RESEARCH PAPER

CORRELATION OF IAC YOKOHAMA CYTOLOGICAL CATEGORIES AND BIRADS SCORES WITH HISTOPATHOLOGY IN BREAST LESIONS IN A TERTIARY CARE CENTRE

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ABSTRACT

Background: Breast lesions encompass a wide spectrum from benign proliferative conditions to malignancy, and accurate cyto-radiologic correlation is essential for early diagnosis, risk stratification, and appropriate clinical management.

Objectives: To assess the correlation of IAC/Yokohama cytological categories (C2–C5) and BI-RADS imaging scores with histopathological diagnosis, determine the diagnostic accuracy of FNAC and BI-RADS individually and in combination.

Methods: This single-centre hospital-based analytical cross-sectional study was conducted at Chettinad Hospital and Research Institute, Chennai, Tamil Nadu, India, from October 2025 to January 2026 among 49 participants with palpable and/or imaging-detected breast lesions who underwent triple assessment and subsequent histopathological confirmation.

Results: The study included 49 women with a mean age of 43.2±13.2 years; most were aged 40–49 years (26.5%), multiparous (55.1%), and had a history of breastfeeding (83.7%). Breast lump was the commonest complaint (83.7%). Histopathology showed 31 benign (63.3%) and 18 malignant lesions (36.7%); fibroadenoma was the leading benign lesion (38.7%), while invasive ductal carcinoma, NST predominated among malignancies (66.7%). BI-RADS 5 was the most frequent imaging category (36.7%), and FNAC C2 was the commonest cytology category (53.1%). All BI-RADS 3 lesions were benign and all BI-RADS 6 lesions were malignant; similarly, all C2 lesions were benign and all C5 lesions were malignant. FNAC showed 83.3% sensitivity, 100.0% specificity, and 93.9% accuracy. Malignancy increased significantly with age (p=0.008) and in absence of exclusive breastfeeding (p=0.014).

Conclusion: IAC/Yokohama-based FNAC and BI-RADS were both significantly associated with histopathological diagnosis, with FNAC demonstrating higher specificity and overall accuracy, while their combined use improved diagnostic confidence for malignancy.

Keywords: Breast lesions, Yokohama system, Fine-needle aspiration cytology, Radiology, Histopathology, Triple assessment

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INTRODUCTION

Breast lesions comprise a broad clinicopathological spectrum ranging from inflammatory to benign proliferative conditions to invasive carcinoma. Making an accurate preoperative diagnosis is essential for timely management. Breast cancer is now the most commonly diagnosed cancer in women worldwide; the IARC GLOBOCAN 2022 breast cancer fact sheet estimated 2,296,840 new breast cancer cases and 666,103 deaths globally in 2022,(1) while the WHO reported that breast cancer caused an estimated 670,000 deaths and was the commonest cancer in women in 157 of 185 countries.(2) The burden is also substantial in India. IARC's 2022 India fact sheet identifies breast cancer as the leading cancer by incidence among Indian women, and CanScreen5 reports an age-standardized female breast-cancer incidence of 26.6 per 100,000 and mortality of 13.7 per 100,000 in India.(3) Survival remains strongly stage- and system-dependent; WHO's Global Breast Cancer Initiative notes that 5-year survival exceeds 90% in high-income countries but is about 66% in India.(4)

At the benign end of the spectrum, fibroadenoma remains the commonest in younger women. Ramala et al. described fibroadenoma as a common benign breast mass usually affecting young women,(5) and Ibrahim et al. reported fibroadenoma as the most prevalent benign lesion, accounting for 36.7% of cases.(6) At the malignant end, invasive breast carcinoma of no special type is the dominant histologic subtype, accounting for about 70%–80% of invasive breast cancers. Standardized reporting systems have therefore become central to breast-lesion evaluation. In imaging, BI-RADS category 3 is intended for probably benign findings with a malignancy rate of no more than 2%, whereas BI-RADS 5 denotes a lesion with at least a 95% likelihood of malignancy.(7, 8) In cytopathology, the IAC Yokohama system classifies breast FNAC into five categories with pooled risks of malignancy of 1% for benign, 20% for atypical, 86% for suspicious, and 100% for malignant interpretations in the meta-analysis by Nikas et al.(9) Recent studies have reaffirmed that FNAC remains a cost-effective and reliable diagnostic tool, and Munjal et al. showed that combining IAC Yokohama reporting with ACR BI-RADS improves risk stratification and clinical decision-making.(10, 11) Patient factors also matter when interpreting breast lesions. Increasing age is associated with higher malignant potential, and breastfeeding appears protective; Stordal reported a 4.3% reduction in breast-cancer risk for every 12 months of breastfeeding, in addition to a 7.0% reduction for each birth.(12) Against this background, the present study aimed to assess the correlation of IAC/Yokohama cytological categories (C2–C5) and BI-RADS imaging scores with histopathological diagnosis, determine the diagnostic accuracy of FNAC and BI-RADS individually and in combination, and evaluate the distribution of breast lesions across age groups, parity status, and lactational history.

MATERIALS AND METHODS

This was a single-centre, hospital-based, analytical cross-sectional study conducted in the Chettinad Hospital and Research Institute, Chennai, Tamil Nadu, India over a period of four months between October 2025 and January 2026. The study was approved by the Institutional Human Ethics Committee (IHEC) with reference number IHEC-I/026/10/2025 dated 19/11/2025. Eligible participants were those presenting first time with a palpable breast lump and/or imaging-detected breast lesion who underwent standard 'triple assessment' (clinical evaluation with breast imaging and cytopathology), with imaging reported using the ACR BI-RADS assessment and FNAC reported using the International Academy of Cytology (IAC) Yokohama system (including the benign/indeterminate/suspicious/malignant categories C2–C5 as applicable), and who subsequently had histopathological confirmation on core needle biopsy or excision as the reference standard. Patients were excluded if histopathology was unavailable (lost to follow-up/no biopsy), if FNAC was inadequate/insufficient for reporting (Yokohama C1) or if imaging was incomplete without a final BI-RADS assessment, and if they had prior breast malignancy or prior treatment/surgery for the index lesion that could alter cyto-radiologic interpretation.

The sample size was calculated using the single-proportion formula $n = 4pq/d^2$, where p is the expected proportion, q = 100 − p, and d is the absolute precision. Based on Dogra et al. (2023) using the IAC Yokohama system for breast FNAC,(13) the proportion of malignant lesions (C5) was 12.6%; therefore, p = 12.6 and q = 87.4. Taking an absolute precision of 10% (d = 10) and 10% non-response/incomplete data, the minimum sample size was 49 participants; enrolled using nonprobability sampling technique – convenient/purposive sampling. FNAC slides evaluated for breast lesions were retrieved and re-reviewed, and each case was reported using the IAC Yokohama System for Reporting Breast FNAC, focusing on the indeterminate-to-malignant diagnostic spectrum (C2- Benign, C3- Atypical, C4- Suspicious for malignancy, and C5- Malignant).(14) Smears were assessed on routine cytomorphology after staining with Papanicolaou stain (for optimal nuclear detail on alcohol-fixed smears) and Romanowsky-type stains such as Leishman (for air-dried smears to enhance cytoplasmic detail and background elements).(15, 16) Corresponding radiology records were reviewed, and breast imaging findings were classified using the ACR BI-RADS final assessment (3–6) to enable uniform imaging interpretation and management. For cyto-radio-pathological correlation, histopathology from core needle biopsy and/or surgical excision was taken as the definitive reference ("gold standard") diagnosis for each lesion.(17) In addition, relevant clinical and reproductive variables (age, parity, and lactational status) were recorded in a structured proforma.

Statistical analysis: Statistical analysis was performed using IBM SPSS Statistics for Windows, version 27.0 (IBM Corp., Armonk, NY, USA). Categorical variables were summarized as frequency and percentage, while continuous variables were expressed as mean±standard deviation (SD). The association between categorical study variables and histopathological diagnosis (benign vs malignant) was assessed using the Chi-square test or Fisher's exact test, as appropriate. Diagnostic performance of FNAC, BI-RADS, and the combined FNAC+BI-RADS assessment for predicting malignancy was evaluated against histopathology as the gold standard by calculating sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and overall diagnostic accuracy, along with their 95% confidence intervals (CI). All statistical tests were two-tailed, and a p-value of <0.05 was considered statistically significant.

RESULTS

Among the 49 participants, the mean age was 43.2±13.2 years, with most women in the 40–49 years age group (26.5%), followed by 30–39 years (24.5%). Most were multiparous, with para 1–2 constituting 55.1%, and 83.7% had a history of exclusive breastfeeding. Breast lump was the commonest presenting complaint (83.7%), and lesions were slightly more frequent in the right breast (51.0%). On imaging, BI-RADS 5 was the most common category (36.7%), while on FNAC, C2 benign lesions predominated (53.1%), followed by C5 malignant lesions (30.6%). Histopathology showed that 31 cases (63.3%) were benign and 18 (36.7%) were malignant; fibroadenoma was the leading benign lesion (38.7%), whereas invasive ductal carcinoma, no special type, was the most frequent malignancy (66.7%).

Table 1: Baseline demographic and clinical profile of participants with BI-RADS, FNAC (IAC/Yokohama C2–C5), and histopathological diagnosis distribution (N=49)

		Value
Age (years), Mean ± SD		43.2 ± 13.2
Age group, n (%)	<30	8 (16.3)
	30–39	12 (24.5)
	40–49	13 (26.5)
	50–59	10 (20.4)
	≥60	6 (12.2)
Parity, n (%)	Nulliparous	6 (12.2)
	Para 1–2	27 (55.1)
	Para ≥3	16 (32.7)
History of exclusive breastfeeding, n (%)	Present	41 (83.7)
	Absent	8 (16.3)
Presenting complaint (primary), n (%)	Breast lump	41 (83.7)
	Breast pain	6 (12.2)
	Nipple discharge	2 (4.1)
Side of lesion, n (%)	Right	25 (51.0)
	Left	22 (44.9)
	Bilateral	2 (4.1)
BI-RADS, n (%)	BI-RADS 3	10 (20.4)
	BI-RADS 4	15 (30.6)
	BI-RADS 5	18 (36.7)
	BI-RADS 6	6 (12.2)
FNAC, n (%)	C2 (Benign)	26 (53.1)
	C3 (Atypical)	4 (8.2)
	C4 (Suspicious for malignancy)	4 (8.2)
	C5 (Malignant)	15 (30.6)
Benign lesions (overall), n (%)		31 (63.3)
	Fibroadenoma	12 (38.7)
	Fibrocystic change / benign proliferative disease	8 (25.8)
	Intraductal papilloma	4 (12.9)
	Benign phyllodes tumour	3 (9.7)

	Granulomatous mastitis	2 (6.5)
	Duct ectasia / inflammation	2 (6.5)
Malignant lesions (overall), n (%)		18 (36.7)
	Invasive ductal carcinoma (NST)	12 (66.7)
	Invasive lobular carcinoma	2 (11.1)
	Ductal carcinoma in situ (DCIS)	2 (11.1)
	Mucinous carcinoma	1 (5.6)
	Malignant phyllodes tumour	1 (5.6)

Cytomorphologically, C2 smears commonly showed cohesive epithelial clusters (22 cases), apocrine change (8), and papillary fragments (7), while C3 smears were characterized by mild atypia in all 4 cases. C4 lesions showed features suggestive of malignancy such as cellular discohesion, high cellularity, and nuclear pleomorphism in 3 of 4 cases each. In contrast, C5 lesions consistently demonstrated marked pleomorphism (15/15), with frequent atypical mitoses (10), prominent nucleoli (12), and tumour diathesis/necrosis (9), reflecting overt malignant cytology.

Table 2: Distribution of key cytomorphological patterns across IAC/Yokohama FNAC categories (C2–C5)

Pattern	C2 (n=26)	C3 (n=4)	C4 (n=4)	C5 (n=15)
Apocrine change	8	1	0	0
Cohesive epithelial clusters	22	2	0	0
Mild nuclear atypia	6	4	0	0
Papillary fragments	7	1	0	0
Cellular discohesion	0	1	3	0
High cellularity	0	1	3	5
Nuclear pleomorphism	0	0	3	4
Atypical mitoses	0	0	0	10
Marked pleomorphism	0	0	0	15
Prominent nucleoli	0	0	0	12
Tumour diathesis/necrosis	0	0	0	9

Table 3: Association of BI-RADS, FNAC (IAC/Yokohama C2–C5), and combined FNAC+BI-RADS assessment with histopathological diagnosis (benign vs malignant)

		Benign	Malignant	
BI-RADS	3	10	0	Chi-square = 19.31, df = 3, p = <0.001*
	4	12	3	
	5	9	9	
	6	0	6	
FNAC	C2	26	0	Chi-square = 41.47, df = 3, p <0.001*
	C3	3	1	
	C4	2	2	
	C5	0	15	
Combined	Combined	0	14	Chi-squar

assessment	test positive			e = 30.05, df = 1, p <0.001*
	Combined test negative	31	4	
Combined test-positive if FNAC was C5 AND BI-RADS was 5/6; otherwise, test-negative *Statistically significant at p<0.05				

On BI-RADS assessment, all BI-RADS 3 lesions were benign (10/10), whereas all BI-RADS 6 lesions were malignant (6/6); BI-RADS 5 showed an even split, with 9 benign and 9 malignant cases. Table3. FNAC showed stronger separation, with all C2 cases being benign (26/26) and all C5 cases malignant (15/15), while C3 and C4 represented intermediate categories with mixed benign and malignant outcomes. The combined assessment was also strongly associated with histopathology: all 14 combined test-positive cases were malignant, whereas 31 of 35 combined test-negative cases were benign. In diagnostic performance, FNAC had 83.3% sensitivity, 100.0% specificity, and 93.9% overall accuracy, while BI-RADS had the same sensitivity (83.3%) but lower specificity (71.0%) and accuracy (75.5%). The combined FNAC+BI-RADS approach achieved 100.0% specificity and PPV, with 91.8% accuracy.

Table 4: Diagnostic accuracy of FNAC (Yokohama-based), BI-RADS, and combined FNAC+BI-RADS for malignancy against histopathology

	FNAC (Yokohama-based)		BI-RADS		Combined FNAC + BI-RADS	
	Estimate (%)	95% CI (%)	Estimate (%)	95% CI (%)	Estimate (%)	95% CI (%)
Sensitivity	83.3	60.8–94.2	83.3	60.8–94		
Specificity	100.0	89.0–100.0	71.0	53.4–8		
PPV	100.0	79.6–100.0	62.5	42.7–7		
NPV	91.2	77.0–97.0	88.0	70.0–9		
Accuracy	93.9	83.5–97.9	75.5	61.9–8		

Histopathological malignancy showed a significant association with age group and lactational history, but not with parity. The malignancy rate increased with age, from 0% in women aged <30 years to 16.7% in 30–39 years, 38.5% in 40–49 years, 70.0% in 50–59 years, and 66.7% in those aged ≥60 years (p=0.008). By parity, malignancy was seen in 50.0% of nulliparous women, 33.3% of para 1–2 women, and 37.5% of women with parity ≥3, with no significant difference (p=0.744). A significant association was also observed with exclusive breastfeeding history: among women with a history of exclusive breastfeeding, 70.7% had benign lesions and 29.3% had malignant lesions, whereas among those without such a history, 75.0% had malignant lesions and only 25.0% had benign lesions (p=0.014).

Table 5: Histopathological outcomes by age group, parity status, and lactational history, with stratified malignancy rates

		Total, n	**Benign, n (%)**
Age group (years)	<30	8	8 (100.0)
	30–39	12	10 (83.3)
	40–49	13	8 (61.5)
	50–59	10	3 (30.0)
	≥60	6	2 (33.3)
Parity	Nulliparous	6	3 (50.0)
	Para 1–2	27	18 (66.7)
	Para ≥3	16	10 (62.5)
History of exclusive breastfeeding	Present	41	29 (70.7)
	Absent	8	2 (25.0)

*Statistically significant at p<0.05

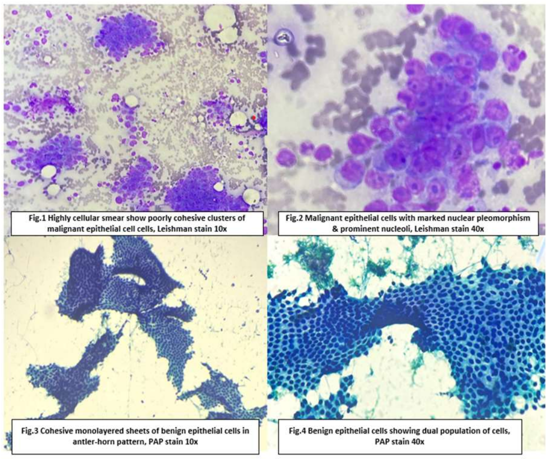

Fig.1 Highly cellular smear show poorly cohesive clusters of malignant epithelial cell cells, Leishman stain 10x

Fig.2 Malignant epithelial cells with marked nuclear pleomorphism & prominent nucleoli, Leishman stain 40x

Fig.3 Cohesive monolayered sheets of benign epithelial cells in antler-horn pattern, PAP stain 10x

Fig.4 Benign epithelial cells showing dual population of cells, PAP stain 40x

DISCUSSION

The present study demonstrated that women with breast lesions requiring triple assessment most often presented in midlife, with a mean age of 43.2±13.2 years and clustering in the 30–49-year range. In corroboration, Ghunaim et al. reported a mean age of 44.57 years among women with BI-RADS 4 lesions,(18) while Ibrahim et al. found that 36.5% of all histologically diagnosed breast lesions occurred in the 30–39-year age group.(6) The clinical profile in the present study, with breast lump being the predominant complaint (83.7%), is in line with Vadakekut et al., who noted that a palpable breast mass is the commonest presenting symptom in breast evaluation, although most symptomatic encounters ultimately prove to be benign rather than malignant.(19) The slight right-sided predominance in the present study (51.0%) was also similar to the 51% right-sided distribution described by Chaudhari et al. in a recent histomorphological study.(20)

Histopathologically, benign lesions outnumbered malignant lesions in the present study (63.3% vs 36.7%), and this distribution was consistent with literature; Ibrahim et al. reported 58.8% benign lesions and 19.6% malignant lesions in a histopathology-based study,(6) while Chaudhari et al. similarly observed that benign lesions constituted the majority of breast pathology specimens.(20) Within the benign group in the present study, fibroadenoma was the leading diagnosis (38.7%), followed by fibrocystic change/benign proliferative disease. This aligns closely with Ibrahim et al., in whom fibroadenoma accounted for 36.7% of benign lesions,(6) and with Chaudhari et al., who found fibroadenoma in 46% of histopathologically examined breast lesions.(20) Among malignant lesions, invasive ductal carcinoma, no special type, formed two-thirds of cancers in the present series (66.7%), again matching the dominant histological pattern reported by Ibrahim et al. (62% IDC-NST).(6) These parallels suggest that the histological case-mix in the present study was representative of routine tertiary-care breast pathology.

The FNAC findings further supported the utility of the IAC/Yokohama framework in stratifying breast lesions. In the present study, C2 lesions predominated (53.1%), whereas C5 comprised 30.6%, reflecting the usual pattern in which benign cytology constitutes the largest category. Niaz et al. reported 65.8% benign and 12.7% malignant cytology cases,(21) and Ahuja and Malviya likewise found the benign category to be the largest group in their Yokohama-based analysis.(22) More importantly, the present study's histological behaviour of C2, C3, C4, and C5 lesions was highly concordant with published risk-of-malignancy data. In the meta-analysis by Nikas et al., the pooled ROM was 1% for benign, 20% for atypical, 86% for suspicious, and 100% for malignant categories.(9) Therefore, the finding that all C2 cases in the present study were benign and all C5 cases were malignant fits very well within the expected biological gradient of the Yokohama system.

The cytomorphological patterns observed across categories were also pathobiologically coherent. Benign smears in the present study frequently showed cohesive epithelial clusters, apocrine change, and papillary fragments. This was understandable because apocrine metaplasia is commonly encountered in benign cystic and papillary breast lesions, and papillary apocrine change may yield papillary clusters on aspiration cytology.(23, 24) At the opposite end of the spectrum, the C5 category in the present study consistently showed marked pleomorphism, with frequent atypical mitoses, prominent nucleoli, and tumour diathesis/necrosis. These features closely mirror the malignant cytomorphological descriptors emphasized in Nigam et al., including high cellularity, dispersal of single cells, nuclear enlargement, pleomorphism, hyperchromasia, and prominent nucleoli.(25) The present C3 and C4 categories behaved as true "gray-zone" groups, with mild atypia characterizing C3 and progressive discohesion, hypercellularity, and pleomorphism characterizing C4, thereby reinforcing the practical value of category-wise cytological risk stratification.

Radiological-histopathological correlation in the present study was strong overall, but it also highlighted known limitations of BI-RADS when used alone in symptomatic lesions. All BI-RADS 3 lesions were benign in the present study, which was consistent with the BI-RADS concept of a "probably benign" lesion carrying a malignancy risk of not more than 2%.(7) Likewise, all BI-RADS 6 lesions were malignant, which is expected because this category is reserved for known biopsy-proven malignancy. The even split of BI-RADS 5 lesions into benign and malignant outcomes in the present study was lower than the ideal expectation for category 5, for which the American Cancer Society describes at least a 95% likelihood of malignancy.(26) However, imaging-histology discordance in highly suspicious categories is recognized, and recent work by Aziz et al. (2022) and Rjoop et al. (2025) has specifically examined benign lesions that were nevertheless classified as BI-RADS IVc or V, emphasizing that false-positive imaging interpretations do occur and require multidisciplinary reconciliation.(27, 28) In diagnostic terms, FNAC outperformed BI-RADS alone in the present study because both modalities had identical sensitivity for malignancy (83.3%), but FNAC showed markedly higher specificity (100.0% vs 71.0%) and accuracy (93.9% vs 75.5%). This pattern is consistent with recent comparative work. In the 2025 series by Munjal et al., BI-RADS achieved sensitivity, specificity, and diagnostic accuracy of 78.67%, 92%, and 87%, respectively,(11) whereas Yokohama-based FNAC reached diagnostic accuracies above 93% depending on the positivity threshold used. Ahuja and Malviya also reported that specificity reached 100% when only malignant cytology was considered positive, which is particularly relevant to the present finding that all C5 cases were histologically malignant.(22) The combined FNAC+BI-RADS rule used in the present study produced 100% specificity and 100% PPV, indicating that a lesion categorized as both cytologically malignant and radiologically BI-RADS 5/6 was an extremely robust "rule-in" marker of malignancy. This agrees with the broader principle that multimodal assessment is superior to any single component: Wai et al. reported 99% accuracy for the modified triple test, and Ahuja et al. recently found that a combined Yokohama-BI-RADS score achieved an AUC of 0.986, outperforming either system alone.(29, 30)

The age-stratified analysis in the present study was particularly noteworthy. Malignancy rose steadily from 0% in women younger than 30 years to 70.0% in the 50–59-year group and 66.7% in those aged 60 years or more. In corroboration, Burciu et al. emphasized that age is highly significant, with the median age of malignant breast-lesion development reported around 60–61 years.(31) Sergesketter et al. further showed that in women with atypical breast lesions, each additional year of age was associated with a greater likelihood of underlying carcinoma (OR 1.028, p=0.03).(32) Recent histomorphological study have also shown that benign lesions cluster in younger women, whereas malignant lesions are concentrated in later decades; for example, Chaudhari et al. found malignant lesions predominantly in the 61–70-year age group.(20) The present data therefore reinforce the importance of interpreting indeterminate cytology and imaging with greater caution in older women. The reproductive findings added another clinically relevant dimension. Parity was not significantly associated with malignancy in the present study, whereas exclusive breastfeeding history showed a clear protective association. Women with exclusive breastfeeding were predominantly in the benign group, while three-fourths of women without such a history had malignant lesions. This direction of association is well supported by epidemiological data. Mutahar et al., in a 2026 meta-analysis, concluded that extended breastfeeding had a protective effect against breast cancer, particularly when breastfeeding exceeded 11 months.(33) Stordal showed that breast-cancer risk decreases by 4.3% for every 12 months of breastfeeding, in addition to a 7.0% risk reduction for each birth.(12) The absence of a simple parity effect in the present study is also understandable because parity is not a uniformly protective variable in all settings; Stordal highlighted that early first full-term pregnancy is protective, whereas later childbearing may attenuate or even reverse that benefit, and women with multiple pregnancies after age 35 can show increased risk.(34) Thus, in the present cohort, breastfeeding history may have captured long-term biological protection more effectively than crude parity.

Taken together, the present results support a practical interpretive model in which FNAC provided the sharper discriminator at the benign and malignant ends of the spectrum, BI-RADS effectively stratified radiologic suspicion but remained vulnerable to false positives, and combined assessment was most useful for confidently identifying lesions that truly warranted definitive tissue management. The present study usefully demonstrated that C3/C4 lesions and BI-RADS 4/5 lesions remained the principal zones of diagnostic uncertainty, whereas concordant high-grade cytology plus high-suspicion imaging provided near-definitive evidence of malignancy before final histopathology. However, the present study had certain limitations. As it was a single-centre, hospital-based analytical cross-sectional study with a relatively small sample size of 49 cases, the findings may have limited generalisability to other institutions or broader screening populations. The study included only lesions that underwent complete triple assessment with histopathological confirmation, which may have introduced selection bias by excluding patients with inadequate FNAC, incomplete imaging, or loss to follow-up. Because the study design was cross-sectional, causal inferences regarding the relationship of age, parity, or lactational history with malignancy could not be established. In addition, interobserver variability in cytological interpretation and radiological BI-RADS categorisation was not separately assessed, and this could have influenced category assignment, particularly in the indeterminate C3/C4 and BI-RADS 4/5 groups.

Conclusion

In conclusion, the present study demonstrated that both IAC/Yokohama-based FNAC and BI-RADS showed significant correlation with histopathological diagnosis in breast lesions, with FNAC providing higher specificity and overall diagnostic accuracy than BI-RADS alone. The combined FNAC+BI-RADS assessment further improved diagnostic confidence by yielding excellent specificity and positive predictive value for malignancy, thereby strengthening the value of integrated triple assessment in routine clinical practice. Benign lesions predominated overall, with fibroadenoma being the most frequent benign diagnosis, while invasive ductal carcinoma, no special type, was the commonest malignancy. Increasing age and absence of exclusive breastfeeding were significantly associated with a higher likelihood of malignancy, whereas parity did not show a significant association. These findings support the usefulness of standardized cyto-radiologic-pathologic correlation for early risk stratification, accurate diagnosis, and appropriate management of breast lesions.

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