Section: Pathology

Original Research Article

VALIDITY OF APPLICATION OF IAC YOKOHAMA SYSTEM FOR REPORTING FNAC AND ACR BI-RADS IN DIAGNOSING BREAST LESIONS

Atul Pawar[1], Devangana Rajyaguru[2], Sheela Chikhalikar[3], Mamata Havnur[4], Dimple Kalsi[5], Preeti Bajaj[6]

[1]*Senior Resident, Department of Pathology, Ashwini Rural Medical College, Sholapur, Maharashtra, India.*
[2]*Professor, Department of Pathology, Dr. Vasantrao Pawar Medical College, Hospital and Research Centre, Nashik, Maharashtra, India.*
[3]*Assistant Professor, Department of Pathology, GMC & MPGIMER, MUHS, Nashik, Maharashtra, India*
[4]*Assistant Professor, Department of Pathology, GMC & MPGIMER, MUHS, Nashik, Maharashtra, India*
[5]*Project Research Scientist, Department of Radiotherapy and Oncology, Post Graduate Institute of Education and Research, Chandigarh, India.*
[6]*Professor and Head, Department of Pathology, Dr Vasantrao Pawar Medical College, Hospital and Research Centre, Nashik, Maharashtra, India.*

Received *: 04/06/2026*
Received in revised form *: 17/07/2026*
Accepted *: 31/07/2026*

Corresponding Author:
Dr. Preeti Bajaj,
Professor and Head, Dept. of Pathology, Dr Vasantrao Pawar Medical College, Hospital and Research Centre, Nashik, Maharashtra, India..
Email: dr.prbajaj@gmail.com

DOI: 10.70034/ijmedph.2026.3.416

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (3); 2615-2620

ABSTRACT

Background: Breast cancer is one of the major health concerns among females, as it is the leading cause of cancer-related mortality among females. Breast lesions are increasingly recognized due to their frequent detection among women of reproductive age, most of which are benign. Globally, breast cancer is the second leading cause of female mortality. According to World Health Organisation (WHO) data for 2020, there were 2.3 million women diagnosed with breast cancer and 6,85,000 deaths globally. The objective is to evaluate the combined effectiveness of the widely used Breast Imaging- Reporting and Data System (BI-RADS) with the recently proposed International Academy of Cytology (IAC) Yokohama System for reporting Breast FNAC.

Materials and Methods: A total of 75 cases were categorised according to the IAC Yokohama System of reporting breast lesions. The Risk of Malignancy (ROM), Sensitivity, Specificity, Positive Predictive Value (PPV), Negative Predictive Value (NPV), and diagnostic yield of the IAC Yokohama System for Breast FNAC, as well as of ACR BI-RADS for ultrasonography, were calculated.

Results: Of the 75 cases studied, 52 underwent histopathology. Considering histopathological examination as the gold standard, Sensitivity, Specificity, PPV, NPV, and diagnostic accuracy of ultrasonography were respectively 96.6%, 87%, 90.3%, 95.2%, 92.3% and those of FNAC were 96.8%, 85.7%, 90.9%, 94.7%, 92.3% respectively.

Conclusion: The utilization of the IAC Yokohama reporting system for breast cytology in conjunction with ACR BI-RADS aids in better stratification of breast lesions.

Keywords: Breast, Fine Needle Aspiration Cytology, BI-RADS, Yokohama, Breast carcinoma, Cytology, Sonomammography.

INTRODUCTION

In 2016, cytopathologists specialized in breast cytology and clinical consultants with expertise in the diagnosis and treatment of breast lesions were convened by the International Academy of Cytology (IAC) to establish the IAC Yokohama System for Reporting Breast Fine Needle Aspiration Biopsy (FNAB) Cytology.[1]

Approximately 25–32% of female cancers in urban India are breast carcinomas, and breast cancer is now the most common malignancy among Indian women. Globally, breast carcinoma accounts for 10.4% of all cancers among women in developed countries.[2] Owing to increasing industrialization, changing lifestyles, and altered dietary patterns, breast cancer has become one of the most common malignancies in urban areas, whereas cervical cancer remains the

leading malignancy among women in rural areas, followed by breast carcinoma.[3]

Most patients presenting with breast lumps experience considerable distress. FNAC is highly beneficial in reducing patient apprehension, avoiding unnecessary surgical interventions, and shortening the waiting period for diagnosis. Fine needle aspiration is a safe procedure with very few reported complications. According to the literature, the risk of tumour cell displacement along the needle tract following FNAC is only up to 0.0045% and is even lower in superficially located tumours.[4]

The Yokohama System classifies breast cytology into five diagnostic categories with corresponding risks of malignancy: insufficient/inadequate (2.6–4.8%), benign (1.4–2.3%), atypical (13–15.7%), suspicious for malignancy (84.6–97.1%), and malignant (99–100%).[2]

Breast cancer is the most common malignancy worldwide and ranks fifth in cancer related mortality according to GLOBOCAN. Breast fine needle aspiration (FNA) is a safe, minimally invasive, accurate, and cost-effective modality for assessing both palpable and nonpalpable breast lesions and is best interpreted in conjunction with the other components of the triple test, namely clinical examination and radiological assessment, within a multidisciplinary setting.[5]

Stratification of breast lesions for appropriate management is achieved through the integration of clinical examination, ultrasound imaging, and fine needle aspiration cytology (FNAC). The combined application of the IAC Yokohama System for FNAC reporting and the American College of Radiology Breast Imaging Reporting and Data System (ACR BI-RADS) provides a standardized approach for risk assessment and facilitates appropriate clinical decision making.

The current study aimed to evaluate the combined effectiveness of the widely used ACR BI-RADS and the recently proposed IAC Yokohama System for reporting breast FNAC in the diagnosis of breast lesions. The objective was to assess the diagnostic validity of both systems individually and in combination, using histopathological examination as the reference standard, to determine their utility in improving the diagnostic accuracy and management of breast lesions.

MATERIALS AND METHODS

Study Design and Ethical Approval: This observational study was conducted in the Department of Pathology at a Medical College and Tertiary Health Care Center. The study was approved by the Institutional Ethics Committee (IEC). Informed consent was obtained from all participants prior to their inclusion in the study.

Study Population: A retrospective analysis was performed on all breast FNACs conducted at the tertiary care center from January 2022 to December 2022. All breast FNAC cases were included in the study, while FNACs from sites other than the breast were excluded. A total of 75 cases were categorized according to the IAC Yokohama System for reporting breast FNAC.

FNAC Procedure and Cytological Evaluation: Breast FNACs were performed at the tertiary care center. The obtained material was spread onto glass slides, fixed appropriately, and stained with Papanicolaou stain or Haematoxylin and Eosin stain. The stained slides were examined microscopically, and the cytological diagnoses were categorized according to the IAC Yokohama System.

IAC Yokohama System Classification: According to the IAC Yokohama System, breast FNAC findings were classified into five categories: Category 1, Insufficient; Category 2, Benign; Category 3, Atypical probably benign; Category 4, Suspicious of malignancy; and Category 5, Malignant.

Radiological Assessment: The IAC Yokohama categories were correlated with radiological diagnoses using the ACR BI-RADS. BI-RADS was classified as follows: Category 1, normal with no suspicious findings; Category 2, benign findings such as a cyst or benign mass; Category 3, findings with less than 2% risk of malignancy requiring additional evaluation; Category 4, suspicious abnormality for which biopsy is recommended; Category 5, highly suggestive of malignancy; and Category 6, known biopsy proven malignancy. For statistical analysis, BI-RADS categories were further grouped into Group 1 (BI-RADS I to III) and Group 2 (BI-RADS IV to VI).

Statistical Analysis: The risk of malignancy (ROM), sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy of the IAC Yokohama System for breast FNAC and ACR BI-RADS for ultrasound were calculated using histopathological examination as the reference standard.

RESULTS

In this study total 75 cases were included and analysed. After microscopic examination correlation of IAC Yokohama category with ACR BIRADS radiological findings was done. Out of 75 cases maximum (46 cases, 61.33%) cases were benign followed by malignant (16 cases, 21.34%) followed by atypical probably benign (09 cases, 12%) followed by suspicious of malignancy (03 cases, 4%) and 1 case (1.33%) was in insufficient category [Table 1].

In the current study, most common (38.67%) age group affected in our analysis was 21- 30 years. Second most common (14 cases i.e. 18.67%) age group affected in our study was 41-50 years of age [Table 2].

Most common lesion observed in our study was fibroadenoma [Figure 1a & 1b] (21 cases i.e. 28%), followed by malignant cases [Figure 6a & 6b] (16 cases i.e. 21.33%). Acute mastitis [Figure 2a & 2b], galactocele [Figure 3a &b] and fibrocystic disease

cases were almost equal (5, 4 & 4 i.e. 6.67% & 5.33% respectively) [Table 3].

Table 1: Distribution of our samples according to IAC Yokohama system for reporting breast cytology.

IAC Yokohama Category	n (%)
Category 1: Insufficient	1 (1.33)
Category 2: Benign	46 (61.33)
Category 3: Atypical probably benign	9 (12.00)
Category 4: Suspicious of malignancy	3 (4.00)
Category 5: Malignant	16 (21.34)
Total	75 (100.00)

Table 2: Age wise categorization of breast lesions.

Age group (years)	Category 1 n (%)	Category 2 n (%)	Category 3 n (%)	Category 4 n (%)	Category 5 n (%)	Total n (%)
<20	1 (1.33)	5 (6.67)	0	0	0	6 (8.00)
21–30	0	27 (36.00)	2 (2.67)	0	0	29 (38.67)
31–40	0	8 (10.67)	1 (1.33)	1 (1.33)	1 (1.33)	11 (14.67)
41–50	0	4 (5.33)	4 (5.33)	1 (1.33)	5 (6.67)	14 (18.67)
51–60	0	2 (2.67)	2 (2.67)	1 (1.33)	6 (8.00)	11 (14.67)
>60	0	0	0	0	4 (5.33)	4 (5.33)
Total	1 (1.33)	46 (61.33)	9 (12.00)	3 (4.00)	16 (21.33)	75 (100.00)

Table 3: Spectrum of distribution of breast lesions by cytology.

Cytological diagnosis	Category 1 n (%)	Category 2 n (%)	Category 3 n (%)	Category 4 n (%)	Category 5 n (%)
Fibroadenoma	0	21 (28.00)	0	0	0
Breast abscess	0	2 (2.67)	0	0	0
Acute mastitis	0	5 (6.67)	0	0	0
Galactocele	0	4 (5.33)	0	0	0
Duct ectasia	0	2 (2.67)	2 (2.67)	0	0
Lactational adenoma	0	3 (4.00)	0	0	0
Fibrocystic disease	0	4 (5.33)	1 (1.33)	0	0
Granulomatous mastitis	0	1 (1.33)	0	0	0
Usual ductal hyperplasia	0	2 (2.67)	0	0	0
Atypical ductal hyperplasia	0	0	3 (4.00)	0	0
Phyllodes	0	2 (2.67)	2 (2.67)	0	0
Fat necrosis	0	0	1 (1.33)	0	0
Suspicious of malignancy	0	0	0	3 (4.00)	0
Malignant	0	0	0	0	16 (21.33)
Total	1 (1.33)	46 (61.33)	9 (12.00)	3 (4.00)	16 (21.33)

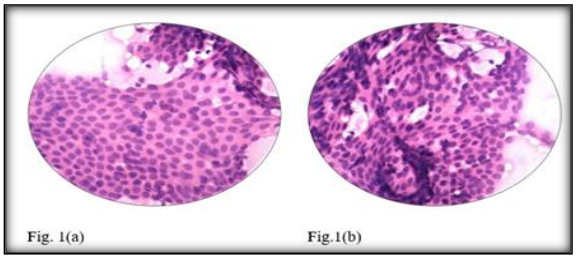

Figure 1: IAC Yokohama System Category 2 (H & E stain- 40x) Fibroadenoma: images depict benign ductal epithelial cells in antler horn pattern, monolayer sheets and bipolar bare nuclei of myoepithelial cells.

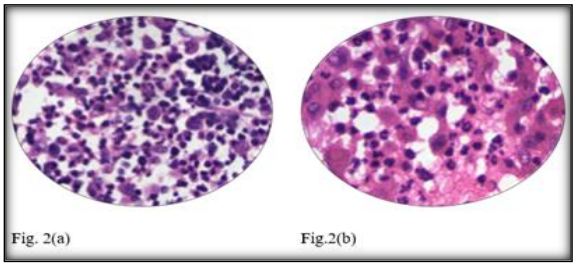

Figure 2: IAC Yokohama System Category 2: Acute mastitis: images depict moderate to dense inflammatory infiltrate consisting predominantly of neutrophils, few lymphocytes and histiocytes. No breast tissue seen in smears.

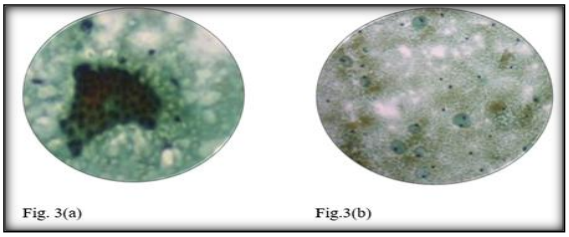

Figure 3: IAC Yokohama System Category 2: Galactocoele: a. image depicts a benign epithelial cluster, background shows frothy appearing lipid micelles. b. depicts a cyst with foamy macrophages.

Microscopic diagnoses were categorized according to International Academy of Yokohama System Cytology. According to this system: 1. Category 1: 01 case was insufficient (BIRADS score II) 2. Category 2: 46, 61.33% were benign- 45 cases, (60%) had BIRADS score I-III and one case (1.33%) had BIRADS score V. 3. Category 3: 9(12%) cases of atypical probably benign, 7(9.33%) cases had BIRADS score I-III and 2(2.66%) cases had BIRADS score IV-VI. 4. Category 4: 3 (4%) cases [Figure 4 a & b, Figure 5]; all were in the BIRADS score system IV-VI. 5. Category 5: 16 (21.34%)

[Figure 6 a & b); BIRADS score was IV-VI [Table 4].

Table 4: Correlation of IAC Yokohama category with ACR BIRADS Score radiological findings.

IAC Yokohama Category	FNAC n (%)	BI-RADS Group 1 (I–III) n (%)	BI-RADS Group 2 (IV–VI) n (%)
Category 1	1 (1.33)	1 (1.33)	0
Category 2	46 (61.33)	45 (60.00)	1 (1.33)
Category 3	9 (12.00)	7 (9.33)	2 (2.67)
Category 4	3 (4.00)	0	3 (4.00)
Category 5	16 (21.33)	0	16 (21.33)
Total	75 (100.00)	53 (70.67)	22 (29.33)

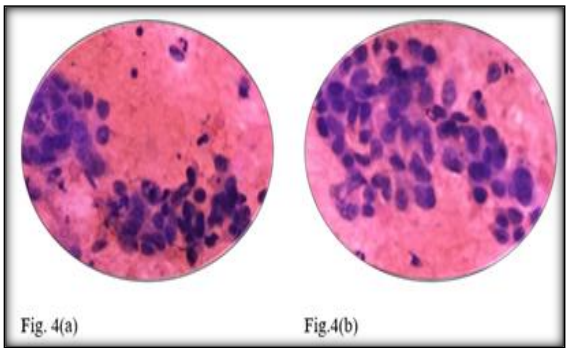

Figure 4: IAC Yokohama System Category 4: suspicious for malignancy: (H&E stain- 100x) Images depict significant cytopathological atypia but in small number of cells- nuclear overcrowding, increased nuclear-cytoplasmic ratio, nuclear membrane irregularities, hyperchromasia

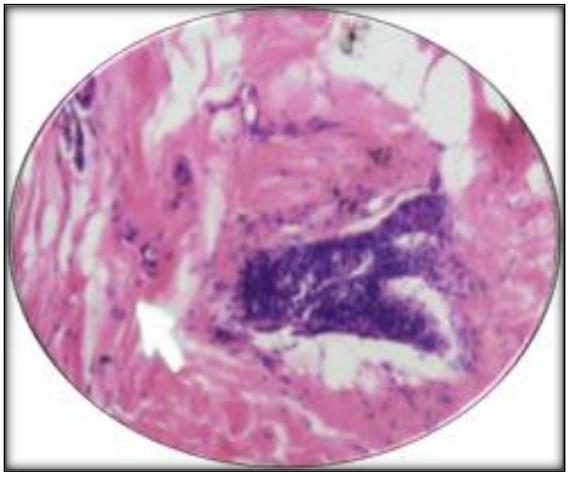

Figure 5: IAC Yokohama System Category 4: suspicious for malignancy (H & E, 100X): Atypical ductal hyperplasia: depicts a solid pattern of uniform cells with round nuclei

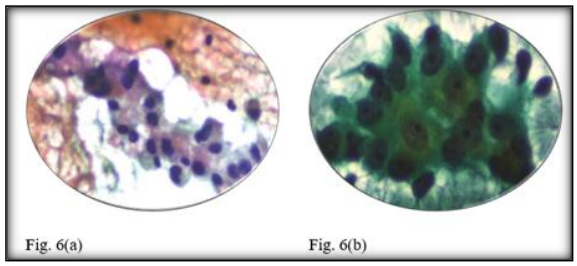

Figure 6: IAC Yokohama System Category 5:(PAP Stain- 100x) breast carcinoma: images depict atypical discohesive breast epithelial cells with high nuclear-cytoplasmic ratio, hyperchromasia, prominent nucleoli and moderate cytoplasm.

The diagnoses given on FNAC were correlated with histopathological and radiological diagnoses. Of the total number of FNAC cases, 50 cases showed concordance with both histopathological and radiological diagnoses. Seventy-one cases matched with radiological diagnoses, while 50 cases matched with histopathological diagnoses. In Category I (Insufficient), one case (1.33%) was reported. In Category II (Benign), 46 cases (61.33%) were reported as benign on FNAC. Out of these, 30 cases (40%) showed concordance with both radiological and histopathological diagnoses as benign. Category III (Atypia of Undetermined Significance / Atypical, probably benign) included 9 cases (12%). Among these, 5 cases (6.66%) matched with both histopathological and radiological diagnoses. In Category IV (Suspicious of Malignancy), 3 cases (4%) were reported. Among these, 3 cases (4%) and 2 cases (2.66%) were diagnosed as malignant on radiology and histopathology, respectively. In Category V (Malignant), all 16 cases (21.33%) showed complete concordance with both radiological and histopathological diagnoses [Table 5].

Table 5: Correlation of IAC Yokohama category with matched histopathology diagnosis and radio-diagnosis.

IAC Yokohama Category	FNAC n (%)	Matched radiological and histopathological diagnosis n (%)	Radiological diagnosis: Benign n (%)	Radiological diagnosis: Malignant n (%)	Histopathological diagnosis: Benign n (%)	Histopathological diagnosis: Malignant n (%)
Category 1	1 (1.33)	0	1 (1.33)	0	0	0
Category 2	46 (61.33)	30 (40.00)	45 (60.00)	1 (1.33)	30 (40.00)	1 (1.33)
Category 3	9 (12.00)	5 (6.67)	7 (9.33)	2 (2.67)	5 (6.67)	1 (1.33)
Category 4	3 (4.00)	2 (2.67)	0	3 (4.00)	0	2 (2.67)
Category 5	16 (21.33)	13 (17.33)	0	16 (21.33)	0	13 (17.33)
Total	75 (100.00)	50 (66.67)	53 (70.67)	22 (29.33)	35 (46.67)	17 (22.67)

Table 6: Sensitivity, specificity, PPV, NPV and diagnostic accuracy rate of Sonomammography and FNAC.

Statistical Parameter	Sonomammography (%)	FNAC (%)
Sensitivity	96.6	96.8
Specificity	87.0	85.7
Positive Predictive Value	90.3	90.9
Negative Predictive Value	95.2	94.7
Diagnostic Accuracy	92.3	92.3

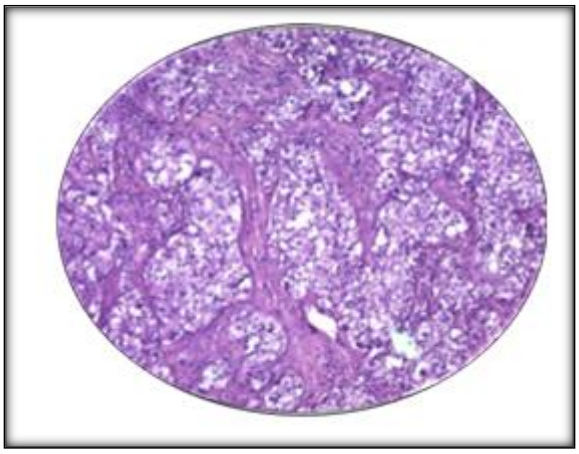

Figure 7: IAC Yokohama System Category 5: Malignant (H & E stain 400X) Invasive Duct Carcinoma not otherwise specified: image depicts infiltrative nest of tumour.

Considering histopathological examination as the gold standard, Sensitivity, Specificity, PPV, NPV and diagnostic accuracy of Sonomammography were respectively 96.6%, 87%, 90.3%, 95.2%, 92.3% and those of FNAC were 96.8%, 85.7%, 90.9%, 94.7%, 92.3% respectively. Sensitivity of Sonomammography and FNAC were almost similar, Specificity & NPV of Sonomammography was slightly higher. ROM is 0% for Category 1, 3.8% for Category 2, 28.6% for Category 3, 66.7% for Category 4 and 100% for Category 5 [Table 6].

DISCUSSION

The present study was conducted to compare the results of breast FNAC with breast ultrasound and histopathological diagnosis to assess its diagnostic accuracy. We retrospectively analyzed and categorized 75 breast FNAC cases according to the proposed IAC Yokohama System for reporting breast cytology. The distribution of cases across the IAC Yokohama categories in our study was comparable with that reported in previous studies [Table 7].

Table 7: Comparison with other studies with reference to Sensitivity, Specificity, PPV, NPV.

Statistical Parameter	Moschetta M et al,[6]	Poornima V Kamatar et al,[7]	Apuroopa M et al,[8]	Risaldar AA et al,[9]	Present study
Sensitivity (%)	97.0	94.59	95.90	91.66	96.8
Specificity (%)	94.0	98.90	97.89	100.0	85.7
Positive Predictive Value (%)	91.0	98.59	96.79	100.0	90.9
Negative Predictive Value (%)	98.0	95.74	97.64	98.0	94.7
Diagnostic Accuracy (%)	95.0	96.97	98.57	98.4	92.3

Most cases (61.33%) were classified as benign (Category 2), followed by Category 5 (malignant, 21.33%). These findings are comparable with those reported by Guru A et al., Verma R et al., Dogra A et al., and Sigamani K et al.[2,10-12] In these studies, the proportion of benign cases was 69%, 67.8%, 64.39%, and 78%, respectively, whereas malignant cases constituted 13%, 19.5%, 12.68%, and 13.6%, respectively.

Shrestha MK et al. demonstrated a strong correlation between BI-RADS scoring and histopathological examination, reporting that 91.3% of BI-RADS 2 and 3 lesions were benign.[13] In the present study, Category 2 was the most common cytological category, and the most commonly affected age group was 21–30 years, which was comparable with the findings of Guru A et al. Similarly, Apuroopa M et al. and Sigamani K et al. reported that 58% and 60% of patients, respectively, belonged to the 21–40 years age group.[8,11] Correlation between radiological and pathological findings is essential for appropriate treatment planning.[13]

Among the benign lesions, fibroadenoma was the most common diagnosis (28%), followed by acute mastitis (6.67%), fibrocystic disease (5.33%), and galactocele (5.33%). Verma R et al. also reported fibroadenoma as the most common lesion (47%), followed by benign proliferative mammary lesions with atypia (8%).[12]

Among patients with breast carcinoma in our study, 10 of the 16 patients (62.5%) were older than 50 years, while 6 (37.5%) were younger than 50 years. This observation was comparable with the findings reported by Takalkar UV et al.[14]

The sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy of FNAC in the present study were 96.8%, 85.7%, 90.9%, 94.7%, and 92.3%, respectively. These findings are comparable with those reported by Moschetta M et al., Kamatar PV et al., Apuroopa M et al., and Risaldar AA et al,[6-9] [Table 7]. Tiwari M et al. reported a sensitivity of 83.3% and specificity of 100% for breast FNAC.[15] Similarly, Risaldar AA et al. reported a slightly higher specificity than that observed in the present study.[9]

The risk of malignancy (ROM) was calculated for each IAC Yokohama category. ROM was 0% for Category 1, as no histopathological follow up was

available for the single insufficient case. Category 2 showed a ROM of 3.8%, with one false negative case subsequently diagnosed as ductal carcinoma in situ. Category 3 demonstrated a ROM of 28.6%, indicating that although this category predominantly includes benign lesions, a proportion may represent malignancy. Category 4 had a ROM of 66.7%, while Category 5 showed a ROM of 100%.

Yadav R et al. reported ROM values of 16.6%, 1.02%, 19.04%, 75%, and 100% for Categories 1 to 5, respectively.[16] The ROM values for Categories 4 and 5 were comparable with those observed in the present study, whereas their study reported a higher ROM for Category 1. Dogra A et al. reported ROM values of 100% for Category 1, 0% for Category 2, 55.55% for Category 3, and 100% for both Categories 4 and 5.[10] Nikas IP et al. reported ROM values of 17%, 1%, 20%, 86%, and 100% for the insufficient, benign, atypical, suspicious for malignancy, and malignant categories, respectively.[5]

Yadav R et al. also observed that ROM was highest in Category 5 (100%), followed by Category 4 (75%) and Category 3 (19.04%), while Category 2 had a ROM of only 1.02%. They attributed the relatively higher ROM in Category 1 (16.6%) to the presence of necrosis and hemorrhage in high grade malignant lesions, which may result in inadequate cytological smears.[16]

The sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy of sonomammography in the present study were 96.6%, 87.0%, 90.3%, 95.2%, and 92.3%, respectively [Table 6]. Shrestha MK et al. reported a sensitivity of 78.9% and specificity of 95% for sonomammography.[13]

Compared with core needle biopsy, FNAC is a rapid, simple, safe, minimally invasive, and cost-effective procedure for evaluating breast lesions. It enables clinicians to predict the likelihood of malignancy and facilitates early diagnosis. Breast ultrasound, when interpreted using the ACR BI-RADS classification, provides standardized reporting with high positive and negative predictive values. The combined use of FNAC and BI-RADS offers complementary information, improving diagnostic confidence and guiding appropriate clinical management.

CONCLUSION

Early screening, accurate diagnosis, and categorization of breast lesions are essential for appropriate patient management. The combined use of the IAC Yokohama System for breast cytology and ACR BI-RADS facilitates better stratification of breast lesions and improves preoperative diagnostic accuracy. FNAC and BI-RADS act synergistically as effective diagnostic modalities in the evaluation and management of breast lesions.

REFERENCES

1. Field AS, Vielh P, Schmitt F, editors. The International Academy of Cytology Yokohama System for Reporting Breast Fine Needle Aspiration Biopsy Cytopathology. Cham: Springer; 2020.
2. Guru A, Sutrakar SK, Jatav J, Tripathi L, Singh UR, Gupta R, et al. Validation of the IAC Yokohama system for reporting breast fine needle aspiration cytology categorization of breast lesions in Vindhya region population. Asian J Med Sci. 2023;14(5):161-166.
3. Malvia S, Bagadi SA, Dubey US, Saxena S. Epidemiology of breast cancer in Indian women. Asia Pac J Clin Oncol. 2017;13(4):289-295.
4. Vala MT, Goswami A, Suri SK. Comparative study of cytological and histopathological findings in breast lesions. IOSR J Dent Med Sci. 2014;13(7):5-9.
5. Nikas IP, Vey JA, Proctor T, AlRawashdeh MM, Ishak A, Ko HM, et al. The use of the International Academy of Cytology Yokohama System for reporting breast fine needle aspiration biopsy. Am J Clin Pathol. 2023;159(2):138-145.
6. Moschetta M, Telegrafo M, Carluccio DA, Jablonska JP, Rella L, Serio G, et al. Comparison between fine needle aspiration cytology and core needle biopsy in the diagnosis of breast lesions. G Chir. 2014;35(7-8):171-176.
7. Kamatar PV, Athanikar VS, Dinesh US. Breast fine needle aspiration biopsy cytology reporting using the International Academy of Cytology Yokohama System: A two year retrospective study in a tertiary care centre in southern India. Natl J Lab Med. 2019;8(3):PO01-PO03.
8. Apuroopa M, Chakravarthy VK, Rao DR. Application of Yokohama System for reporting breast fine needle aspiration cytology in correlation with histopathological and radiological findings. Ann Pathol Lab Med. 2020;7:A210-A215.
9. Risaldar AA, Begum Z, Alvi U. Correlation of fine needle aspiration cytology with histopathology of breast lesions. IP J Diagn Pathol Oncol. 2020;5(4):375-380.
10. Dogra A, Pant P, Joshi U, Pandey HS. Cytological evaluation of fine needle aspiration of breast lesions using the IAC Yokohama Classification System for reporting breast cytopathology. J Med Sci Health. 2023;9(3):245-250.
11. Sigamani K, Chandran N. Application of the International Academy of Cytology Yokohama System for reporting breast fine needle aspiration cytology: A retrospective study. Natl J Lab Med. 2022;11(2):PO63-PO66.
12. Verma R, Ahalawat A, Marwah N, Kalra R, Chhabra S, Singh S, et al. Unveiling breast FNAC trends with the Yokohama System: A tertiary care hospital perspective. Int J Acad Med Pharm. 2024;6(2):761-765.
13. Shrestha MK, Ghartimagar D, Ghosh A, Shrestha E, Bolar P. Significance of quadruple assessment of breast lump: A hospital based study. J Pathol Nepal. 2014;4:630-634.
14. Takalkar UV, Asegaonkar SB, Kulkarni U, Saraf M, Advani S. Clinicopathological profile of breast cancer patients at a tertiary care hospital in Marathwada region of western India. Asian Pac J Cancer Prev. 2016;17(4):2195-2198.
15. Tiwari M. Role of fine needle aspiration cytology in diagnosis of breast lumps. Kathmandu Univ Med J. 2007;5:215-217.
16. Yadav R, Singh N, Bakna M, et al. Cytomorphological spectrum of breast fine needle aspiration cytology using the International Academy of Cytology Yokohama System and evaluation of associated risk of malignancy: A retrospective study in a tertiary care centre. Surg Exp Pathol. 2024;7:6.