

Correlation between the Cytological and Histopathological Analysis of Breast Lesion

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Abstract: ***Introduction:** Breast lesions can be benign or life - threatening. Accurate and timely diagnosis of these lesions is crucial for clinical management and patient outcomes. Cytological and histopathological analysis helps detect breast cancer early and reduce unnecessary surgery. Henceforth, we aimed to find the correlation between the cytological and histopathological analysis of breast lesions. **Methodology:** In this cross - sectional descriptive study, 85 women with palpable breast lumps were included. Demographic characteristics were documented, and both FNAC and histopathological tests were performed. All data were meticulously recorded and subjected to rigorous statistical analysis. **Results:** Among the 85 patients, the majority (52.94%) were aged 15 - 30 years. Cytological examination diagnosed 55 patients as benign, with histopathological examination confirming 58 cases as benign. Fibroadenomas were the most prevalent diagnosis in both tests. In the 15 - 30 age group, benign conditions were most common (74.55%), while the 31 - 45 age group showed a relatively higher malignancy rate (33.33%). Out of 58 cases diagnosed as benign on histopathology, 3 were found to be malignant on cytology, while 55 were truly benign. All 24 cases diagnosed as malignant on histopathology were also confirmed as malignant cytologically. FNAC showed a sensitivity of 100.00% and specificity of 88.89%, with a diagnostic accuracy of 96.34%. **Conclusion:** According to this study, FNAC is a valuable initial diagnostic tool for breast lesions, offering ease, lower discomfort, and cost - effectiveness compared to conventional skin biopsies.*

Keywords: Breast lesions, Fine Needle Aspiration Cytology, Histopathology, Grade

1. Introduction

The evaluation of prognostic parameters for breast cancer is gaining increasing attention. These include the status of the axillary lymph nodes, the oestrogen receptor status, the histological grade, and the cell proliferation index. [1] As neoadjuvant chemotherapy gains popularity as the primary medical treatment modality for breast cancer, a great deal of focus is being placed on the grading of breast cancer on fine - needle aspiration cytology (FNAC) smears. [2] Such grading would permit evaluation of the tumour in situ, guiding the selection of the most appropriate treatment before primary surgery and thereby preventing the morbidity associated with the overtreatment of low - grade tumours. [3] Breast lesions represent a significant health concern, with a wide spectrum of benign and malignant conditions. [4] Accurate and timely diagnosis is crucial for determining appropriate treatment strategies and optimizing patient outcomes. The correlation between cytological and histopathological analysis of breast lesions holds paramount importance, as it can provide valuable insights into the diagnostic accuracy and reliability of non - invasive techniques like fine - needle aspiration cytology (FNAC). [5] Understanding the concordance and discrepancies between these diagnostic methods can guide clinicians in making informed decisions about patient management, including the need for further investigations or surgical interventions. Moreover, exploring the strengths and limitations of cytological analysis in detecting breast lesions can potentially enhance its clinical utility and foster more efficient and cost - effective diagnostic pathways. Thus, this study seeks to bridge the gap in knowledge by investigating

the correlation between cytological and histopathological findings in breast lesions, providing evidence - based guidance for clinical practice and contributing to improved patient care.

2. Material and Methods

This cross - sectional descriptive study was conducted at the Department of Pathology, Integral Institute of Medical Sciences and Research, Lucknow, Uttar Pradesh, over 2.5 years from January 2020 to May 2022. The study included 85 women who presented with palpable breast lumps in the outpatient department (OPD). Patients with inconclusive cytology and those who did not undergo subsequent histopathological investigation after FNAC were excluded from the study. FNAC was performed using 10 ml plastic disposable syringes and 23-24 - gauge disposable needles. Smears were stained with Field's stain and Giemsa stain. Cases with sufficient material underwent histopathological correlation with tru - cut biopsies, lumpectomies, and mastectomies. All data were systematically recorded and subjected to statistical analysis. Categorical variables were presented as frequencies, and diagnostic accuracy, sensitivity and specificity were evaluated using a 2x2 contingency table.

3. Results

The majority of the patients belonged to the age group 15 - 30 years [45 (52.94%)] followed by 31 - 45 years [22 (25.88%)] and 46 - 60 years [13 (15.29%)]. On cytological diagnosis, 55 patients were diagnosed as Benign, of which

49 had Fibroadenoma and 6 had Fibrocystic disease. And 27 were diagnosed as Malignant, and the rest 3 had Inflammatory. Among 85 patients, 58 cases (55.29%) were identified as benign, with the most prevalent diagnosis being fibroadenoma (47 cases, 55.29%). In contrast, 24 cases (28.24%) were identified as malignant. The most common malignant diagnosis was classic (NOS) invasive ductal carcinoma, comprising 17 cases (23.53%) of all samples. Lastly, 3 cases (3.53%) were categorized as inflammatory, all diagnosed as chronic lymphocytic mastitis. [Table - 1] In the 15 - 30 age group, benign conditions were most prevalent (74.55%), while malignancy was relatively higher in the 31 - 45 age group (33.33%), and inflammatory cases were notable in the same age group (66.67%). The 46 - 60 age group had a significant proportion of malignancy (48.15%) followed by (33.33%), with no benign cases reported. [Figure - 1] Out of 58 cases diagnosed as benign on histopathological examination, 3 were found to be malignant cytologically and 55 benign. Out of 24 cases diagnosed malignant on histopathology, all cases were found to be malignant cytologically. The sensitivity and specificity of FNAC were found to be 100.00% & 88.89%, respectively. The PPV and NPV were 94.83% and 100.00%. The diagnostic accuracy of FNAC was 96.34% in predicting the correct diagnosis. [Table - 2]

4. Discussion

In the present study, the age range was 15 - 75 years, with a mean age of 30.65 years. In the study by Pandey V et al. [6] and others [7, 8], the age range was 15 - 75, 16 - 80 and 15 - 67 years, respectively. Similarly, Pandey V et al. [6] noted the mean age as 30.8 years. Further, Mufti and Sawan [7] and Koirala S [8] noted the mean age as 37.26 and 36.2 years in their studies. The majority of the women were aged between 15 - 30 (52.94%), followed by 31 - 45 (25.88%), 46 - 60 (15.29%) and 61 - 75 (7.06%). Similar results were reported by Pandey V et al. [6], where most cases belonged to the age group 15 - 30 years. This study highlights the prevalence of benign breast lesions, indicating increased patient awareness. Reassurance is the primary treatment, complemented by mandatory close follow - up for effective management. In our study, 85 women underwent cytological examination, and we noted that 55 had benign breast lesions (64, 71%), 27 had malignant lesions (31.76%), and 3 had inflammatory (3.53%). Likewise, Pandey V et al. [6] also reported that the majority of their cases were diagnosed with benign lesions (70.5%), followed by malignant lesions (27.9%) on cytological examination. Consecutively, Mufti and Sawan [7] observed that benign lesions were most prominent (45.83%), followed by malignant (30.76%). In the study by Tiwari M [9], benign cases outnumbered malignant ones. Additionally, Koirala S [8] showed that 66.7% of cases were benign, and 15.6% were malignant. Our study, like others, confirms the higher incidence of benign breast lesions. However, what sets our research apart is that we observed the highest percentage of benign lesions compared to other studies. On the other hand, the proportion of malignant lesions in our study closely aligns with the findings of similar research conducted previously. On FNAC, out of 85 cases, we observed that fibroadenoma was the most common benign lesion (57.65%), followed by Fibrocystic disease (7.06%). Mastitis (3.53%) was the only

inflammatory lesion in our study. Similar to the present study, another study reported that 70.5% of the benign cases were diagnosed as fibroadenoma and Fibrocystic disease. [6] On the contrary, Mufti and Sawan [7], the most common benign lesion on FNAC was benign proliferative (22.11%). In a study by Tiwari M [9], the most common cause of breast lump was fibroadenoma, accounting for 36 (39.5%) of the total cases. Others also reported the same. [10 - 12] On histopathological examination, out of 85, 58 cases (55.29%) were identified as benign, with the most prevalent diagnosis being fibroadenoma (55.29%). In contrast, there were 24 cases (28.24%) identified as malignant. The most common malignant diagnosis was classic (NOS) invasive ductal carcinoma (23.53%). Lastly, there were only 3 cases (3.53%) of chronic lymphocytic mastitis inflammatory lesions. Similarly, Pandey V et al. [6] showed that 41 (67.3%) cases were benign and 19 (31.1%) cases were malignant, and 1 case (1.6%) was inflammatory in their study. On the contrary, Mufti and Sawan [7] reported that most cases were malignant, followed by benign and inflammatory. In the Koirala S [8] study, 66.7% of cases were benign, and 33.3% were malignant. In the present study, benign lesions were more prominent in the age group of 15 - 30 years (74.55%), followed by 31 - 45 (25.45%). Malignant lesions were more prominent in the age group of 46 - 60 years (48.15%), followed by 31 - 45 (33.33%). Inflammatory lesions were common in 31 - 45 years of age group (66.67%), followed by 46 - 60 years (33.33%). Similar were the observations of Pandey V et al. [6]. Additionally, Mufti and Sawan [7] showed that the mean age of cases with benign lesions was 32.8 years and for malignant lesions, it was 42.5 years. Of 58 cases diagnosed as benign on histopathology, 3 were malignant on cytology, and 55 were benign. Out of 24 cases diagnosed malignant on histopathology, all cases were found to be malignant cytologically. The sensitivity and specificity of FNAC were found to be 100.00% & 88.89%, respectively. The PPV and NPV were 94.83% and 100.00%. The diagnostic accuracy of cytological diagnosis was 96.34%. Pandey V et al. [6] showed that benign cases (n=43) on cytological examination, only 2 cases were found to be malignant on histopathological examination and all the malignant cases on cytological examination were confirmed as malignant on histopathological examination. Thus, in most cases (96.7%), the cytological diagnosis was consistent with histopathological diagnosis. The sensitivity and specificity were found to be 100% & 89.5% in our study. Several studies have investigated the efficacy of FNAC (Fine Needle Aspiration Cytology) for diagnosing breast lesions. Makhija and Patil [10] reported a cytology - histology concordance of 94.4%, while our study found positive and negative predictive values of 94% and 94.2%, sensitivity of 90.1%, specificity of 96.5%, and accuracy of 94.1%. Similar results were obtained by Anand V et al. [11] with a sensitivity of 97.67% and specificity of 97.14%. Consecutively, Tiwari M [9] noted a sensitivity and specificity of 83% and 100%, respectively. Further, Koirala S [8] showed a sensitivity and specificity of 100%, consistent with the results reported by Ariga et al. [13] (99% sensitivity, 99% positive predictive value, 99% specificity, and 99% negative predictive value) for FNAC. Khemka et al. [14] reported a positive predictive value of 100% and a negative predictive value of 95.12% for FNAC in

diagnosing breast malignancy. These findings collectively support the reliability and accuracy of FNAC as a diagnostic tool for breast lesions. The present study showed that FNAC is a dependable diagnostic method with high sensitivity and specificity, particularly when conducted and interpreted by experienced cytopathologists. It serves as a valuable preliminary tool for evaluating breast lesions. Nonetheless, our study also revealed three cases with false negative results, where cytology diagnosed the lesions as benign, but they were ultimately confirmed as malignant on histopathology. False negative diagnoses in FNAC may arise from technical failures, misinterpretations, or the presence of mixed benign and malignant features.^[15] Cell disruption can be caused by acellular or insufficient cellular material, severely blood - stained smears, partial air drying, and smearing. Through techniques such as ultrasound - guided FNA biopsy, sensitivity can be increased and limitations diminished.^[14, 16] Expanding the use of the 'triple test,' which consists of FNAC, physical examination, and mammography, can mitigate unavoidable limitations further.^[17, 18] According to studies, when all three components of the triple test concur, it has a 100% accuracy rate for diagnosing palpable breast lesions.^[17 - 19] Vetto et al.^[20] proposed the use of a "modified triple test," replacing mammography with ultrasound, which is more accurate and cost - effective in diagnosing palpable breast lesions in younger women. respectively. This is similar to the findings of Ariga et al.¹⁸ who reported 99% sensitivity, 99% positive predictive value, 99% specificity, and 99% negative predictive value for FNAC. In this study, the positive and negative predictive value for FNAC was 100% which is comparable to the study of A. Khemka et al¹ who found that positive predictive value was 100% and the negative predictive value was 95.12%. This study showed a sensitivity and specificity of 100% respectively. This is similar to the findings of Ariga et al.¹⁸ who reported 99% sensitivity, 99% positive predictive value, 99% specificity, and 99% negative predictive value for FNAC. In this study, the positive and negative predictive value for FNAC was 100% which is comparable to the study of A. Khemka et al¹ who found that positive predictive value was 100% and the negative predictive value was 95.¹²

5. Conclusion

In conclusion, FNAC emerges as a practical, cost - effective, and dependable method for assessing breast lesions in our setting. Its routine use as a preliminary tool can aid in making preoperative decisions and guiding further patient management, reducing unnecessary surgical interventions. Although false negative results are unavoidable, incorporating proper FNAC techniques and ultrasound assistance can help minimize their occurrence. We recommend including cytological grade information in all FNAC reports for breast cancer to facilitate informed decisions by surgeons, particularly in determining the appropriate use of neoadjuvant therapy and avoiding overtreatment of low - grade cancers. This integration could improve patient outcomes and enhance the overall management of breast cancer cases.

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As per international or university standards, the authors have collected and preserved written participant consent.

Ethical Approval:

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Tables and Figures

Table 1: Clinico - demographics of patients enrolled in the study (n=85).

Clinico - demographics		Number	Percentage	
Age (Years)	15 - 30	45	52.94%	
	31 - 45	22	25.88%	
	46 - 60	13	15.29%	
	61 - 75	6	7.06%	
Cytological Diagnosis	Benign (n=55)	Fibroadenoma	49	57.65%
		Fibrocystic Disease	6	7.06%
	Inflammatory (n=03)	Malignant (n=27)	27	31.76%
Histopathological Diagnosis	Benign (n=58)	Mastitis	3	3.53%
		Fibroadenoma	47	55.29%
		Fibroadenosis	3	3.53%
		Fibrocystic disease	2	2.35%
		Lactating adenoma	2	2.35%
	Malignant (n=24)	Benign phyllodes tumour	4	4.71%
		Classic (NOS) invasive ductal carcinoma	17	23.53%
		Mucinous carcinoma	2	2.35%
		Medullary carcinoma	1	1.18%
		Metaplastic carcinoma	1	1.18%
Inflammatory (n=03)	Squamous cell carcinoma	3	3.53%	
	Chronic lymphocytic mastitis	3	3.53%	

Table 2: Contingency table of the association of Cytological and Histopathological diagnosis of the enrolled patients

Contingency table		Cytological diagnosis		
		Benign	Malignant	Total
Histopathological Diagnosis	Benign	55	03	58
	Malignant	0	24	24
	Total	55	27	62
Sensitivity		100.00%		
Specificity		93.51% to 100.00%		
PPV		88.89%		
NPV		94.83%		
Accuracy		100.00%		
		96.34%		

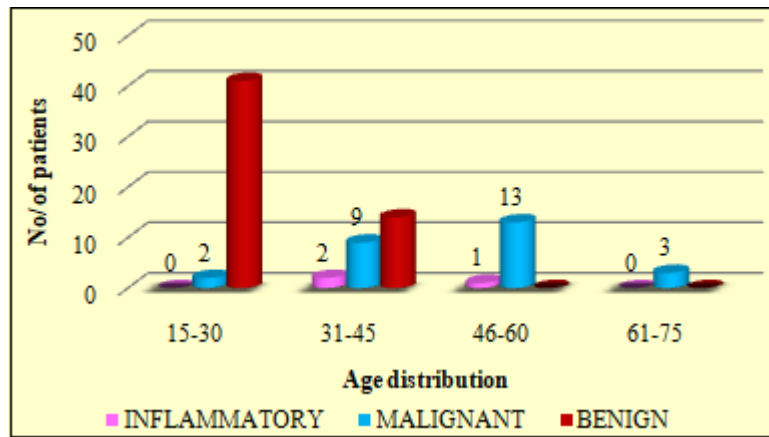


Figure 1: Association of the cytological diagnosis with different age groups.