



Original Article



Cytomorphological Spectrum of Breast Fine Needle Aspiration Cytology Using International Academy Cytology Yokohama System- A Retrospective Study in the Tertiary Care Center of Sahiwal

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ABSTRACT

Breast carcinoma is also a very widespread and upsetting cancer that pertains to women, and the incidence of the same is also high in developing countries. Breast cancer is one of the most common malignancies women are exposed to, and its occurrence is particularly high in third-world countries. Fine needle aspiration cytology (FNAC) is a good diagnostic tool when it comes to the detection of early breast lesions. **Objectives:** To evaluate the role of FNAC in the screening and assessment of breast lumps to identify breast cancer in the resource-poor Sahiwal Division. **Methods:** This retrospective cross-sectional study included 392 females presenting with palpable breast lumps. After obtaining informed consent, FNAC was performed, and the aspirated material was used to prepare and stain slides for cytological examination. The data were collected from clinical records and then analyzed. **Results:** Out of 392 female patients, the majority of breast lesions (40.05%) were found in C5; malignant category followed by 26.78% in C2 (benign), 21.93% of lesions in C3 (atypical), and 10.52% in C4 (suspicious for malignancy) categories. Most of the patients (39.84%) were aged 41 and above, and 143 patients (36.48%) were seen in category 5 whereas the duration of lesion according to history of disease for the majority of cases (36.48%) can be seen from 7 to 12 months in reporting category 5 (40.86%). **Conclusions:** The fine needle aspiration cytology (FNAC) is associated with fast, trustworthy, and economical means of initial classification of palpable breast growths on the basis of the standardized IAC system.

INTRODUCTION

Breast cancer is one of the most distressing and prevalent cancers among females after cervical cancer [1]. It accounts for approximately 18.4% of all cancers worldwide. The incidence is even more in developing countries. While in developed countries, due to early diagnosis and accessible diagnostic measures, it's under control. Being one of the major causes of mortality in women, it is very

significant to differentiate between benign and malignant lesions of the breast and several other reactive conditions mimicking malignant ones [2]. Pakistan ranks as the fifth Asian country where the number of females affected by breast carcinoma is increasing with every passing year. Pakistan currently has the highest death rate, which is 25.2/100,000 alone due to breast cancer alone, and one in



every 9 women has the risk in their lifetime of getting diagnosed with breast carcinoma [3]. Many patients present with an advanced stage of disease owing to several factors, such as social circumstances and low socio-economic status. Breast cancer is now considered a global burden posing as a major public health concern. It is also one of the leading causes of mortality and morbidity in women in African countries, where the incidence rate of 2.7 cases was seen in every 100,000 females [4]. Triple assessment is used worldwide for investigating a breast mass, which includes physical examination, radiological investigations such as ultrasound and mammography, and Fine needle aspiration cytology, which is a very valuable pre-operative assessment technique. It has two main objectives; firstly, to confirm of radiological and clinically benign lesions, which then avoid unnecessary surgical interventions. Thus, the diagnostic accuracy of diagnosing breast lesions is greatly increased by the combination of palpation (clinical examination), mammography, and cytology [5, 6]. In developing countries like Pakistan with limited resources, FNAC is considered to be a rapid, reliable, and cost-effective method of diagnosing breast carcinomas in palpable lumps. In India, similarly, which is also a developing country, the diagnostic accuracy of FNAC was found to be very high (97%) with 98% specificity and 94.5% sensitivity [7]. Due to an increase in demand for FNACs and increasing experience of our surgeons, the incidence and prevalence of breast carcinoma seem to be increasing. But still, there is seen to be paucity in data available, like disease (breast lesions), risk factors causing progression to carcinomas, epidemiology, and distribution of disease patterns [4].

Despite breast cancer being a major public health concern with high morbidity and mortality in Pakistan, there is limited locally available data on the diagnostic categorization of palpable breast lesions using standardized systems such as the IAC Yokohama classification. This study aims to determine the crucial role of FNAC in categorizing and screening palpable breast lumps in female patients according to the standardized IAC Yokohama system, as presented at Sahiwal Teaching Hospital in the Sahiwal division. As there are very limited resources for early diagnosis of palpable breast lesions, it is imperative to develop a technique that is cost-effective and requires little expertise.

METHODS

The study was a descriptive, retrospective, cross-sectional study that was done at Sahiwal Teaching Hospital, Sahiwal. The Institutional Review Board approved the study (No. 110/IRB/SLMC/SWL). Information was collected by retrieving the medical records of female patients who had presented to the hospital with palpable

lumps in the breast between 1 January 2020 and 31 December 2023. The projected sample size of 344 was calculated using the OpenEPI online calculator with a margin of error of 5 and is believed to have a 95 percent confidence level [2]. In total, 392 female patients with palpable breast lesions were enrolled, including those of any age presenting with breast lumps at Sahiwal Teaching Hospital, Sahiwal, Pakistan. Patients in whom an adequate aspirate was obtained. Patients with breast imaging done with reported mass lesions. Exclusion criteria included male patients with breast swellings, Female patients having bleeding disorders, and Female patients having recurrent malignant tumors or who were already undergoing chemo-radiotherapy. After having taken written informed consent, the breast lump was cleaned using aseptic techniques. After palpation and examination of the lump, an aspirate was taken by using 23 and 25-Gauge needles 1.0 to 1.5 inches long, creating negative pressure. Each patient had approx. 6 -10 slides. All aspirated material was placed on slides, spread at the frosted end using a glass spreader to prepare smears, and processed for staining. Giemsa staining of air-dried slides was done to examine cytological characteristics, and three or more slides were fixed using 95 percent alcohol and stained with hematoxylin and eosin (H&E) to estimate the nuclear morphology. A histopathologist/cytopathologist viewed the stained specimens under 20xs and 40x objectives, and results were classified based on the International Academy of Cytology Yokohama System for Reporting Breast FNAC, which included inadequate (C1), benign (C2), atypical (C3), suspicious of malignancy (C4), and malignant (C5) [8]. Patient data, including demographic details, clinical history (age, pain, mobility, duration, and site of lesion), examination findings, and cytological diagnosis, were extracted from archived records using a pretested data collection form. Data analysis through the use of SPSS version 20.0 was conducted. The quantitative variables (age, lesion duration) were presented in the form of mean and standard deviation, and the frequency and percentages were used to describe the qualitative variables (IAC categories). Results obtained with the Shapiro-Wilk test showed that age and duration of lesion were non-normally distributed ($p < 0.05$), and so, wherever possible, non-parametric tests were used (Kruskal-Wallis test). Categorical variables age group, lesion duration, and IAC categories were tested using the Chi-square test with $p < 0.05$ as the level of significance.

RESULTS

Out of 392 female patients presenting with palpable breast lumps, the majority of breast lesions (40.05%) were found in C5; malignant category followed by 26.78% in C2 (benign), 21.93% of lesions in C3 (atypical), and 10.52% in C4

(suspicious for malignancy) categories, Figure 1.

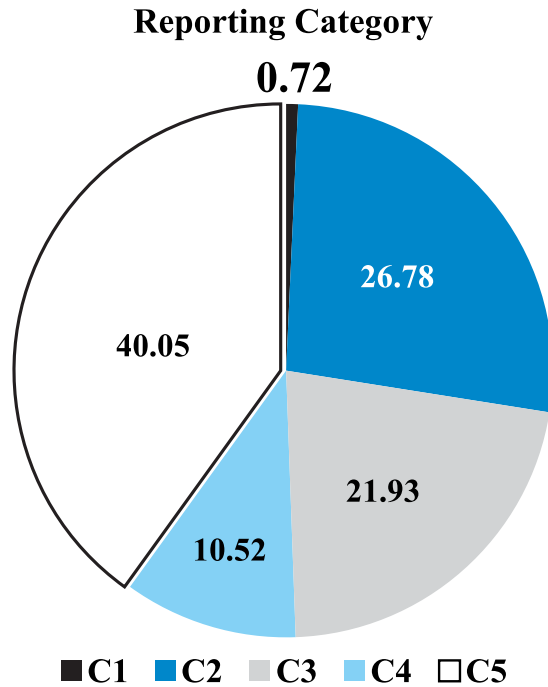


Figure 1: Distribution of Reporting Categories of Breast Lesions according to the IAC Yokohama system (n=392)

C1; insufficient material (Giemsa Stain, 10X) is shown, figure 2.

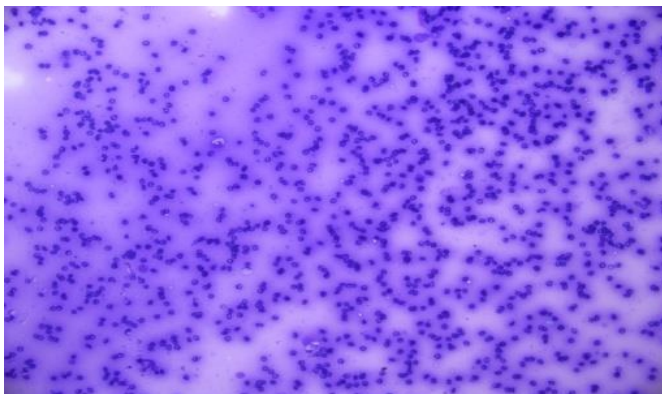


Figure 2: C1; Insufficient Material (Giemsa Stain, 10X)

C2; Benign (Giemsa stain, 20x) is shown, figure 3.

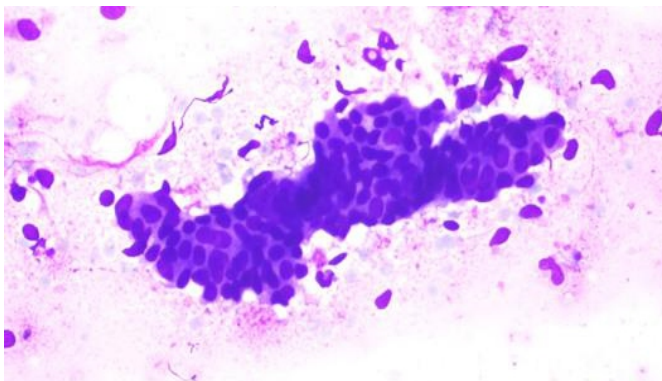


Figure 3: C2; Benign (Giemsa stain, 20x)

C3; Atypical (Giemsa stain, 20x) is shown, figure 4.

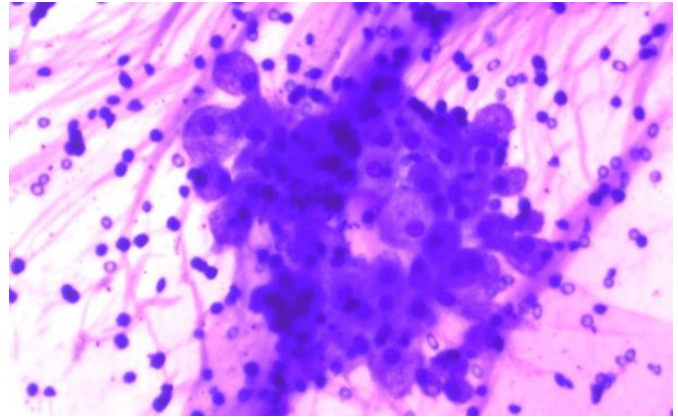


Figure 4: C3; Atypical (Giemsa stain, 20x)

C4; Suspicious of malignancy (Giemsa stain, 20x) is shown, figure 5.

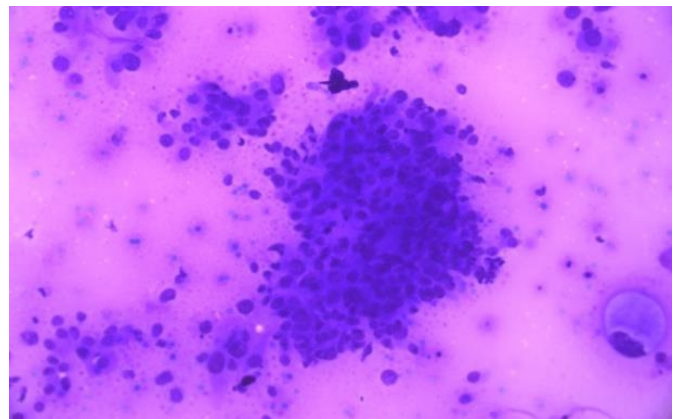


Figure 5: C4; Suspicious of Malignancy (Giemsa stain, 20x)

C5; Malignant (Giemsa stain, 40x) is shown, figure 6.

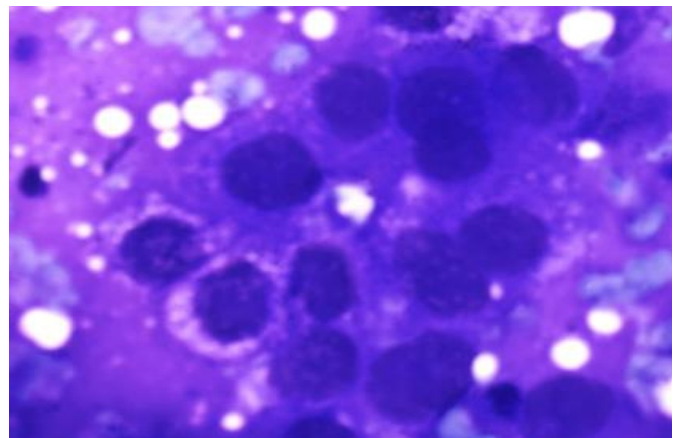


Figure 6: C5; Malignant (Giemsa stain, 40x)

The age group ranged between 15-78 years. Most of the patients (39.84%) were aged 41 and above, and 143 patients (36.48%) were seen in category 5. The reporting categories' correlation with age distribution was analyzed using the Chi-square test and found to be statistically non-significant (p-value=0.712), indicating no strong

association between age group and reporting category, table 1.

Table 1: Age Group of Patients at Presentation of Different Categories of Breast Lumps(n=392)

Reporting Category	Less than 20 Years	21-30 Years	31-40 Years	41-50 Years	51 and Above Years	Total	p-Value
C1	14 (29.17%)	10 (20.83%)	8 (16.67%)	11 (22.91%)	5 (10.42%)	48 (12.24%)	p=> 0.700
C2	12 (17.39%)	18 (26.08%)	11 (15.94%)	21 (30.44%)	7 (10.15%)	69 (17.60%)	
C3	13 (18.57%)	11 (15.71%)	13 (18.58%)	19 (27.14%)	14 (20%)	70 (17.86%)	
C4	12 (19.35%)	15 (24.20%)	10 (16.13%)	16 (25.80%)	9 (14.52%)	62 (15.82%)	
C5	31 (21.68%)	28 (19.58%)	30 (20.98%)	27 (18.88%)	27 (18.88%)	143 (36.48%)	
Total	82 (20.92%)	82 (20.92%)	72 (18.37%)	94 (23.98%)	62 (15.82%)	392	

The duration of the lesion, according to the history of disease for the majority of cases (42), can be seen from 7 to 12 months in the reporting category 5. The post-stratification correlation between the categories of reporting and duration of the lesions was statistically significant (p-value<0.001). Upper outer quadrant (58.3%), upper inner quadrant (33.4%), and central part of the breast (8.3%) were found to accommodate the highest number of patients with breast carcinomas with a lump (Table 2).

Table 2: Frequency of Duration of Lesion Groups with Reporting category(n=392)

Reporting Category	Less than a Month	1-3 Months	4-6 Months	7-12 Months	More than 1 Year	Total	p-Value
C1	4 (4.40)	7 (5.10)	2 (3.05)	8 (8.39)	2 (2.05)	23 (5.87%)	p= <0.001
C2	12 (17.22)	34 (19.97)	20 (11.94)	14 (32.83)	10 (8.04)	90 (22.96%)	
C3	18 (20.47)	20 (23.75)	6 (14.19)	51 (39.03)	12 (9.55)	107 (27.30%)	
C4	13 (11.48)	5 (13.32)	10 (7.96)	28 (21.89)	4 (5.36)	60 (15.30%)	
C5	28 (21.43)	21 (24.86)	14 (14.86)	42 (40.86)	7 (10.00)	112 (28.57%)	
Total	75 (19.13%)	87 (22.19%)	52 (13.27%)	143 (36.48%)	35 (8.93%)	392	

DISCUSSION

Nowadays, one of the leading causes of mortality in females is breast carcinoma all around the world, especially in a developing country, Pakistan. It is increasing at an alarming rate due to late diagnosis and scarce resources. Therefore, early detection is very important, and FNAC is found to be more reliable, cheaper, and quicker in diagnosing palpable breast lesions. In order to plan proper protocol for treatment and management, FNAC plays an important part in distinguishing benign and malignant breast tumors [9]. At present, it is also insisted upon to go for core needle biopsies directly to reach a definitive diagnosis and get receptor studies done. These

include Estrogen and progesterone receptors and HER2 neu, which are done as part of prognostic studies and disease management. But in countries like Pakistan, where the resources are already limited, FNAC and cell preparation combined from the material aspirated can also help in proceeding to definitive management, increasing its diagnostic accuracy and having receptor studies done as well without even requesting tissue biopsies [10]. In our current study, the prevalence of benign and malignant breast lumps was seen by using cytological categories of IAC Yokohama System in addition to post-stratification correlation of reporting categories with age groups as well as durations of lesions, the studies of which are not much available. According to our study of 392 patients, the cytological examination of palpable breast lumps showed 26.78% of patients in the C2 (Benign) and 40.05% in C5 (Malignant) categories which is opposed to the studies done by Sarfraz *et al.* and Rehan *et al.* with 50% and 64.5% of patients in C2 and 30% in C5 categories in both studies respectively [11, 2]. The youngest age group in our study presented with palpable breast lumps was less than 20 11 15 years, which is found to be by the study done by Roheen *et al.* in Medinah Teaching Hospital of Faisalabad [12] and Panwar *et al.* a study conducted in Central India [13]. respectively. Similarly, the age distribution ranged between less than 20 to greater than 50, which also may be seen according to the study done by Rehan *et al.* which was 14-85 years and 14-86 years in another study of Bangladesh done by Rahman *et al.* [2,14]. In another done by Chandawale *et al.* the benign breast lesions were present in a younger demographic age group, and malignant lesions occurred in middle to elderly patients; these findings are similar to the data in our present study [15]. As compared to a study conducted by Shrestha *et al.* and Tripath *et al.* the majority of cases occurred within the age bracket of 31-40 years and 41-50 years [16, 17]. Correlation of reporting of cytological categories compared with duration of lesions is found in a very low number of studies. Based on our findings, most of the breast lesions in C2 (34) were found within 1-3 months and that in C5 (malignant) category took place in 7- 12 months duration but this is not reflected by the study conducted by Umat *et al* where most of the palpable breast lesions in C2 (32 patients) occurred in less than 1 month and that in C5 [13] took less than a year [18]. Breast cancer has emerged as a major health issue, as the rate of its occurrence around the world has shocked people. Hence, early detection has to be the main priority, especially among young women, who are increasingly likely to survive [19]. FNAC has never been perfect in terms of making the right diagnosis of breast disease, as was relatively invasive. The clinical assessment done carefully should make it complement the histopathological

diagnosis in different settings [20].

This study was limited by its single-center design and lack of histopathological correlation for all cytological cases, which may affect diagnostic validation of FNAC categories. Additionally, incomplete availability of clinical follow-up and receptor status data restricted assessment of long-term outcomes and prognostic accuracy. Future studies should include multi-center designs with routine histopathological confirmation and integration of receptor studies to improve diagnostic accuracy and prognostic utility of FNAC in breast lesions.

CONCLUSIONS

Fine-needle aspiration cytology provides an efficient, cost-effective, and accurate means of initially categorizing palpable breast lesions following the standardized IAC classification system. This approach not only enables timely management of treatment but also plays a crucial role in screening programs at breast clinics. This study highlighted that the majority of palpable breast lumps in female patients were malignant (C5), with a significant correlation between lesion duration and reporting category.

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Authors' Contribution

Conceptualization: RAL, MUS

Methodology: QUAT

Formal analysis: SS, FBS

Writing and Drafting: SS, FBS, OW, MUS

Review and Editing: RAL, QUAT, SS, FBS, OW, MUS

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

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