

ORIGINAL RESEARCH

Categorization & Assessment of Risk of Malignancy and Diagnostic Accuracy of International Academy of Cytology Yokohama System in Fine Needle Aspirates of Breast lesions in a Tertiary Care Centre**Saurabh Shrivastava¹, Yash Saxena^{2*}, Surabhi Mishra³**¹Assistant Professor, Department of Pathology, GRMC Gwalior, M.P, India.^{2*}Postgraduate, Department of Pathology, GRMC Gwalior, M.P, India.³Postgraduate, Department of Pathology, GRMC Gwalior, M.P, India.**ABSTRACT**

Background: International Academy of Cytology (IAC) Yokohama System has developed a standardized system of reporting breast cytology, It has 5 categories that may be stratified by their risk of malignancy (ROM) and supply guidance within a management algorithm for every category. The main objectives were to categorize the Breast FNAC samples according to new system of reporting and to assess the Risk of malignancy (ROM) and diagnostic accuracy for all categories.

Materials and Methods: A total of 212 Breast FNAC were done & retrospectively studied over a period of one year from 1st November 2021 to 31st October 2022 in Department of Pathology GajraRaja Medical College, Gwalior M.P. All the FNAC received was reported routinely according to the newly proposed Yokohama system of reporting breast cytology. Out of these 212 cases 72 were correlated histopathologically. The Risk of Malignancy and diagnostic accuracy of Breast FNAC were calculated.

Results: ROM is 0% for category 1, 2.5% for category 2, 16.6% for category 3, 77.7% for category 4 and 100% for category 5. Diagnostic accuracy were 0% for category 1, 97.5% for category 2, 83.3% for category 3, 77.7% for category 4 and 100% for category 5.

Conclusion: Categorization of the Breast FNA cytology according to IAC Yokohama system of reporting helps pathologist in the diagnostic clarity and guides clinician in the appropriate patient management.

Keywords: IAC Yokohama system, risk of malignancy (ROM), Breast carcinoma, positive predictive value.

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INTRODUCTION

Breast carcinoma has overtaken cervical cancer in India with the incidence rate being 26 per 100,000 women population and mortality rate of 13 per 100,000 women population (Gupta 2016).^[1] Fine Needle Aspiration Biopsy could be a simple, relatively painless, inexpensive outpatient department procedure with speedy results. It enables Rapid onsite evaluation (ROSE) and provides reporting which is good for multidisciplinary “one step”.^[2] The International Academy of Cytology (IAC) Breast Group was brought together in 2016 at the Yokohama International Congress of Cytology with the aim of developing an internationally recognized and standardized reporting system that would define best practice guidelines for the use of FNAB in diagnosing breast lesions more consistently and accurately.^[3] The System has established uniform terminology for five defined categories for breast FNAB with

stratified associated risks of malignancy (ROM) and management recommendations.^[3, 4] The IAC Yokohama system has 5 categories that may be stratified by their risk of malignancy (ROM) and supply guidance within a management algorithm for every category. The categories defined are insufficient/inadequate; benign; atypical, probably benign; suspicious of malignancy; probably in situ or invasive carcinoma; malignant. It will establish best practice protocols for suggested management of each of 5 categories with their varying risk of malignancy, taking into consideration the possible availability of imaging, Fine Needle Aspiration Biopsy, surgical pathology and management options. The recommendations include several options because it is recognized that the management options available in well-resourced countries are often different to those in low- and middle-income countries, most particularly in the availability of imaging and CNB.^[5]

The IAC Yokohama Breast FNAC Reporting system has been developed by a group of expert cytopathologists with assistance from surgeons, oncologists, and radiologists. [6] It has been developed to have a standardized reporting system to improve the interpretation of breast cytology. It also aims at improving communication between the cytopathologist and clinician by linking reporting system with management options.^[7]

MATERIALS & METHODS

The present study is a hospital based study on the routine materials from the Department of Pathology, GajraRaja Medical College, Gwalior. A total of 212 Breast FNAC were done & retrospectively studied over a period of one year from 1st November 2021 to 31st October 2022 in Department of Pathology GajraRaja Medical College, Gwalior M.P.

Inclusion Criteria • All patients irrespective of age and sex with breast lump reporting to Department of Pathology, GajraRaja Medical College, Gwalior.

Exclusion Criteria • Patients presenting with nipple discharge but without breast lump.
• Lactating breast.

All the FNAC received was reported routinely according to the newly proposed IAC Yokohama system of reporting breast cytology. Out of these 212 cases 72 were correlated histopathologically. These cases were retrospectively studied over a period of one year from 1st November 2021 to 31st October 2022. All the Fine Needle Aspiration Cytology received was reported routinely, & categorize according to the newly proposed Yokohama system of reporting breast cytology. Histological samples of the corresponding breast Fine Needle Aspiration Cytology were considered as the gold standard.

In each case Informed consent were taken with personal information and clinical history like age, size of swelling, duration of swelling, location of swelling, history of any discharge from nipple, pain, adherence to adjacent structures and physical examination along with evaluation of mammographic findings, if any was carried out. The Giemsa stained smears were then subjected to microscopic examination and routine reporting of all the slides were reviewed by chief reviewer and reported according to the newly proposed IAC Yokohama system of reporting breast cytology (C1-C5) category.

C1. Insufficient

C2. Benign

C3. Atypical

C4. Suspicious of Malignancy

C5. Malignant.

The Risk of Malignancy (ROM) & Diagnostic accuracy for each category is calculated by using the formula -:

ROM = Number of confirmed malignant cases

Total number of cases in the diagnostic category

Diagnostic accuracy = $\frac{\text{Number of Cyto-Histopathologically correlated cases}}{\text{Total number of cases in the diagnostic category}}$

Procedure for Histopathological Examination

• Breast specimens were fixed in 10% buffered formalin. • Gross features were recorded. • Bits were given from the specimens as follows: 1 bit from nipple, 3 bits from tumor for less than 5 cms and additional bits for larger tumors i.e. 1 bit per 1 cm of tumor, 2 bits from non tumor areas of uninvolved quadrants, bits from all surgical margins. Lymph nodes were detected in the specimen and bits from all the lymph nodes were given. For lymph nodes less than 5 mm, entire bit was given and larger lymph nodes were bisected and half of the tissue was taken for section. • The specimens were processed and stained routinely with haematoxylin and eosin

RESULTS

The cytology of 212 cases were analyzed and categorized into 5 categories from C1 to C5. There were 9 cases in C1 category, 138 cases in C2 category, 08 cases in C3 category, 18 cases in C4 category and 39 cases in C5 category. 72 cases had a cytohistological correlation available.

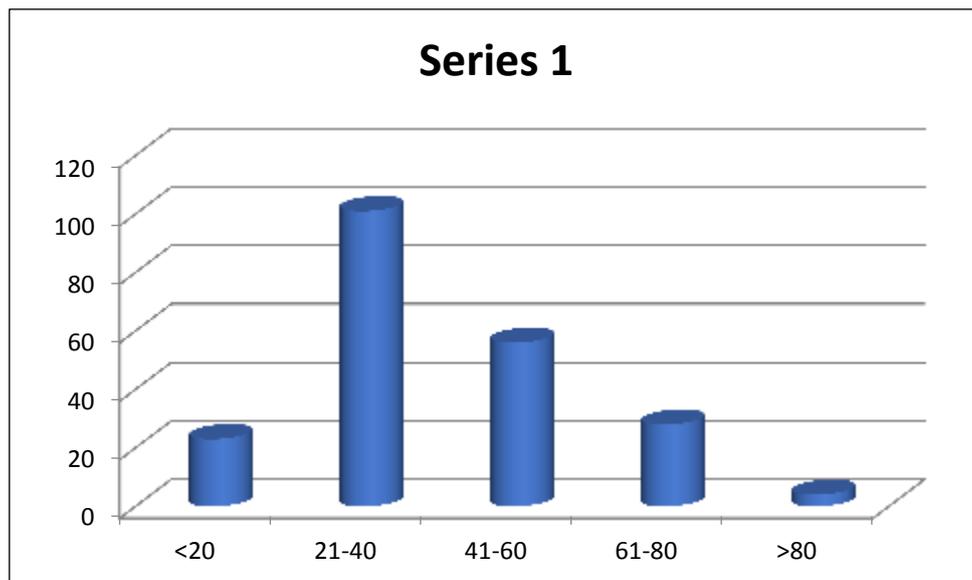


Figure 1: Age wise distribution of cases

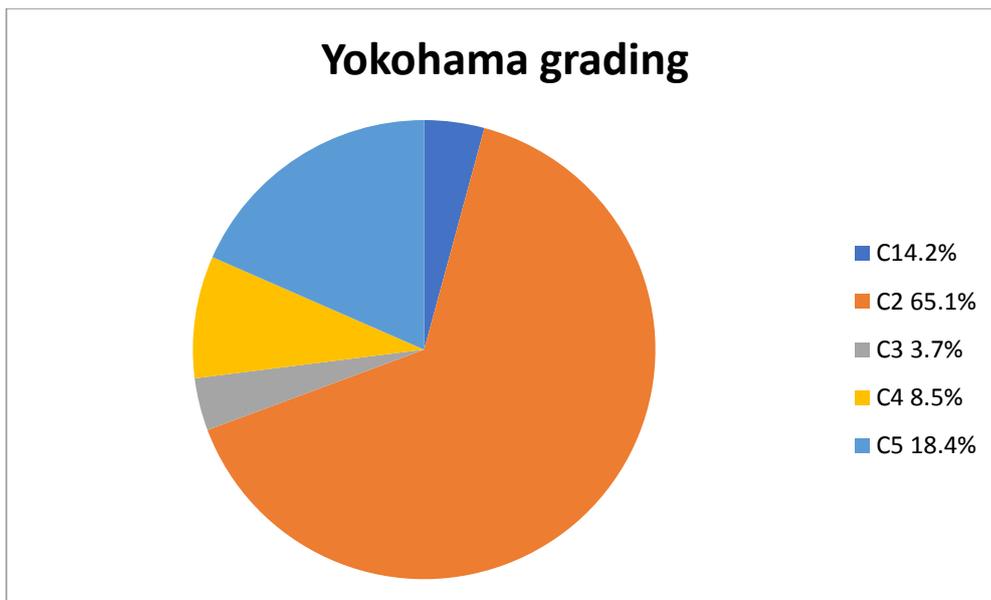


Figure 2: Cytology Result Categorization

Table 1: Cytological categorization according to Yokohama Grading

| Yokohama Grading | No. of Cases (Total =212) | Percentages |
|------------------|---------------------------|-------------|
| C1 | 9 | 4.2% |
| C2 | 138 | 65% |
| C3 | 08 | 3.7% |
| C4 | 18 | 8.5% |
| C5 | 39 | 18.4% |

Table 2: Cyto-histocorrelation according to Yokohama Grading

| Yokohama Grading | No. of Cytology Cases | Histopathology cases | |
|------------------|-----------------------|----------------------|-----------|
| | | Benign | Malignant |
| C1 | 04 | - | - |
| C2 | 40 | 39 | 01 |
| C3 | 06 | 05 | 01 |
| C4 | 09 | 02 | 07 |
| C5 | 13 | 00 | 13 |
| Total Cases | 72 | 46 | 22 |

Table 3: Risk of malignancy (ROM) for each category

| Yokohama Grading | Risk of malignancy in Percentage (%) |
|------------------|--------------------------------------|
| C1 | 0% |
| C2 | 2.5% |
| C3 | 16.6% |
| C4 | 77.7% |
| C5 | 100% |

Table 4: Diagnostic Accuracy of Yokohama Grading with Histopathological Correlation

| Yokohama Grading | Diagnostic Accuracy in Percentage (%) |
|------------------|---------------------------------------|
| C1 | 0% |
| C2 | 97.5% |
| C3 | 83.3% |
| C4 | 77.7% |
| C5 | 100% |

Cytohistological discordance seen in 4 out of 72 cases. Cytohistological concordance was calculated to 94.4%.

DISCUSSION

FNAC has a very crucial role to play, especially in a tertiary care center like ours where it is not feasible to take an adequate number of core needle biopsies in each patient with a breast lump due to time and cost limitations. Moreover, it is easier to perform in experienced hands and more cost-effective as compared to core needle biopsies. Despite it being a rapid test, turnaround time can be further reduced using rapid on-site evaluation. In addition, FNAC is also a more suitable procedure for breast lesions close to the chest wall/vessels or in patients on anticoagulants.^[9] In our center, we preferably use FNA for evaluation of breast lumps except in cases of atypical or suspicious categories where it is followed up by a core needle biopsy for confirmation.

The use of a standardized reporting system will aid in the reproducibility of reports between different institutions and better patient care through improved communication between clinicians and pathologists.^[7]

Our study included the FNAC material of 212 breast cases in which the cytomorphological features were studied in detail. The age of the patients ranged from 15 to 81 years with the majority in the 21-40 yr age group. Out of 212 cases, majority of the masses were located in the right breast in the upper outer quadrant and least in the subareolar quadrant. Out of 212 cases, in 203 cases the aspirates were adequate and 9 were inadequate for interpretation. All the FNAB procedures were performed in our institution by experienced pathologist. The analyzed cases were obtained between 1st November 2021 and 31st October 2022, with a total no of 212 samples.

Distribution according to the IAC Yokohama reporting system as C1 -insufficient material (9), C2 Benign (138), C3 atypical (8), C4 suspicious for malignancy (18), C5 malignant (39).

Table 5: Distribution of breast lesions according to IAC Yokohama System in various published studies

| | C1 Insufficient | C2 Benign | C3 Atypical | C4 Suspicious of Malignancy | C5 Malignant |
|--|-----------------|-----------|-------------|-----------------------------|--------------|
| De Rosa <i>et al.</i> ^[11] (n=4624) | 19.2% | 36.9% | 10.8% | 4.7% | 28.4% |
| Mc Hugh <i>et al.</i> ^[12] (n=695) | 9% | 47% | 7% | 11% | 26% |
| Wong <i>et al.</i> ^[5] (n=2696) | 11.2% | 72% | 4.3% | 2.2% | 10.3% |
| Montezuma <i>et al.</i> ^[6] (n=3625) | 5.77% | 73.38% | 13.74% | 1.57% | 5.54% |
| Agarwal <i>et al.</i> ^[9] (n=1205) | 19% | 50.2% | 6.6% | 3.8% | 20.4% |
| Kamatar <i>et al.</i> ^[10] | 5% | 71% | 1% | 2% | 21% |

| | | | | | |
|---|------|-------|-------|------|-------|
| (n=470) | | | | | |
| Apuroopa <i>et al.</i> ^[13] (n=900) | 4.3% | 58% | 17.7% | 7.2% | 12.8% |
| Ahuja S <i>et al.</i> (n=554) | 3.6% | 69.5% | 6.3% | 2.3% | 18.2% |
| Present study (n= 212) | 4.2% | 65% | 3.7% | 8.5% | 18.4% |

The respective ROM for each category was 0% for category 1 (insufficient material), 2.5% for category 2 (benign), 16.6% for category 3 (atypical), 77.7% for category 4 (suspicious for malignancy), and 100% for category 5 (malignant).

Table 6 Risk of malignancy was analysed and compared with the previous studies

| Categories | Montezuma D <i>et al.</i> , ^[2] | Kamatar P V <i>et al.</i> , ^[6] | Aithimia R <i>et al.</i> | Ahuja S <i>et al.</i> | Present Study |
|-------------------------------|--|--|--------------------------|-----------------------|---------------|
| C1- Insufficient | 4.8% | 0% | 0% | 5% | 0% |
| C2 - Benign | 1.4% | 4% | 2.27% | 1.5% | 2.5% |
| C3 - Atypical | 13% | 66% | 50% | 17.4% | 16.6% |
| C4 - Suspicious of malignancy | 97.1% | 83% | 50% | 81.8% | 77.7% |
| C5 - Malignant | 100% | 99% | 100% | 100% | 100% |

CONCLUSION

Uniform reporting system for standardization and diagnosis of breast lesions is useful as it is directly related to the risk of malignancy in each category. The IAC Yokohama Reporting System for breast cytology provides a uniform reporting platform with better reproducibility of reports. The Risk of malignancy of different categories are similar to the suggested in the original publication of the Yokohama system. We recommend the usage of FNA for the evaluation of breast lumps and further categorization based on the Yokohama system. The core needle biopsy can be limited only in cases where the cytological diagnosis is atypical or suspicious.

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