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CYTOHISTOLOGICAL STUDY OF BREAST LESIONS WITH SONOMAMMOGRAPHIC CORRELATION

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ABSTRACT

Introduction: Breast cancer, an epithelial malignancy with the ability to attack regionally and remotely, is one of the leading causes of malignancy and the second most common cause of death in women worldwide. It usually presents as a lump or as nipple discharge. The breast is a dynamic structure that changes during sexual life, including the periodic changes that occur during menstruation. It's estimated that about 30% of newly diagnosed cancers in women will be breast cancers. The goal of this research is to find out if the results of radiological and cytological exams of breast lesions match the final histological diagnosis. So, this will cut down on the number of unnecessary diagnostic procedures and/or bring attention to the critical need to treat malignant lesions quickly and early. **Method:** Cross sectional retrospective study on 72 females have breast lesions. All cases who undergo breast FNA, ultrasound, mammography and histology were included in this study. Other parameters of this study are age, site, position and quadrant of the lesion. **Results:** Mean age of females are [47.96 ± 11] years, [34.7%] of females in age group 40-49 years and [30.6%] of them in age group 50-59%. [56.9%] of females have left breast mass while [40.3%] have right breast mass. [34.7%] of females the mass at left upper quadrant while [27.8%] of them at right lower quadrant. [50%] of females diagnosed C5 grade on cytology, [31.9%] of females diagnosed IV grade on ultrasound, [40.3%] of females diagnosed IV grade on mammogram**,** most of females have mammary carcinoma, then fibro adenoma, and then fibrocystic changes in histopathological diagnosis, the cytological diagnosed as following:[35] females have mammary carcinoma,[8] females have fibro adenoma, and[8] females have fibrocystic changes. **Conclusion:** In this study, the most common breast lesion is mammary carcinoma. The cytology was 100% specific, sensitive and accurate in detecting breast lesion. In correlation to cytology, ultrasound and mammogram were useful in the detection of breast lesion.

KEYWORDS: Cytohistological study, Breast lesions, Sonomammographic, correlation.

INTRODUCTION

Breast cancer, an epithelial malignancy that may attack locally and distantly, is one of the primary causes of cancer and the second leading cause of death in women globally. It often manifests as a lump or a discharge from the nipple.[1] The breast is a dynamic structure that undergoes periodic alterations during menstruation and throughout sexual life. Approximately 30% of newly diagnosed malignancies in women are believed to be breast cancers.[2] The hormonal variables estrogen-progesterone, menopause, and age at first pregnancy[3-5] contribute to the growth in breast cancer. About sixty to eighty percent of all breast diseases are attributable to benign breast enlargements.[2] Common breast pathologies include benign masses such as fibro adenoma, cyst, fibrocystic disease, abscess, galactocell, ectasia, or swollen lymph nodes, and sometimes malignant tumours.[6] "High-resolution ultrasonography (HRUSG), mammography, fine needle aspiration cytology (FNAC), and core needle biopsy" are just a few of the procedures used to examine breast enlargement; the sensitivity of each approach varies.[7,8] Mammography and ultrasound are the main procedures for breast imaging, however sometimes alternative methods such as breast MRI, CEUS, and breast biopsy are utilized.[5] Diagnostic mammography is very accurate in the initial diagnosis and follow-up of breast masses; its benefits include repeatable, safe, straightforward, and

acceptable; nevertheless, it cannot distinguish between solid and cystic lesions,[9] which is its primary limitation. For the examination of mass lesions, fine needle aspiration cytology is a reasonably easy, reliable, non-traumatic, cost-effective, and complication-free approach. Fine needle aspiration cytology is an approved and well-established approach for determining the type of a breast mass. A clinical evaluation may be carried out to narrow down the possibilities after low-cost and non-invasive diagnostic tools like HRUSG and mammography have ruled out a causal relationship. These practices thrive in areas with little available resources. Similar to other forms of cancer, malignant neoplasms are more common among the elderly. Most of them are usually present in a progressive phase, making late detection more difficult and therefore making treatment more challenging. Mammography is a highly advantageous examination to differentiate breast cancer as well. Few patients with HRUSG have missed the diagnosis.[9] A diagnostic test should provide sufficient accuracy to prevent unnecessary biopsies. The goal of this research is to find out if the results of radiological and cytological exams of breast lesions match the final histological diagnosis. So, this will cut down on the number of unnecessary diagnostic procedures and/or bring attention to the critical need to treat malignant lesions quickly and early.

METHOD

Cross sectional retrospective study on 72 females who have breast lesions was collected in the oncology teaching hospital from January 2022 to July 2022. All cases who undergo breast FNA, ultrasound, mammography and histology were included in this study. Other parameters of this study are age, site, position and quadrant of lesion. Utilizing SPSS 22, frequency and percentage are used for categorical data, while mean, median, and SD are utilised for continuous data. Utilizing Chi-square to evaluate the correlation between variables. P-value below or equal to 0.05 is judged significant.

RESULTS

Mean age of females are [47.96 ± 11] years, [34.7%] of females in age group 40-49 years and [30.6%] of them in age group 50-59%. [56.9%] of females have left breast mass while [40.3%] have right breast mass. [34.7%] of females the mass at left upper quadrant while [27.8%] of them at right lower quadrant. [50%] of females diagnosed C5 grade on cytology, [31.9%] of females diagnosed IV grade on ultrasound, [40.3%] of females diagnosed IV grade on mammogram. As show in table 1.

Table 1: Distribution of patients according to study variables.

Variables		Frequency	Percentage
Age groups	*11-19*	1	1.4
	20-29	1	1.4
	30-39	13	18.1
	40-49	25	34.7
	50-59	22	30.6
	≥ 60	10	13.9
Site	*Bilateral nipple discharge*	1	1.4
	Left breast mass	41	56.9
	Left nipple discharge	1	1.4
	Right breast mass	29	40.3
Quadrant	*Axillary tail*	4	5.6
	Left lower quadrant	11	15.3
	Left upper quadrant	25	34.7
	No	1	1.4
	retro areolar	11	15.3
	right lower quadrant	20	27.8
Cytology	*(C1)*	8	11.1
	(C2)	5	6.9
	(C3)	19	26.4
	(C4)	4	5.6
	(C5)	36	50.0
US results	*(I)*	2	2.8
	(II)	4	5.6
	(III)	9	12.5
	(IV)	23	31.9
	(V)	12	16.7
	No	22	30.6
Mammogram	*(I)*	1	1.4
	(II)	7	9.7
	(III)	7	9.7

	(IV)	29	40.3
	(V)	15	20.8
	No	13	18.1

As show in fig 1; the histopathological diagnosed as following: [55.56%] of females have mammary carcinoma, [13.89%] of females have fibro adenoma, and [12.5%] of females have fibrocystic changes,and other histopathological diagnosis appears in fig 1.

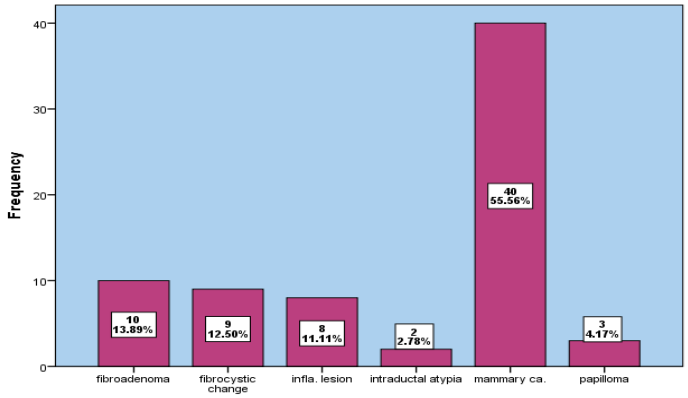

Fig. 1: Distribution of patients according to histopathological results.

As show in fig 2; the cytological diagnosed as following:[35] females have mammary carcinoma,[8] females have fibro adenoma, and[8] females have fibrocystic changes, and other cytological diagnosis appears in fig 2.

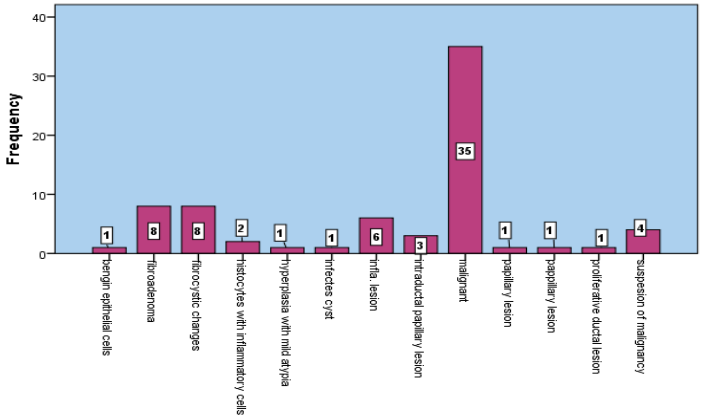

Fig. 2: Distribution of patients according to cytological diagnosis results.

There is significant association between Histological diagnosis and (U/S, mammogram and cytology). [87.5%] of patients histological diagnosed as mammary carcinoma have C5 cytological diagnosis, [50%] of patients histological diagnosed as atypia have C5 cytological diagnosis, [100%] of patients histological diagnosed as papilloma have C3 cytological diagnosis, [75%] of patients histological diagnosed as inflammation have C1 cytological diagnosis.

[37.5%] of patients histological diagnosed as mammary carcinoma have V mammogram diagnosis, [66.7%] of patients histological diagnosed as fibrocystic changes and papilloma have V mammogram diagnosis, [37.5%] of patients histological diagnosed as inflammation have II and III mammogram diagnosis.

[30%] of patients histological diagnosed as mammary carcinoma have V ultrasound diagnosis, [50%] of patients histological diagnosed as atypia have IV ultrasound diagnosis, [50%] of patients histological diagnosed as inflammation have III ultrasound diagnosis.

There is no significant association between Histological diagnosis and (age groups and site of lesion). As show in table 2.

Table 2: association between histopathological Dx and [Cytology grades, mammogram grades, U/s Grades and Site].

Variables		Histological Dx						P-value
		FA	**Fc**	**Infl.**	**atypia**	**M Ca**	**papilloma**	
Cytology	*(C1)* *(C2)* *(C3)* *(C4)* *(C5)* *Total*	0 0.0% 2 20.0% 7 70.0% 1 10.0% 0 0.0% 10 100.0%	2 22.2% 2 22.2% 5 55.6% 0 0.0% 0 0.0% 9 100.0%	6 75.0% 1 12.5% 1 12.5% 0 0.0% 0 0.0% 8 100.0%	0 0.0% 0 0.0% 1 50.0% 0 0.0% 1 50.0% 2 100.0%	0 0.0% 0 0.0% 2 5.0% 3 7.5% 35 87.5% 40 100.0%	0 0.0% 0 0.0% 3 100.0% 0 0.0% 0 0.0% 3 100.0%	**0.0001**
Mamo.	*(I)* *(II)* *(III)* *(IV)* *(V)* *No* *Total*	0 0.0% 1 10.0% 2 20.0% 3 30.0% 0 0.0% 4 40.0% 10 100.0%	1 11.1% 1 11.1% 0 0.0% 6 66.7% 0 0.0% 1 11.1% 9 100.0%	0 0.0% 3 37.5% 3 37.5% 2 25.0% 0 0.0% 0 0.0% 8 100.0%	0 0.0% 0 0.0% 0 0.0% 1 50.0% 0 0.0% 1 50.0% 2 100.0%	0 0.0% 1 2.5% 2 5.0% 15 37.5% 15 37.5% 7 17.5% 40 100.0%	0 0.0% 1 33.3% 0 0.0% 2 66.7% 0 0.0% 0 0.0% 3 100.0%	0.004
US	*(I)* *(II)* *(III)* *(IV)* *(V)* *No* *Total*	0 0.0% 1 10.0% 3 30.0% 2 20.0% 0 0.0% 4 40.0% 10 100.0%	1 11.1% 1 11.1% 2 22.2% 2 22.2% 0 0.0% 3 33.3% 9 100.0%	1 12.5% 0 0.0% 4 50.0% 1 12.5% 0 0.0% 2 25.0% 8 100.0%	0 0.0% 0 0.0% 0 0.0% 1 50.0% 0 0.0% 1 50.0% 2 100.0%	0 0.0% 1 2.5% 0 0.0% 17 42.5% 12 30.0% 10 25.0% 40 100.0%	0 0.0% 1 33.3% 0 0.0% 0 0.0% 0 0.0% 2 66.7% 3 100.0%	0.005
Site	*BND* *LBM* *LND* *RBM* *Total*	0 0.0% 5 50.0% 0 0.0% 5 50.0% 10 100.0%	1 11.1% 5 55.6% 0 0.0% 3 33.3% 9 100.0%	0 0.0% 3 37.5% 1 12.5% 4 50.0% 8 100.0%	0 0.0% 1 50.0% 0 0.0% 1 50.0% 2 100.0%	0 0.0% 24 60.0% 0 0.0% 16 40.0% 40 100.0%	0 0.0% 3 100.0% 0 0.0% 0 0.0% 3 100.0%	0.24
Age groups	11-19 20-29 30-39 40-49 50-59	1 10.0% 0 0.0% 3	0 0.0% 0 0.0% 2	0 0.0% 0 0.0% 3	0 0.0% 0 0.0% 0	0 0.0% 1 2.5% 4	0 0.0% 0 0.0% 1	0.91

	≥60	30.0%	22.2%	37.5%	0.0%	10.0%	33.3%	
	Total	3	2	3	1	15	1	
		30.0%	22.2%	37.5%	50.0%	37.5%	33.3%	
		2	3	2	1	13	1	
		20.0%	33.3%	25.0%	50.0%	32.5%	33.3%	
		1	2	0	0	7	0	
		10.0%	22.2%	0.0%	0.0%	17.5%	0.0%	
		10	9	8	2	40	3	
		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

P-value ≤ 0.05 (significant).

There is significant association between cytology grades and [mammogram grades, U/s grades], [40%] of patients cytological diagnosed as C5 have V mammogram diagnosis, [57.9%] cytological diagnosed as C3 have IV mammogram diagnosis. [34.3%] of patients cytological diagnosed as C5 have V ultrasound diagnosis, [40%] cytological diagnosed as C2 have IV ultrasound diagnosis. As show in table 3.

Table 3: association between cytology grades and [mammogram grades, U/s grades].

Variables		Cytology					P-value
		(C1)	(C2)	(C3)	(C4)	(C5)	
Mammo	*(I)*	1	0	0	0	0	0.001
		12.5%	0.0%	0.0%	0.0%	0.0%	
	(II)	3	1	2	0	1	
		37.5%	20.0%	10.5%	0.0%	2.8%	
	(III)	2	0	3	1	1	
		25.0%	0.0%	15.8%	25.0%	2.8%	
	(IV)	2	2	11	1	13	
		25.0%	40.0%	57.9%	25.0%	36.1%	
	(V)	0	0	1	0	14	
		0.0%	0.0%	5.3%	0.0%	38.9%	
	No	0	2	2	2	7	
		0.0%	40.0%	10.5%	50.0%	19.4%	
	Total	8	5	19	4	36	
		100.0%	100.0%	100.0%	100.0%	100.0%	
US	*(I)*	2	0	0	0	0	0.0001
		25.0%	0.0%	0.0%	0.0%	0.0%	
	(II)	1	0	2	0	1	
		12.5%	0.0%	10.5%	0.0%	2.9%	
	(III)	3	4	2	0	0	
		37.5%	66.7%	10.5%	0.0%	0.0%	
	(IV)	1	1	5	2	14	
		12.5%	16.7%	26.3%	50.0%	40.0%	
	(V)	0	0	0	0	12	
		0.0%	0.0%	0.0%	0.0%	34.3%	
	No	1	1	10	2	8	
		12.5%	16.7%	52.6%	50.0%	22.9%	
	Total	8	6	19	4	35	
		100.0%	100.0%	100.0%	100.0%	100.0%	

P-value ≤ 0.05 (significant).

According to table 4; there is significant association between cytology diagnosis and histology diagnosis in general, [100%] of patients diagnosed as breast malignancy in histology have positive cytology results. Specificity of cytology to histology is 100%, Sensitivity of cytology to histology is 100%, accuracy of cytology to histology is 100%.

Table 4: Association, specificity, Sensitivity and Accuracy of cytological diagnosis according to histological diagnosis.

		histology result		Total
		Malignant	Benign	
Cytology result	Positive	40 (100%)	0 (0%)	40
	Negative	0 (0%)	32 (100%)	32
Total		40 (100%)	32 (100%)	72
P-value = 0.0001, (highly significant).				

Specificity= 40/40+0= 100%
Sensitivity= 32/32+0= 100%
Accuracy= 40+32/40+32+0+0= 100%

DISCUSSION

Breast cancer is one of the most prevalent malignancies worldwide among women. FNAC of breast lumps is a known and confirmed method for accurately determining the type of breast swellings. Needless Aspiration Martin and Ellis introduced cytology for the diagnosis of palpable breast tumours in 1930.[10,11] The objective of this research was to correlate cytological, radiographic, and biopsy data with breast enlargement thought to indicate malignancy. In the present research, the mean age of females is [47.96 ± 11] years, with [34.7%] of females in the 40-49 year age group and [30.6%] in the 50-59 year age group. This is comparable to previous studies in which the age range of patients was 30-90 years, which corresponded to 35-86 years.[12,13] In the present investigation, the following cytological diagnoses were made: There are forty females with mammary cancer, including five instances with atypia for whom a biopsy was recommended. There are eight females with fibro adenoma and eight females with fibrocystic alterations. The histopathological diagnoses were as follows: [55.56 %] of females have mammary carcinoma, [13.89 %] of females have fibro adenoma, and [12.5 %] of females have fibrocystic changes, which agreed with Sarangan et al.[13] cytologically, there were 15 cases of malignancy and suspicious for malignancy, which disagreed with Neha et al., who stated They were classified histopathologically as in situ ductal carcinoma, infiltrating ductal carcinoma, lobular, and papillary cancer. There were 35 instances of benign conditions, including simple cysts, duct ectasia, mastitis, galactocele, and phyllodes. In addition, Rajiv et al. concurred with our findings and claimed that histology revealed these patients to be malignant. Ultrasound found 41 benign (BIRADS I and II) cases (out of 50) in the study,[12] 41 of the 50 cases were benign. According to our findings, there is a considerable correlation between cytology grades and [mammogram grades, U/s grades]. This was consistent with the findings of a research indicating that breast cancer was histologically identified in 14 instances, of which 9 were accurately diagnosed by radiography, yielding a sensitivity of 56.25 percent. The ability of cytology and radiography to identify breast illness differed significantly.[12] In the present research, the histological diagnoses were as follows: [55.56 %] of females had mammary cancer, [13.89 %] of females had fibroadenoma, and [12.5 %] of females had fibrocystic alterations, while in previous studies, suspicious cases on FNAC were 38.31% and on CNB were 2.80 %. According to the research done by Rupom et al.[15] There is a strong connection between Histological diagnosis and (U/S, mammography, and cytology) in the current research. [85%] of histologically diagnosed mammary carcinoma patients have C5 cytological diagnosis, [50%] of histologically diagnosed atypia patients have C5 cytological diagnosis, [100%] of histologically diagnosed papilloma patients have C3 cytological diagnosis, and [75%] of histologically diagnosed inflammation patients have C1 cytological diagnosis. In accordance with prior findings, 11 of the 54 cases of ductal carcinoma (NOS) were grade I, whereas 43 were grade II. No instances diagnosed grade III. P 489 aspirates (6%) were classed as cytologically "atypical" or "suspicious," as determined by the Chi Square test, which revealed a substantial correlation between cytological and histological grades. Among the 'atypical' aspirates, 118 (52%) produced malignant signs on histological examination, with infiltrating ductal carcinoma (n=87, 74%) being the most prevalent (n=118, 52%). Histological examination of 135 (83%) of questionable aspirates revealed cancer cells. The most prevalent benign diagnosis in both atypical and suspicious aspirates was proliferative fibrocystic change, followed by fibroadenoma, which is consistent with the current research.[12,16] The ratios for malignant, suspicious, atypical, benign, and inadequate cytological analysis were 98.71, 5.48, 1.09, 0.07, and 0.55, respectively, in the research by Kim et al.[17] In the current investigation, there is a substantial correlation between the cytology and histology diagnoses; [100%] of patients diagnosed with malignancy by histology also had positive cytology findings. Specificity of cytology to histology is one hundred percent, sensitivity of cytology to histology is one hundred percent, and accuracy of cytology to histology is one hundred percent. This is comparable to other studies which found that the absolute and complete sensitivities for malignant lesions were 64.5% and 90.3%, respectively. The predictive value for cytological diagnosis of malignancy was 98.4%. In the research undertaken by Ibikunle et al.[18] FNAC connection with histopathological results in 289 breast masses was investigated. There were 161 instances of FNAC with tissue for histopathology correlation, resulting in a biopsy rate of 55.7%. The sensitivity of FNAC in establishing the final histologic diagnosis was determined to be 99.4%, whilst the

specificity was found to be 100%. In 86.3% of instances, FNAC was able to identify the definitive histologic diagnosis. The association between cytological and histological diagnosis has been shown in numerous research. 78% of cytological and histological grades were concordant. The correlation coefficient between cytology grade and histopathology grade was 0.804, and the P value was.[19,20] 78% of cytological and histological grades were in accord. The correlation between cytological and histological grades was found to be very significant (r = 0.804, p 0.001), indicating a causal link between the two. Overall, sensitivity varied from 100 percent for tumours of cytological grade I to 45.45 percent for tumours of cytological grade III. The majority of tumours were successfully identified (94.87%) in cytological grade III, but only 72.72 % in cytological grade II. The incidence of axillary lymph node metastasis was highest in malignancies of cytological grade III or II.[21]

CONCLUSION

In this study, the most common breast lesion is mammary carcinoma. The cytology was 100% specific, sensitive and accurate in detecting breast lesion. In correlation to cytology, ultrasound and mammogram were useful in the detection of breast lesion.

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