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Correlation of ultrasound study with histological type of malignant breast cancer in women attending Al-Elwiya maternity teaching hospital (Tumor women center)/Baghdad

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Abstract
Background: Breast cancer incidence is rising, it is the commonest type of malignancy among women worldwide and in Iraq. Core needle biopsy and excisional technique provides adequate tissue for histopathological diagnosis of suspected breast lumps. Breast ultrasonography has gained widespread acceptance as a diagnostic tool for the evaluation of breast disorders. The aim of study is to find the correlation between ultrasound study and the histological type of malignant breast cancer.
Method: A cross-sectional research was done on 98 female breast clinic patients at Al-Elwyia Maternity Teaching Hospital between January and December 2023. Each participant's age (in years), family history of breast cancer, and ultrasound characteristics like lesion shape (irregular or regular), margin (speculated or well-defined), calcification (negative or positive), and lymph node metastasis were recorded. Histopathological diagnosis included cancer grade (1, 2, or 3), breast side (bilateral, left, or right), and malignancy type.
Results: The study at Al-Elwyia Maternity Teaching Hospital on 98 female breast cancer patients found a higher prevalence of breast cancer in the 40-59 age range, with 68.9% having no family history. Ultrasound characteristics showed 77% had irregularly shaped lesions, and histopathology revealed 90.1% with Invasive Ductal Carcinoma (IDC), with no significant correlation between ultrasound features and cancer type.
Conclusion: Breast cancers is more common in women aged 40-59 without a family history, with most lesions having irregular shape and speculated margin in ultrasound, and IDC on histology. These ultrasound findings were common, but they did not correlate with histological kinds of cancer, highlighting the difficulty of breast cancer detection and the need for comprehensive diagnostic tools.

Keywords: Correlation, ultrasound, histological, malignant, breast cancer, women, Al-Elwiya maternity teaching hospital

Introduction

Breast cancer continues to be a significant health concern globally, with increasing incidence rates observed across various populations. The presentation of a breast lump often triggers apprehension among women, leading them to seek medical advice due to the potential association with malignancy. Breast lumps are focal, abnormal lesions that are distinct from the surrounding normal breast tissue, in terms of consistency. These lumps can arise from a variety of causes, not all of which signify the presence of cancer, highlighting the importance of accurate diagnosis and management strategies [1]. Breast cancer remains the most prevalent cancer among women worldwide and is particularly notable in Iraq, where it constitutes the leading cause of cancer-related deaths among females [2]. The detection of a breast mass is a primary concern that prompts women to visit breast clinics, with approximately 10% of these lumps being malignant [3]. This underscores the necessity of thorough evaluation and diagnosis to differentiate benign from malignant lesions effectively. Diagnostic strategies have evolved, with the triple assessment technique-encompassing clinical breast examination, imaging study (Mammogram and ultrasound), and histopathological study -emerging as a cornerstone in the accurate diagnosis of breast cancer, particularly in specialized breast centers [4]. This multidisciplinary approach facilitates the identification of malignant masses, thereby enabling timely and appropriate intervention. Ultrasound play a crucial role in the diagnostic process, offering a non-invasive means to assess breast lesions. The Breast Imaging Reporting and Data System (BIRADS) provides a

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standardized framework for reporting ultrasound findings, thereby aiding in the stratification of breast cancer risk [5]. A BIRADS category V, for instance, indicates a greater than 95% likelihood of malignancy, necessitating prompt action from the treating physician [6, 7]. In 1993 The Breast Imaging Reporting and Data System (BI-RADS) lexicon was invented by the American College of Radiology (ACR), for purposes of diagnosing uncertain results. BIRADS category [5]: The BI-RADS categories are:

- BI-RADS 0-incomplete.
- BI-RADS 1-negative (no cancer).
- BI-RADS 2-benign findings (100% benign).
- BI-RADS 3-abnormality probably benign (>98% benign).
- BI-RADS 4-suspicious abnormality requiring biopsy (10 to 50% malign)
- BI-RADS 5-highly suspicious of malignancy (>95% malign).
- BI-RADS 6-malignancy proved by biopsy (100% malign).

Ultrasonography has been playing an important role in the diagnosis of breast cancer. There are many specific indications for breast ultrasound which include: clinical evaluation of a palpable mass incompletely assessed by mammography, palpable lesions with associated mammographic asymmetry or no mammographic findings, to differentiated cystic from a solid lesion, and if a history of lumpectomy or segmentectomy present. Breast ultrasound is ascribed a higher sensitivity for detecting breast cancer in women with dense breast tissue, women under the age of 50 and high-risk women [8, 9]. The capability of ultrasound to provide detailed information regarding the mass's characteristics, including its location, echo texture, margins, and size, as well as to assess the axillary region for normal or pathological lymph nodes, underscores its value in the diagnostic process [10]. The incidence of breast cancer varies significantly across different regions, being higher in developed countries compared to developing nations [11]. This disparity points to the need for tailored approaches to breast cancer screening

and diagnosis, taking into account the specific demographics and risk factors prevalent in each region. Moreover, while women over 40 years of age are most affected by breast cancer in developed countries, developing nations witness a younger demographic being at risk [12]. This emphasizes the importance of breast self-examination, early medical consultation, and treatment in mitigating the mortality and spread of breast cancer [13]. The aim of study is to find the correlation between ultrasound study and the histological type of malignant breast cancer.

Method
A cross-sectional study was conducted involving 98 female patients who attended the breast clinic at Al-Elwyia maternity Teaching Hospital between January and December 2023. The study collected comprehensive data on each participant, including age (In years), presence of a family history of breast cancer, and various ultrasound characteristics such as the shape of the observed lesion (Categorized as irregular or regular), the margin (Classified as speculated or well-defined), the presence of calcification (Noted as negative or positive), and lymph node metastasis (Also recorded as negative or positive). Additionally, histopathological diagnoses were compiled, detailing the grade of cancer (1, 2, or 3) (Well differentiated, moderately differentiated, poor differentiated), the side of the breast affected by cancer (bilateral, left, or right), and the specific type of malignancy identified. For the purpose of statistical analysis, SPSS version 22 software was utilized. Categorical data were analyzed using frequencies and percentages, while continuous data were assessed through the calculation of means, medians, and standard deviations. The chi-square test was employed to investigate the associations between categorical variables. A p-value of 0.05 or lower was considered to indicate statistical significance in the relationships examined.

Results
As shown in table 1, 31.6% of patients at age group 40-49 years old. And 70.4% of patients without previous family history.

Table 1: Distribution of patients according to sociodemographic data

Variables		Frequency (no.)	Percentage (%)
Age groups	30-39	14	14.3
(Years)	40-49	31	31.6
	50-59	28	28.6
	≥60	25	25.5
Family	Negative	69	70.4
History	Positive	29	29.6

Table 2 show Distribution of patients according to ultrasound features. 76.5% of patients with irregular shape lesion, 64.3% of them have Speculated lesion margin, 61.2% of patients have positive lesion Calcification and finally 61.2% of patients have Lymph Node Metastasis.

Table 2: Distribution of patients according to ultrasound features.

Variables		Frequency (No.)	Percentage (%)
Shape	Irregular	75	76.5
	Regular	23	23.5
Margin	Speculated	63	64.3
	Well defined	35	35.7
Calcification	Negative	38	38.8
	Positive	60	61.2
Lymph node	Negative	38	38.8
Metastasis	Positive	60	61.2

Table 3 show Distribution of patients according to histopathology diagnosis. 61.2% of patients at grade 1, while 12.2% of them at grade 3. Also 48% of patients the lesion on left side while 43.9% of patients the lesion on right side.

Table 3: Distribution of patients according to histopathology diagnosis.

Variables		Frequency (no.)	Percentage (%)
Grade	1	26	26.5
	2	60	61.2
	3	12	12.3
Side	Bilateral	8	8.1
	Left	47	48.0
	Right	43	43.9

As show in fig 1, 93.88% of patients have IDC type (Invasive ductal carcinoma) of lesion on histopathology diagnosis. And 3.06% of them have ILC (Invasive lobular carcinoma).

Table 4-6 showed there is no significant association between types of cancer under histological diagnosis and (Shape, margin, calcification) under ultrasound.
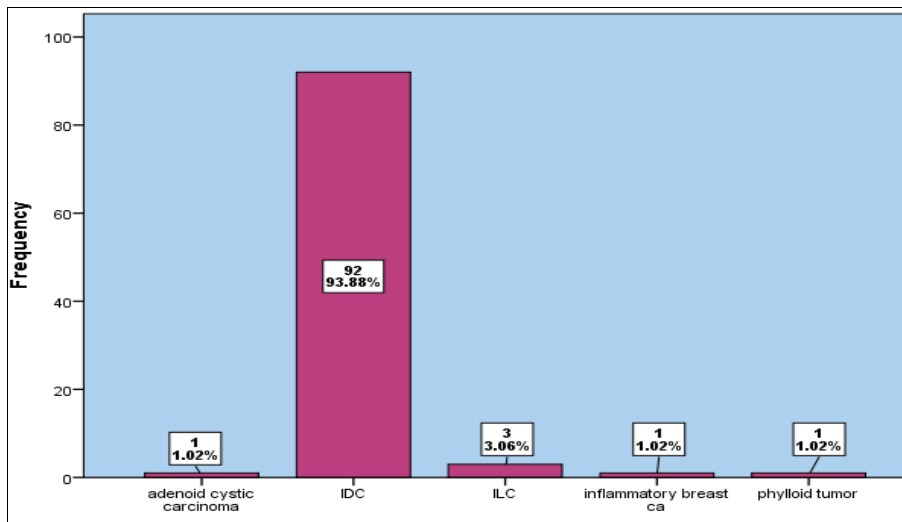

Fig 1: Distribution of patients according to types of malignancy on histopathology diagnosis.

Table 4: Association between the types of cancer under histological diagnosis and shape under ultrasound

Variables		Shape		P-value
		Irregular	Regular	
Types	Adenoid cystic carcinoma	1	0	
		100.0%	0.0%	
	IDC	70	22	
		76.1%	23.9%	0.3
	ILC	3	0	
		100.0%	0.0%	
	Inflammatory breastca	1	0	
		100.0%	0.0%	
	Phylloid tumor	0	1	
		0.0%	100.0%	

P-value ≤ 0.05 (significant).

Table 5: Association between the margin of cancer under histological diagnosis and shape under ultrasound.

Variables		Margin		
		Speculated	Well defined	P-value
Types	Adenoid cystic carcinoma IDC ILC	0	1	
		0.0%	100.0%	
		60	32	
		65.2%	34.8%	0.4
		2	1	
		66.7%	33.3%	
	Inflammatory breastca	1	0	
		100.0%	0.0%	
	Phylloid tumor	0	1	
		0.0%	100.0%	

P-value ≤ 0.05 (significant).

Table 6: Association between the Calcification of cancer under histological diagnosis and shape under ultrasound.

Variables		Calcification		P-value
		Negative	Positive	
Types	Adenoid cystic carcinoma	0	1	
		0.0%	100.0%	
	IDC	38	54	
		41.3%	58.7%	0. 4
	ILC	0	3	
		0.0%	100.0%	
	Inflammatory breast ca	0	1	
		0.0%	100.0%	
	Phylloid Tumor	0	1	
		0.0%	100.0%	

P-value ≤ 0.05 (significant).

Discussion

In the discussion of the findings from a cross-sectional study conducted at the Al-Elwyia Maternity Teaching Hospital, several key observations were noted concerning the demographic and clinical characteristics of female patients presenting with breast cancer. The age distribution of the patients showed a significant proportion (31.6%) within the age groups of 40-49. This is consistent with literature indicating that the incidence of breast cancer increases with age, particularly in the postmenopausal phase, underscoring the importance of targeted screening efforts in these age groups [14]. A notable finding was that a majority of the patients (70.4%) did not have a prior family history of breast cancer, suggesting that while genetic predisposition plays a crucial role in breast cancer risk, other factors such as environmental influences and lifestyle choices are also significant contributors to disease development. This aligns with studies suggesting that the majority of breast cancer cases are sporadic, with only a minority attributed to inherited genetic mutations [15, 16]. The ultrasound features of the breast lesions provided critical insights into the nature of the malignancies. A high percentage of patients (76.5%) presented with lesions of irregular shape, and a similar proportion exhibited speculated margins (63.3%) and positive calcification (61.2%). Additionally, lymph node metastasis was observed in 61.2% of cases. These ultrasound findings are indicative of more aggressive disease and are in line with other studies that have correlated such features with higher grades of malignancy and poorer prognosis [17, 18]. The histopathological analysis revealed that 61.2% of the patients had grade 1 tumor, suggesting a predominance of less aggressive cancer types in this study. However, 12.2% of patients were diagnosed with grade 3 tumors, highlighting the presence of a subset of individuals with high-grade, aggressive breast cancer. The distribution of cancer across the left and right sides of the breast was relatively even, with 48% and 43.9% of lesions located on the left and right sides, respectively. This finding is consistent with other reports that do not support a significant side predilection for breast cancer development [19, 20]. A significant majority of the patients (93.88%) were diagnosed with Invasive Ductal Carcinoma (IDC), while a smaller percentage (3.06%) had Invasive Lobular Carcinoma (ILC). This distribution mirrors global epidemiological data, where IDC is recognized as the most common histological subtype of breast cancer [21]. Interestingly, the study found no significant association between the types of cancer under histological diagnosis and ultrasound features such as shape, margin, and calcification. This suggests that while ultrasound is a valuable tool for detecting and characterizing breast lesions, its findings must be integrated with histopathological analysis to accurately determine the nature of the malignancy. This conclusion supports the multidisciplinary approach to breast cancer diagnosis, emphasizing the importance of combining imaging techniques with cytological and histological assessments to achieve a comprehensive understanding of the disease [22].

Conclusion

The study reveals a high incidence of breast cancer among women aged 40-59 without a family history, with the majority of lesions being irregular, speculated, and IDC on histopathology. Despite the prevalence of these ultrasound features, no significant correlation was found with the histological types of cancer, underscoring the complexity of breast cancer diagnosis and the necessity for comprehensive diagnostic strategies.

Conflict of Interest

Not available

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Not available

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