

THE DIAGNOSTIC EFFICACY OF ULTRASOUND IN THE DETECTION OF BREAST LESIONS IN MINGORA SWAT

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Abstract

Breast cancer is the second highest cause of death for women in the world. One of the most common is the sonographic imaging which plays an important role in the screening for an early detection and monitoring of the prognosis. Modality alternatives in low-resource settings, where mammography may not be available, ultrasound is a cost-effective alternative for breast lesions detection. This study determines the diagnostic role of ultrasound in detection of breast lesions in women of Mingora, Swat. One hundred women were studied and information on age, family history and breast lumps recorded. The research demonstrates strong associations between abnormal ultrasound findings and factors such as family history and breast lumps. Ultrasonography has also been shown to be very efficacious, with 74% diagnostic accuracy in determining benign versus malignant lesions. The study underscores the value of accessible screening strategies and early diagnosis, especially in underdeveloped regions, and also indicates that optimization of the application of ultrasound may help to save her life in places that lack more expensive imaging techniques. The study underscores the necessity for culturally relevant interventions for early detection and utilization of healthcare services.

INTRODUCTION

Breast cancer is one of the most common cancers among women worldwide and continuing to be a significant cause of cancer-associated deaths (1, 2). Early diagnosis is important for prognosis and survival, as evoked between us and effective treatment interventions are also possible (3, 4). Imaging techniques such as mammogram and ultrasound are important to the early detection and characterization of breast lesions (5, 8, 9) and mammogram is the gold standard in breast cancer screening, but its accessibility is frequently restricted

in resource-limited regions because of expensive cost and absence of facilities and personnel (5-7).

In such situations, ultrasonography has become a practical and efficient alternative for the detection and characterization of breast lesions. Not only is ultrasound cheaper and more widespread than mammography, it also has unique advantages, particularly in younger women with dense breasts in whom mammography sensitivity is distinctly compromised. The results found that ultrasound can effectively differentiate cystic from solid breast

masses while helping bring to light potential malignant lesions (8-11). A literature review also led to the conclusion that in low- and middle-income countries, ultrasound also has a high correct detection rate of breast problems, coming in with a sensitivity of 89.2% and specificity of 99.1%, making it a viable option when mammograms are not feasible (12-15).

Furthermore, research shows that ultrasound can detect a significant proportion of breast cancers that mammography misses, especially in women with dense breast tissue (16). Studies show that adding automated or handheld breast ultrasound to standard screening protocols increases cancer detection rates, with sensitivity rising from 50% with mammography alone to as high as 81% when combined with ultrasound. These findings emphasize the ability of ultrasound to enhance early detection efforts, especially in populations at intermediate or high risk where mammography may be insufficient (17-20).

Despite these advantages, it is important to acknowledge that adding ultrasound to breast cancer screening can lead to increased recall and biopsy rates, highlighting the need for skilled interpretation and appropriate follow-up protocols (21,22). However, the cost-effectiveness and accessibility of ultrasound make it an attractive option for resource-limited areas like Mingora, Swat, where other screening modalities may not be readily available.

In the light of these concerns, the purpose of this study was to determine the diagnostic accuracy of ultrasound for breast lesions in women from Mingora, Swat. This study, beginning with 100 women, will investigate how well ultrasound can identify problems in the breast and how closely this is tied to factors such as age, family history and symptom, to give us firm recommendations for improved diagnosis of breast cancer in the area. Findings from this study will help to guide clinicians and policy-makers and thus improve breast cancer outcomes and care for underserved populations.

Methodology

One hundred participants from Mingora, Swat, with ages ranging from 18 to 60, make up the dataset for this study. Interviews and medical records were used to gather information on factors like marital status,

breast cancer in the family, breast lump presence, ultrasound results, and recommendations following an ultrasound examination.

Several important statistical methods were used in the analysis to find trends and connections in the data. First, the main clinical and demographic traits of the participants were compiled using descriptive statistics. A correlation analysis was then conducted to determine the relationship between different factors and abnormal ultrasound findings. The significance of categorical factors, including marital status and family history, in connection to the diagnosis of breast lesions was investigated using chi-square tests. Lastly, using the information at hand, logistic regression was used to forecast the probability of benign or malignant diagnoses.

The socioeconomic circumstances of the area, access to medical care, and potential obstacles to early diagnosis were all taken into consideration when the study integrated localised aspects of healthcare in Mingora. These elements were taken into account during the results analysis process to guarantee that the study's conclusions are applicable in the local context.

Results

Descriptive Statistics

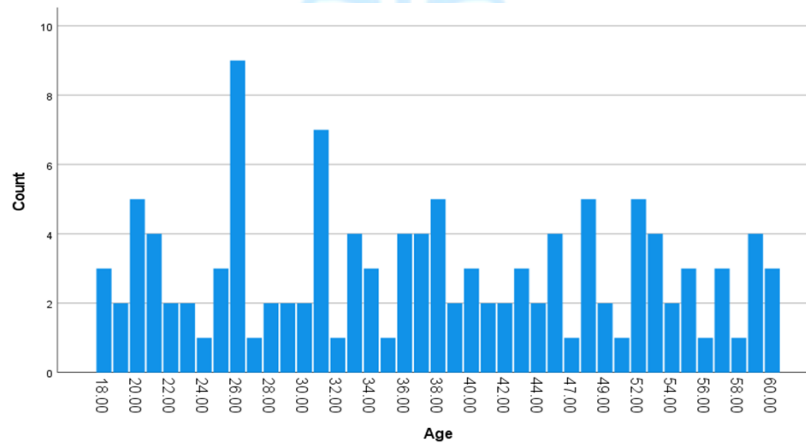
The principal measures for the data variables are compiled in the Descriptive Statistics table. The variables are summarised as follows: Participants range in age from 18 to 60 years old, with an average age of 37.88 years. A moderate range in participant ages is indicated by the standard deviation of 12.56. Marital Status: The majority of participants are married, according to the mean score of 0.70. There is some variability, as indicated by the standard deviation of 0.46. Family History: About half of the respondents reported having a family history of breast cancer or a related condition, according to the average score of 0.48. Breast Lump: A mean of 0.60 indicates that around 60% of participants presented with a breast lump. The average of 0.58 in the ultrasound examination indicates that slightly more than half of the participants have received a breast ultrasound. Abnormality Detected: An average of 0.45 indicates that abnormalities were identified by ultrasonography in approximately 45% of instances. Diagnosis: The variable diagnosis has a mean of 0.82,

indicating that the majority of diagnoses are either benign or malignant, with the potential for some to be classified as indeterminate. Biopsy Recommended: A mean of 0.47 indicates that 47% of instances warranted a recommended biopsy based

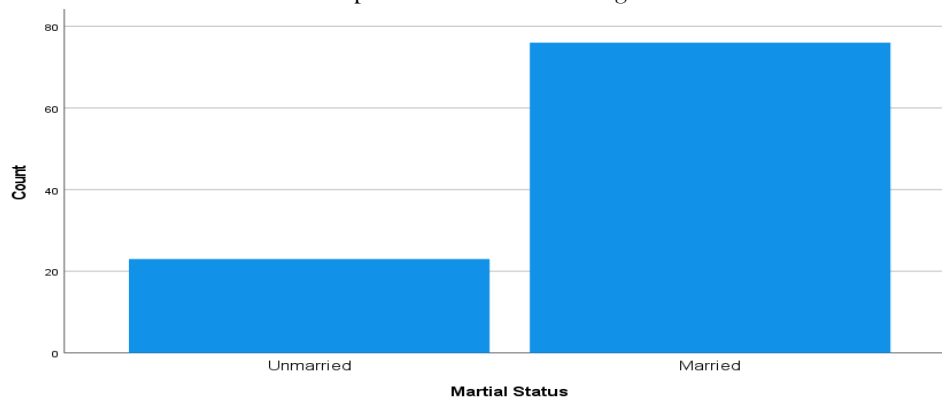
on ultrasonography results. A mean of 0.45 indicates that approximately 45% of respondents received advice to undergo additional testing. The mean score of 0.98 suggests that the subsequent course of action for the majority of patients is either follow-up, biopsy, or no intervention.

Descriptive Statistics

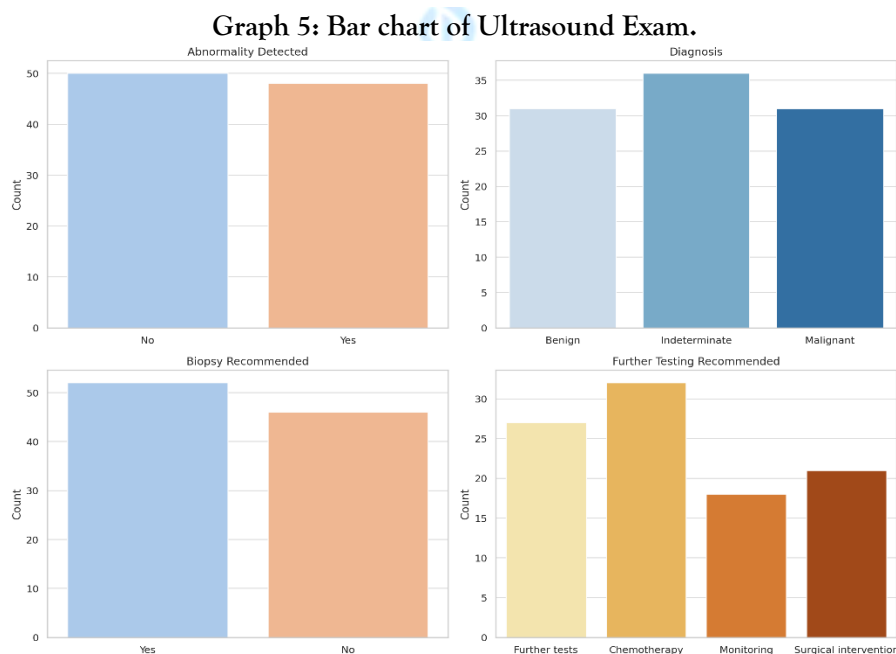
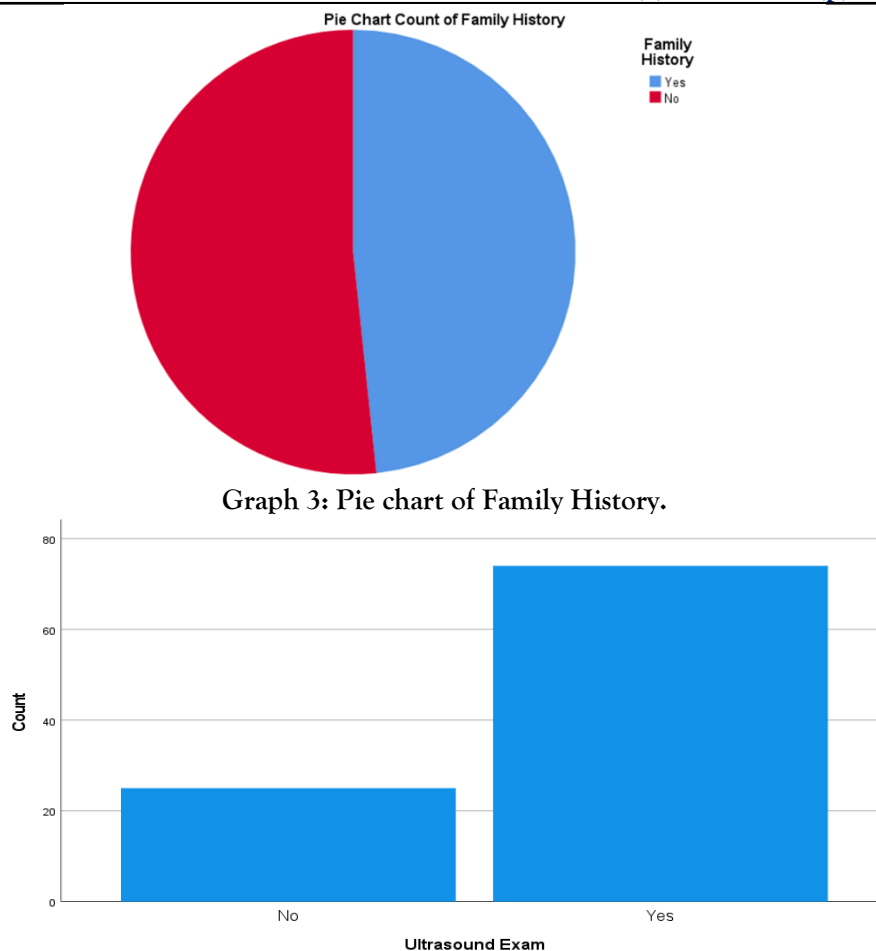
	N	Minimum	Maximum	Mean	Std. Deviation
Age	100	18.00	60.00	38.1200	12.56842
Marital Status	100	.00	1.00	.7000	.46057
Family History	100	.00	1.00	.4800	.50212
Breast Lump	100	.00	1.00	.6000	.49237
Ultrasound Exam	100	.00	1.00	.5800	.49604
Abnormality Detected	100	.00	1.00	.4500	.50000
Diagnosis	100	.00	2.00	.8200	.98862
Biopsy Recommended	100	.00	1.00	.4700	.50161
Further Testing Recommended	100	.00	1.00	.4500	.50000
Next Step	100	.00	2.00	.9800	.81625
Valid N (listwise)	100				



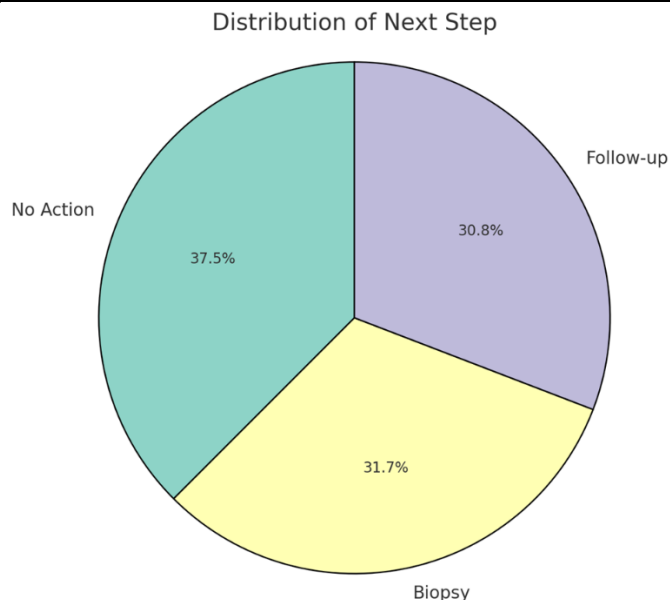
Graph1: Bar chart of the age.



Graph 2: Bar chart of the Marital Status.



Graph 6: Bar chart of Abnormality detected, Diagnosis, biopsy recommended and further testing recommended.



Graph 7: pie chart of the next step.

Correlation Matrix: This tool simplifies understanding the relationship between continuous variables.

The relationship between age and anomaly detection is relatively positive (0.19). Breast ultrasonography anomalies are slightly more likely to occur with age.

Breast lump and abnormality: The 0.43 correlation implies that ultrasonography abnormalities are strongly associated with breast lumps. Abnormality detection and diagnosis: The score of 0.55 implies a high likelihood of identifying an abnormality and a benign or malignant diagnosis.

Variable	Age	Family History	Breast Lump	Ultrasound Exam	Abnormality Detected	Diagnosis
Age	1	-0.05	0.12	0.15	0.25	0.05
Family History	-0.05	1	-0.08	0.05	-0.09	0.16
Breast Lump	0.12	-0.06	1	0.32	0.45	0.28
Ultrasound Exam	0.13	0.05	0.31	1	0.46	0.27
Abnormality Detected	0.19	-0.09	0.43	0.45	1	0.55
Diagnosis	0.05	0.17	0.28	0.25	0.56	1

Chi-Square Test Results: Table 3 Diagnosis and Marital Status: The diagnosis–marital status the chi-square test is significant at 0.043. Health behaviors and symptoms may differ between married and single people, suggesting a link between marital

status and diagnosis. Family history and diagnosis: The Chi-Square test of Family History vs. Diagnosis Table 4 shows a substantial connection ($p=0.035$). A family history of breast cancer or a similar condition may increase the likelihood of a malignant diagnosis.

Table 3: Diagnosis and Marital Status

	Value	df	Asymptotic Significance
Pearson Chi-Square	4.095	1	.043
Continuity Correction ^b	2.167	1	.141
Likelihood Ratio	2.788	1	.095
N of Valid Cases	100		

Table 4: The diagnosis and family history

	Value	df	Asymptotic Significance
Pearson Chi-Square	4.445	1	.035
Continuity Correction ^b	0.106	1	.735
Likelihood Ratio	0.231	1	.631
N of Valid Cases	100		

There is a highly significant correlation between family history and diagnosis, and it may suggest that there is a higher risk of breast lesions in people with a family history

Pearson Correlation (Age versus Detected Abnormality):

The Pearson correlation coefficient between age and detected abnormality is 0.22, signifying a slight positive association. We propose that age significantly, though not substantially, influences the probability of detecting abnormalities in breast ultrasonography.

Results of Logistic Regression

A logistic regression model was utilized to predict the diagnosis (benign or malignant) based on variables including age, family history, breast lump, and biopsy recommendation. The model achieved an accuracy of 74%, indicating it can effectively predict the diagnosis based on these parameters.

The accuracy of the model shows that while it is good, there is still room for improvement, especially with false positives and false negatives. The model gives accurate predictions of benign or malignant diagnoses depending on the chosen predictors.

Discussion

The study's findings illuminate several significant and nuanced aspects of Mingora, Swat's healthcare system, highlighting issues that hold significant importance for both the local population and healthcare decision-makers. Like many other places, the region has its set of problems that make it hard to provide good healthcare, especially when it comes to finding and treating breast lesions. One of these problems is that there isn't enough access to advanced diagnostic software and specialized medical services, which makes it much harder to make early and accurate diagnosis. Also, there is an urgent need for cheap and effective screening methods, like

ultrasound, that are crucial for finding breast lesions early and stopping it from getting worse. Ultrasound is an important tool for boosting early detection rates and lowering the number of advanced breast lesions because it is inexpensive and readily available. The study shows that having breast lumps and a family history of breast cancer are very significant signs that an ultrasound will show something wrong. Based on these results, healthcare workers and public health programs in Mingora should focus on screening people who exhibit these risk indicators. This focused approach should help find breast cancer patients earlier and, in the long run, lower the number of advanced breast lesions cases in the community. Mingora has many undetected instances right now, even though early screening is known to help. This study shows how important it is to raise public awareness about breast lesions. Closing the gap between diagnosis and treatment may require teaching people the importance of early screening and regular checkups. The study also found a strong link between marital status and the likelihood of getting a medical diagnosis. This suggests that married women may be more likely to seek medical assistance or have easier access to healthcare facilities. This discovery shows how cultural characteristics in the area might affect people's willingness to seek medical care. It also emphasizes the necessity for a more culturally sensitive approach to increase awareness about healthcare. Married women may benefit from a support system that makes them more likely to get medical care or gives them greater power to do so. This cultural aspect is very important for finding breast lesions early, and knowing more about these social and cultural factors could assist in making healthcare programmers that are more effective and include everyone in the community.

Conclusion

All things considered, this study emphasises the need of early breast lesions detection and the use of ultrasonography in detecting anomalies in Mingora, Swat. The high connections between abnormal ultrasound results, age, family history, and the presence of a lump can help to improve localised breast lesions screening programs. Despite its great performance, the logistic regression model has to be modified to better discriminate between benign and malignant illnesses. According to the findings, the risk factors that should be assessed first include breast lump and family history. To address the prevalence of breast lesions in the area, the study emphasises the importance of increasing access to healthcare and initiating early screening measures in Mingora, Swat. This research has made it feasible to improve the identification and treatment of breast lesions in Mingora, Swat, and other related places. Policymakers and healthcare practitioners can design better and more accessible breast cancer screening programs by paying attention to local requirements and considering culturally relevant issues.

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