-4
20. Kocjan G, Bourgain C, Fassina A, Hagmar B, Herbert A, Kapila K, et al. The role of breast FNAC in diagnosis and clinical management: a survey of current practice. Cytopathology. 2008; 19(5):271-278. DOI: 10.1111/j.1365-2303.2008.00610.x
21. Gupta RK, McHutchison AG, Dowle CS, Simpson JS. Fine-needle aspiration cytodiagnosis of breast masses in pregnant and lactating women and its impact on management. Diagn Cytopathol. 1993;9(2):156-159. DOI: 10.1002/dc.2840090206
22. Saha A, Mukhopadhyay M, Das C, Sarkar K, Saha K, Sarkar R. FNAC versus core needle biopsy: A comparative study in evaluation of palpable breast lump. J Clin Diagn Res. 2016;10(2):EC05-EC08. DOI: 10.7860/JCDR/2016/17076.7219
23. Ljung BM, Drejet A, Chiampi N, Jeffrey J, Goodson WH 3rd, Chew K, et al. Diagnostic accuracy of fine-needle aspiration biopsy is determined by physician training in sampling technique. Cancer. 2001;93(4):263-268. DOI: 10.1002/cncr.9040
24. Montezuma D, Malheiros D, Schmitt FC. Breast fine needle aspiration biopsy cytology using the newly proposed IAC Yokohama System for Reporting Breast Cytopathology: The experience of a single institution. Acta Cytol. 2019;63(4):274-279. DOI: 10.1159/000500190.