Original Research Article

IAC Yokohama Reporting of Breast Cytology to Assess Risk of Malignancy and Predictive Values

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Abstract

Background: 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 main objectives were to categorize the Breast FNAC samples according to new system of reporting and to assess the Risk of malignancy (ROM), sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and diagnostic accuracy for all categories. *Material and Methods:* A total of 174 cases were prospectively studied over a period of one year from 1st November 2019 to 31st October 2020 in GMC, Jammu. All the FNAC received was reported routinely according to the newly proposed Yokohama system of reporting breast cytology. The ROM, sensitivity, specificity, Positive Predictive Value (PPV), Negative Predictive Value (NPV) and accuracy of Breast FNAC were calculated. *Results:* ROM is 0% for category 1, 2.27% for category 2, 50% for category 3, 50% for category 4 and 100% for category 5. Sensitivity, specificity, and diagnostic accuracy were, respectively, 100%, 100% and 99.11% for category A (only C5 category cases considered positive test results), 88.2%, 93.6%, and 93.6% for category B, (both C4 and C5 categories considered positive test results), and 94.1%, 91.48%, and 92.1% for category C (C3, C4, and C5 category cases grouped as positive test results). PPV and NPV were also calculated. *Conclusion:* Categorization of the Breast FNAB 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.

BACKGROUND

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. The Fine Needle Aspiration Biopsy cytology report is employed in conjunction with the clinical and imaging

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finding during a triple test approach, which yields very high positive predictive value (PPV) and negative predictive value (NPV) and provides basis for management decision.

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].

MATERIAL AND METHODS
Study design: Observational study

Place of study: Government Medical College, Jammu (Tertiary care hospital in Northern India).

Source of data and cases: Patient with breast lump and reporting to department of pathology and undergoing Fine Needle Aspiration Cytology for the evaluation of the lesion.

Duration of study: 1 year (1st November 2019 to 31st October 2020).

Inclusion Criteria
- All patients irrespective of age and sex with breast lump reporting to Department of Pathology, Government Medical College, Jammu.

Exclusion Criteria
- Patients presenting with nipple discharge but without breast lump.
- Lactating breast.
- Non cooperative patients.

METHODOLOGY
The present study is a hospital based study on the routine materials from the department of Pathology, Government Medical College, Jammu. A total of 173 Subjects were prospectively studied over a period of one year from 1st November 2019 to 31st October 2020. Ethical clearance was taken from the institutional ethical committee vide No.IEC/GMC/2020/326. All the

Fine Needle Aspiration Cytology received was reported routinely, followed by the Chief reviewer to 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. The Risk of Malignancy (ROM) for each category using the formula, number of confirmed malignant cases to the total number of cases in the diagnostic category was calculated.

In each case, 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 and Pap 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.

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 173 cases were analyzed and categorized into 5 categories from C1 to C5. There were 17 cases in C1 category, 117 cases in C2 category, 6 cases in C3 category, 12 cases in C4 category and 21 cases in C5 category.64 cases had a cytohistological correlation available.
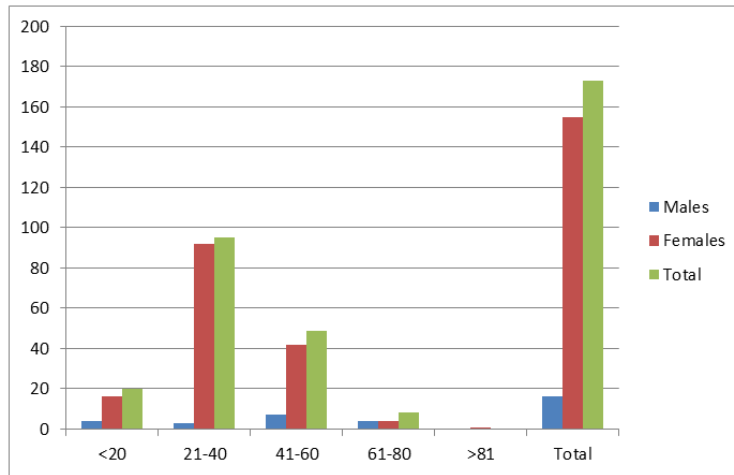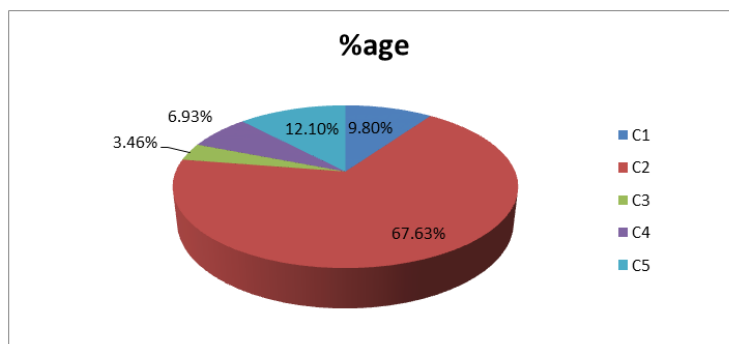
Figure 1: Age and Sex wise distribution of cases

Figure 2: Cytology result categorization

Table 1:

Total no. of cases (FNAC)		Matched HPE cases		
Yokohama Category	No. of cases	No. of cases	Benign	Malignant
C1	17	-	-	-
C2	117	44	43	1
C3	6	2	1	1
C4	12	6	3	3
C5	21	12	0	12

Table 2: Risk of malignancy (ROM) for each category

Yokohama Category	Percentage
C1	0%
C2	2.27%
C3	50%
C4	50%
C5	100%

Risk of malignancy (ROM) =
$$\frac{No.\,of\,confirmed\,malignant\,cases}{Total\,no.\,of\,cases\,in\,that\,category}$$

With this confirmation an overall sensitivity, predictive value of a positive result and percentage of false negative indices were calculated.

Sensitivity, specificity, PPV, NPV and diagnostic Accuracy using following formulas

$$Sensitivity = \frac{True\,positive}{True\,positive + False\,negative}$$

$$Specificity = \frac{True\,negative}{True\,negative + False\,positive}$$

$$PPV = \frac{True\ positive}{True\ positive + False\ positive}$$

$$NPV = \frac{True\ negative}{True\ negative + False\ negative}$$

Accuracy

$$= \frac{True\ positive + True\ negative}{True\ negative + False\ positive + True\ positive + False\ negative}$$

Table 3: Results of FNAC breast cytology using Yokohama reporting system

Category	Sensitivity	Specificity	PPV	NPV	Accuracy
A	100%	100%	100%	100%	100%
B	88.2%	93.6%	83.35%	95.6%	93.6%
C	94.1%	91.48%	80%	97.7%	92.1%

Results were calculated in 3 categories:
Category A: included C5 lesions as positive
Category B: included C4 and C5 as positive
Category C: included C3, C4 and C5 as positive

Maximum sensitivity and specificity was obtained in category A while minimum sensitivity was obtained in category B and minimum specificity was obtained in category C.Cytohistological disconcordance seen in 4 out of 64 cases. Cytohistological concordance was calculated to 93.7% .

DISCUSSION

Our study included the FNAC material of 173 breast cases in which the cytomorphological features were studied in detail. The age of the patients ranged from 14 to 83 years with the majority in the 21-40 yr age group. Out of 173 cases, majority of the masses were located in the right breast in the upper outer quadrant and least in the subareolar quadrant.

Out of 173 cases, in 156 cases the aspirates were adequate and 17 were inadequate for interpretation. All the FNAB procedures were performed in our institution by experienced pathologist. The analyzed cases were obtained between 1st November 2020 and 31st October 2021, with a total no of 173 samples. A total of 173 cases were distributed according to the IAC Yokohama reporting system as insufficient material (n = 17), benign (n = 117), atypical (n = 6), suspicious for malignancy (n =12), malignant (n = 21).

FNAC results were divided into 5 categories-C1 through to C5 based on yokohama reporting criteria. The respective ROM for each category was 0% for category 1 (insufficient material), 2.27% for category 2 (benign), 50% for category 3 (atypical), 50% for category 4 (suspicious for malignancy), and 100% for category 5 (malignant) Sensitivity, specificity, and diagnostic accuracy were, respectively, 100,100% and 99.11% for category A (only malignant cases considered positive test results), 88.2%,93.6%, and 93.6% for category B, (both suspicious and malignant categories considered positive test results), and 94.1, 91.48, and 92.1% for category C (atypical, suspicious, and malignant cases grouped as positive test results). PPV and NPV were also calculated.

Table 4: Risk of malignancy was analysed and compared with the previous studies

Categories	Montezuma D *et al*., [2]	Kamatar P V *et al*., [6]	Present study
Insufficient	4.8%	0%	0%
Benign	1.4%	4%	2.27%
Atypical	13%	66%	50%
Suspicious of malignancy	97.1%	83%	50%
Malignant	100%	99%	100%

We conclude that a uniform reporting system for classification and diagnosis of breast lesions is useful as it is directly related to the risk of malignancy in each category. Main limitation of our study is its small sample size, lack of repeat aspiration in C1 category lesions and excision of lesion in case of C3 and C4 category patients mainly because of ongoing COVID-19 pandemic. So, most of patients with advanced disease went for excision. Another limitation is that as our centre is a tertiary care hospital, most of the patients in this area are from rural population who presented with advanced disease stage. Thus, the limitation in the present study was lack of health education, causing loss of follow up of patients with small lesions of benign breast lumps.

BIBLIOGRAPHY

1. Gupta, S. (2016). Breast cancer: Indian experience, data, and evidence. *South Asian journal of cancer*, *5*(03), 85-86.
2. Montezuma, D., Malheiros, D., & Schmitt, F. C. (2019). Breast fine needle aspiration biopsy cytology using the newly proposed IAC Yokohama system for reporting breast cytopathology: the experience of a single institution. *Acta Cytologica*, *63*(4), 274-279.
3. Field, A. S., Vielh, P., & Schmitt, F. (2017). IAC

Standardized Reporting of Breast FNA Biopsy Cytology. *Acta Cytol*, 61, 3-6.

4. Field, A. S., Raymond, W., & Schmitt, F. (2019). The IAC Yokohama System for Reporting Breast FNAB Cytology. *Acta Cytol*.

5. Wong, S., Rickard, M., Earls, P., Arnold, L., Bako, B., & Field, A. S. (2019). The International Academy of Cytology Yokohama System for reporting breast fine needle aspiration biopsy cytology: a single institutional retrospective study of the application of the system categories and the impact of rapid onsite evaluation. *Acta Cytol*, 20, 1-12. DOI: 10.1159/000500191

6. Kamatar, P. V., Athanikar, V. S., & Dinesh, U. S. (2019). Breast fine needle aspiration biopsy cytology reporting using international academy of cytology yokohama system-two year retrospective study in tertiary care centre in Southern India. *National journal of laboratory medicine*, *8*(3), 1-3.