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Research Article

Relationship between Clinical Examination, Ultrasonography, and Histopathological Findings in Breast Tumors

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ABSTRACT

Breast cancer is a global health issue and one of the leading causes of death among women in Indonesia, accounting for approximately 65% of cases. Various factors, such as lifestyle, genetics, and delayed diagnosis, contribute to the high mortality rate. This study aims to analyze the application of triple diagnosis, which includes clinical examination, ultrasound, and histopathology in the diagnosis of breast tumors at Ibnu Sina Hospital in Makassar. This study used an observational analytic design with a cross-sectional approach. A total sampling method was applied to all breast tumor patients who underwent clinical examination, ultrasonography, and histopathological examination during 2023–2024. Data were obtained from medical records and analyzed descriptively using frequencies and percentages. The association between clinical examination, ultrasonography, and histopathological findings was assessed using the Chi-square test. The results showed that most patients were young women and that benign tumors were more common than malignant tumors. Clinical examination and ultrasonography findings were predominantly benign. Histopathological examination showed that fibroadenoma mammae was the most common benign tumor, while invasive breast carcinoma of no special type was the most common malignant tumor. The Chi-square test showed a significant association between clinical examination, ultrasonography, and histopathological findings. These findings indicate diagnostic concordance among the three examination methods and support the role of integrated diagnostic assessment in assisting clinical decision-making for breast tumor management.



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INTRODUCTION

Breast cancer is one of the global health issues that remains a leading cause of death among women worldwide (Barrios, 2022). Data from the World Health Organization (WHO) shows that new cases of breast cancer are increasing each year significantly (Arnold et al., 2022). Various factors, such as lifestyle, genetic factors, and delayed diagnosis, contribute to the high mortality rates that still occur in many countries (Hossain et al., 2022). Breast cancer ranks sixth in the national disease pattern and is one of the leading causes of death in Indonesia (Alifian et al., 2024).

Most breast tumors in Indonesia are benign, accounting for about 65% of cases, but malignant tumors remain a serious problem (Icanervilia et al., 2023). One of the most common types of malignant tumors is invasive breast carcinoma of no special type (NST). Additionally, research conducted at Ibnu Sina Hospital in Makassar in 2025 also showed that approximately 35% of breast tumor cases found were malignant tumors, while fibroadenomas and breast cysts dominated the types of benign tumors (Irawan et al., 2025).

In diagnosing breast cancer patients, triple diagnosis is an important step in detecting this disease (Hsu & Chang, 2022). Triple diagnosis includes clinical examination, ultrasound, and histopathological examination. These three methods are used in combination to improve diagnostic accuracy and provide a more precise assessment of tumor malignancy. Clinical examination focuses on detecting breast lumps through medical history and physical examination (Forrai et al., 2022). Ultrasound is used to detect lesions that are difficult to palpate and to determine the biopsy site (Pelu et al., 2022). Histopathology via needle biopsy or excision is used to confirm whether the lesion is benign or malignant and

to determine tumor cell characteristics, such as hormone receptor status and vascular invasion (Harbhajanka et al., 2022).

Although triple diagnosis has been shown to improve diagnostic accuracy, previous studies have examined only one or two aspects, without integrating all three. Research conducted at Ibnu Sina Hospital in Makassar shows that many patients arrive at an advanced stage, with most cases being NST breast cancer. However, no study has comprehensively integrated these three diagnostic methods in eastern Indonesia. Therefore, this study aims to analyze the application of triple diagnosis in establishing breast tumor diagnoses at Ibnu Sina Hospital in Makassar, specifically to assess the extent to which combining these three methods can improve diagnostic accuracy and inform appropriate therapeutic measures.

The importance of this study lies in its potential to provide new insights into the application of triple diagnosis in referral hospitals in the Makassar and South Sulawesi regions. The results of this study are expected to enrich scientific data on the use of more accurate diagnostic methods for detecting breast tumors and to contribute to improving the quality of health services in these hospitals and other hospitals in eastern Indonesia.

METHODS

Research Design

This study was an observational analytic study with a cross-sectional design. The study aimed to evaluate the application of triple diagnosis, consisting of clinical examination, ultrasonography, and histopathological examination, in patients with breast tumors at Ibnu Sina Hospital, Makassar, during 2023–2024. The descriptive component was used to describe the demographic characteristics of patients and the distribution of breast tumor



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findings, while the analytic component was used to examine the association between clinical examination, ultrasonography, and histopathological findings.

Sampling Method

Sampling was conducted using a total sampling technique, where all patients diagnosed with breast cancer who underwent triple diagnosis examination in 2023-2024 at Ibnu Sina Hospital, Makassar, were included in the study sample. The sample comprised patients who underwent clinical examination, ultrasonography, and histopathology in accordance with the hospital's standard procedures.

Clinical Examination Data and Criteria

Clinical examination data were obtained retrospectively from patients' medical records. The recorded clinical findings were based on breast examinations performed by the attending physicians as part of routine hospital care. The clinical variables extracted from the medical records included the presence of a breast mass; lesion location, size, consistency, margin, mobility, and tenderness; skin and nipple changes; nipple discharge; and regional lymph node enlargement.

Based on the clinical information recorded in the medical records, lesions were categorized as clinically benign or clinically suspicious for malignancy. Lesions were considered clinically benign when the recorded findings included a well-defined margin, soft-to-firm consistency, good mobility, absence of fixation to the skin or chest wall, absence of skin or nipple changes, and no suspicious lymph node enlargement.

Lesions were considered clinically suspicious for malignancy when one or more suspicious features were documented, including hard consistency, irregular or ill-defined margins, poor mobility or fixation, skin dimpling, peau d'orange, ulceration, nipple retraction, bloody nipple discharge, rapid enlargement, or suspicious axillary or supraclavicular lymph node enlargement. The final classification of lesions as benign or malignant was determined by histopathological examination, which served as the reference standard.

Data Collection

The data used in this study were obtained from the medical records of breast tumor patients who underwent triple diagnosis. The data collected included the results of clinical examinations, ultrasonography, and histopathology. These data were obtained with official permission from Ibnu Sina Hospital in Makassar and had been approved by the hospital's ethics committee. Data collection was conducted after obtaining a research permit from the Faculty of Medicine at the University of Muslim Indonesia.

Data Analysis

The data were analyzed descriptively and analytically. Descriptive analysis was performed using frequencies and percentages to describe patient characteristics and the distribution of clinical, ultrasonographic, and histopathological findings. Bivariate analysis was conducted using the chi-square test to examine the association between clinical examination and histopathological findings, as well as between ultrasonography and histopathological findings.



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RESULTS

Table 1. Distribution Based on Patient Demographic Characteristics

Patient Demographic Characteristics	Frequency (%)
Age	
<25 years	21 (3.3)
26-35 years	10 (14.9)
36-45 years	17 (25.4)
46-55 years	12 (17.9)
>56 years	7 (10.4)
Gender	
Men	0 (0.0)
Women	67 (100.0)
Marital Status	
Married	47 (70.1)
Not married	20 (29.9)
Employment Status	
Employed	25 (37.3)
Unemployed	42 (62.7)

Table 2. Distribution of Breast Tumor Findings Based on Diagnostic Examination

Diagnostic Examination	Frequency (%)
Clinical Examination	
Malignant	22 (32.8)
Benign	45 (67.2)
Ultrasound Examination	
Malignant	16 (23.9)
Benign	51 (76.1)
Benign Tumor	
Fibroadenoma mammae	22 (32.8)
Fibrocystic breast changes	11 (16.4)
Sklerosing adenosis mammae	7 (10.4)
Phyllodes tumor	4 (6.0)
Intraductal papilloma	2 (3.0)
Kista mammae	2 (3.0)
Atypical ductal hyperplasia	2 (3.0)
Tubular adenoma	1 (1.5)
Malignant Tumor	
Invasive breast carcinoma of no special type	13 (19.4)
Invasive lobular carcinoma	2 (3.0)
Mucinous cystadenocarcinoma	1 (1.5)



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Table 1 shows that the 56-year-old age group includes seven people (10.4%), indicating that breast cancer is commonly experienced by young women, including those in the productive age group. By gender, all patients were female, totaling 67 (100.0%). Based on marital status, married respondents dominated (70.1%), while unmarried respondents accounted for 29.9%. This indicates that breast tumors are more common among married women. By occupation, the unemployed group was the most significant (62.7%), whereas employed individuals accounted for 37.3%. This shows that most breast tumor patients at Ibnu Sina Hospital in Makassar came from the unemployed group.

Table 2 shows that the results of clinical examinations were mainly benign 45 cases (67.2%), whereas 22 cases (32.8%) were classified as clinically malignant. Based on ultrasound results, the majority of findings (76.1%) were benign, with 16 cases (23.9%) malignant. These findings indicate that most patients at Ibnu Sina Hospital in Makassar have non-malignant lesions. Based on the BI-RADS categories, most cases fall into the benign category (BI-RADS 2 and 3), while the malignant category (BI-RADS 4-6) is less common.

The most common benign histopathological type was fibroadenoma mammae (22 cases; 32.8%), followed by fibrocystic breast changes (11 cases; 16.4%). Other benign histopathological types identified were sclerosing adenosis mammae in 7 cases (10.4%), phyllodes tumor in 4 cases (6.0%), atypical ductal hyperplasia in 2 cases (3.0%), and tubular adenoma in 1 case (1.5%). The most prominent malignant histopathological findings were NST in 13 cases (19.4%), followed by Invasive Lobular Carcinoma in 2 cases (3%), and Mucinous Cystadenocarcinoma in 1 case (1.5%). Several other cancer types, such as IDC, DCIS, LCIS,

and ILC, were excluded from this study. These results indicate the predominance of benign histopathological findings in fibroadenoma and malignant findings in NST.

Based on Table 3, there is a significant association between clinical and histopathological findings in breast cancer patients ($p < 0.05$). This reinforces the critical role of clinical and histopathological findings in the diagnosis of breast cancer. More specifically, patients with benign clinical findings (67.2%) tended to have benign histopathology (65.7%), underscoring that both are mutually supportive diagnostic tools. Table 3 shows a significant association between ultrasound and histopathology ($p < 0.05$). These findings confirm that ultrasound and histopathology play an essential role in the diagnosis of breast tumors. A clear pattern is evident, where patients with benign ultrasound findings (76.1%) tend to have benign histopathology (73.1%). This further reinforces the role of ultrasound and histopathology as complementary diagnostic tools.

The results of the chi-square test analysis in Table 4 show a significant relationship between triple diagnosis and histopathology in breast cancer patients, with a p-value of 0.000 ($p < 0.05$). This finding reinforces the critical role of Triple Diagnostic and histopathology in the diagnosis of breast tumors. Specifically, a clear pattern was observed: patients with benign concordance (65.7%) tended to have benign histopathology (65.7%), reinforcing that both serve as mutually supportive standard diagnostic tools. In addition, there were 8 cases (11.9%) in the discordance category, in which 5 cases showed clinical features suggestive of malignancy, but ultrasound and histopathology confirmed benign lesions. There were also 2 cases in which clinical and ultrasound findings suggested malignancy, but histopathology revealed benign lesions. Conversely, 1 case was identified with malignant



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**Table 3.** Relationship between Type of Examination and Histopathology

Types of Examinations	Histopathology		<i>p-value</i>
	Malignant Frequency (%)	Benign Frequency (%)	
Clinical Examination			
Malignant	15 (22.4)	7 (10.4)	0.000
Benign	1 (1.5)	44 (6.,7)	
Ultrasound Examination			
Malignant	14 (20.9)	2 (3.0)	0.000
Benign	2 (3.0)	49 (73.1)	

Table 4. Relationship between Triple Diagnosis and Histopathology

Triple Diagnosis	Histopathology		<i>p-value</i>
	Malignant Frequency (%)	Benign Frequency (%)	
Concordance Malignant	15 (22.4)	0 (0.0)	0.000
Concordance Benign	0 (0.0)	44 (65.7)	
Disconcordance	1 (1.5)	7 (10.4)	

histopathological findings, whereas clinical and ultrasound examinations were benign. These proportions indicate that the majority of breast abnormalities in the study sample were benign lesions, and triple diagnosis accurately identified their nature.

DISCUSSION

This study aims to analyze the application of triple diagnosis of breast tumors consisting of clinical examination, ultrasonography, and histopathology at Ibnu Sina Hospital in Makassar. Based on the results of the study, it was found that the <25 age group dominated the patient population, indicating that breast abnormalities or clinical findings are not only experienced by adult women but also by those of early productive age. This study is in line with previous research reporting that benign tumors such as fibroadenomas are more commonly found in younger age groups (Haldar, 2025). This phenomenon is caused by

the high sensitivity of breast tissue to hormonal changes that occur during adolescence and young adulthood, which increases the prevalence of benign abnormalities such as fibroadenomas in this group.

The dominance of the <25 age group also underscores the need for early-detection education from a young age (Pratidina et al., 2025). This is consistent with other findings that early-life lifestyle and activity patterns also influence the likelihood of breast abnormalities, although most are benign (Nurprilinda & Lamhot, 2023). Education about self-breast examination is crucial for raising awareness about breast conditions among adolescents and young adults, which can prevent delayed diagnosis in this age group.

Furthermore, the study results indicate that female patients constitute the largest group. This is because women have higher exposure to estrogen throughout their reproductive life, and have more estrogen receptors in their breast



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tissue (Vladimirovna et al., 2023). Estrogen promotes breast tissue proliferation by binding to cells with the potential to become cancerous, increasing cell growth and promoting tumor formation. These results are in line with previous studies that reported 99.75% of breast cancer patients were female (Nindito et al., 2025).

Regarding marital status, married respondents are the majority in this study. This may be due to higher levels of awareness and concern for breast health among married women. Other studies have shown that married women are more likely to seek health examinations due to partner support and psychosocial stability (Watanabe et al., 2024). This underscores the importance of broader health interventions and education across all age groups and marital statuses, emphasizing that routine screening is essential for early detection. The study also shows that most breast tumor patients come from the non-working group, indicating that homemakers or those with more flexible time tend to pay greater attention to their health and seek medical examination earlier when symptoms arise. This is consistent with previous findings that non-working women are more frequently recorded in breast tumor screenings (Shafique et al., 2023).

If a triple diagnosis is not performed, several clinical consequences may occur. Malignant tumors may be underestimated when diagnosis relies solely on clinical examination or ultrasonography, whereas benign lesions may be overtreated if tissue confirmation is not obtained. These conditions may lead to delayed diagnosis, inappropriate treatment planning, repeated procedures, unnecessary surgery, increased healthcare costs, and psychological burden for patients. Therefore, histopathological confirmation remains essential, especially in patients with suspicious clinical findings, BI-RADS 4–5 lesions, or discordant

findings between clinical examination and ultrasonography.

In diagnostic management, triple diagnosis should be applied as a stepwise, integrated approach. First, clinical breast examination should be performed to identify the characteristics of the lesion, including size, mobility, consistency, skin changes, nipple discharge, and lymph node involvement. Second, ultrasonography should be used to characterize the lesion and classify the level of suspicion based on BI-RADS categories. Third, histopathological examination through fine-needle aspiration biopsy, core biopsy, or excisional biopsy should be performed in suspicious or discordant cases. This pathway allows clinicians to make more accurate decisions regarding observation, follow-up, biopsy, surgery, or referral.

The application of triple diagnosis is also feasible in district, rural, or resource-limited hospitals when supported by a clear referral system. Clinical examination can be performed at the first level of care by trained physicians, while ultrasonography can be provided at referral hospitals with basic radiological facilities. When histopathological services are not available in smaller hospitals, tissue samples can be obtained and referred to pathology laboratories, or patients can be referred to higher-level healthcare facilities. In the Indonesian healthcare context, the National Health Insurance system provides a framework for tiered referral from primary healthcare facilities to referral hospitals. The regulation of healthcare tariffs under the JKN/BPJS system also supports healthcare services at both primary and referral levels, including specialist assessment and medically indicated diagnostic procedures. Thus, triple diagnosis can be implemented not only in tertiary hospitals but also in district or rural hospitals



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through appropriate clinical pathways, referral mechanisms, and health insurance support.

This study reinforces the importance of triple diagnosis in the management of breast tumors. The high concordance among clinical examination, ultrasonography, and histopathology supports its role in improving diagnostic confidence, while the presence of discordant cases highlights the risk of relying on a single diagnostic modality. Therefore, triple diagnosis should be integrated into routine breast tumor management to reduce diagnostic uncertainty, prevent delayed treatment of malignant lesions, avoid unnecessary procedures in benign cases, and support more appropriate clinical decision-making.

Nevertheless, this study has several limitations. First, this study was conducted in a single hospital, namely Ibnu Sina Hospital in Makassar, so the findings may not fully represent the broader population of breast tumor patients in other healthcare settings. Second, the study design was observational and relied on available clinical, ultrasonographic, and histopathological data, which may limit the ability to establish causal relationships. Third, several patient-related factors, such as family history, hormonal status, reproductive history, genetic risk, lifestyle factors, and symptom duration, were not analyzed in detail. Fourth, the interpretation of clinical examination and ultrasonography may be influenced by the examiner's experience and operator dependency. Finally, the sample size and distribution of benign and malignant cases may affect the strength of the concordance analysis among the three diagnostic modalities. Therefore, future studies involving larger sample sizes, multicenter data, and more comprehensive clinical variables are recommended to validate and strengthen the findings of this study.

CONCLUSION

This study showed that most breast tumor cases at Ibnu Sina Hospital, Makassar, were benign lesions, with fibroadenoma mammae as the most common histopathological finding. Malignant tumors were also identified, particularly invasive breast carcinoma of no special type, indicating the importance of careful diagnostic evaluation in breast tumor patients. Clinical examination and ultrasonography showed significant associations with histopathological findings, suggesting that both methods may serve as useful initial diagnostic assessments. The concordance among clinical examination, ultrasonography, and histopathology supports the role of triple diagnosis as an integrated approach to guide further evaluation and clinical decision-making. However, because this study used association analysis, the findings should be interpreted as diagnostic concordance rather than direct evidence of diagnostic accuracy.

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