Comparative analysis of mammary lump histology and elasto-graphy results at a tertiary hospital

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Abstract: In the majority of India's metropolitan populations, mammary carcinoma has become the commonest type of carcinoma. A non-invasive imaging method called mammary sono-elasto-graphy can reveal information about mammary lesions. Aims & objectives: In the current research, we examined the diagnostic efficacy of elasto-graphy and histo-pathological findings of mammary lumps. Material and Methods: The current investigation involved Female patients had solid mammary lesions less than 3 cm in size that were visible on sonography. Classified as BI RADS 3 and 4 lesions, these lesions. Results: 252 female patients had U.S.G. elastography, followed by biopsy or surgery, and histopathology reports were available during the research period. Histopathologically, 104 (41.72%) samples were benign, and the remaining 148 (58.73%) were malignant. Age, B.I.R.A.D.S., Elastography Score, and Strain Ratio were all statistically higher in malignant cases than in benign patients (p 0.001). According to Histo-pathological analysis, fibroadenoma (77.03%) accounted for the majority of benign lesions, followed by Abscess (5.41%), sclerosing adenosis (1.35%), benign fibroepithelial lesion (6.76%), and fibrocystic disease (9.46%). Conversely, poorly differentiated invasive carcinoma (5.77%), invasive ductal carcinoma (67.31%), and invasive mucinous carcinoma (13.46%), IL.C. (5.77%), medullary carcinoma (1.92%), papillary carcinoma (1.92%), and phylloid (1.92%) made up the bulk of malignant cases, Excellent results were noticed with the combination of Ultrasound Score + Elastography Score + Strain Ratio, with scores of 96.00%, 96.05%, 96.03%, 94.12%, and 97.33%, respectively, for susceptibility, accuracy, diagnostic accuracy, and N.P.V. and PPV. Conclusion: The ability to distinguish between benign and malignant mammary masses using ultra-sound elasto-graphy, strain elasto-

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graphy, and ultra-sound score has good susceptibility, accuracy, and diagnostic accuracy.

Keywords: mammary lump, mammary malignancy, elasto-graphy, histopathology

1. INTRODUCTION

In most of India's metropolitan populations, mammary carcinoma has become the most common type of cancer. As the most significant leading location of cancer in women, it quickly displaces cervical carcinoma[1]. The pathogenesis of the disease is thought to be influenced by a number of etiological variables, such as endocrine factors, lifestyle, physical inactivity, alcohol, diet, age, genetics, and family history. The "gold standard" procedure for finding breast masses is a biopsy, although it is invasive and expensive. Elastography has gained popularity recently as an alternative technique for non-invasive breast cancer screening to ultra-sonography[2-5]. Real-time elastography is employed in addition to the standard U.S., increasing diagnostic precision. A non-invasive imaging method called breast sonoelastography can provide information about breast lesions. By contrasting the hardness of a breast tumor with the surrounding tissue, it is feasible to distinguish between healthy and unhealthy tissue[6]. Shear wave elastography and strain (compression-based) elastography are currently the two methods used in clinical settings. The Sonoelastogram's color scale is used to measure the lesions[7]. The Tsukuba elasticity score is the most well-known of the several scoring techniques used in elastography.[8]
Aims & objectives: In the current research, we examined the diagnostic efficacy of elasto-graphy and histo-pathological findings of mammary lumps.

2.MATERIAL AND METHODS

The current research was prospective observational research carried out in central India's Department of Radio Determination. Researching lasted for a full year. The ethical committee at the institution gave its blessing.
Female patients with solid mammary lesions that are sonographically evident and less than 3 cm in size and are BI RADS 3 or 4 are required to meet the inclusion criteria.
Cystic lesions, solid lesions classified as B.I.R.A.D.S. types 2 or 5, lesions located near the skin's surface or the chest wall, and other lesions that meet specific requirements are excluded. There was no cytologic or histopathologic analysis of the lesions.
Each participant gave their signed, informed consent before participating throughout the research. An RS80A Samsung Medison device (42 Teheran ro 108 Gil, Gangnam gu, Seoul 135 851, South Korea) was used for the real-time ultrasound, and one of the two radiologists—who had eight and ten years of experience performing breast ultrasounds and training in elastography—performed S.E. after that.Clinical examination results, prior medical history, and demographic data were documented. The lesions were assessed using radial scanning and standard B mode ultra-sonography with supine patients. Based on standard ultrasonic parameters such shape, echotexture, margin, direction, and posterior acoustic characteristics, a BI-RADS category was assigned to each lesion.
Following it was elasto-graphy. The five-point Tsukuba categorization suggested by Itoh et al. was used to construct the Elastography score (ES).

Table 1: 5-score system for Elasto-graphy images

Score	Characteristic
1	The entire lesion is uniformly coloured green, showing that there is homogeneous strain throughout and that the lesion is soft throughout.
2	Green and blue mixed pattern indicating that the lesion is mostly soft with a few alternating patches of rigidity
3	Lesion displays strain at the periphery, which is shown by green, and central stiffness, which is represented by blue.
4	The lesion has uniform blue colouring, indicating that it is rigid throughout.
5	There is blue colouring throughout the lesion and its surroundings, demonstrating stiffness within and around the lesion.

Table 1: Lesions with an E.S. of 1-3 were considered benign lesions, whereas those with an E.S. of 4 or 5 were considered carcinomatous. Before being implanted in lateral subcutaneous fat tissue comparable in size and depth to the target lesion, the region of interest (R.O.I.) was initially positioned in the target lesion. The histopathological findings from biopsy or surgical specimens served as the benchmark for comparing the results of conventional ultra-sonography with elastography. The sonographic and elastographic properties of Based on the histological assessment, benign and malignant lesions were compared using the Mann-Whitney U test. P = 0.05 was utilized to define the significance threshold.

3.RESULTS

252 female patients had USG elasto-graphy during the research period, followed by biopsy or surgery, and histopathology results were made accessible. Histo-pathologically, 104 (41.72%) samples were benign and 148 (58.73%) were malignant. In comparison to benign cases, malignant patients had significantly greater age, BIRADS, Elastography Score, and Strain Ratio (p 0.001).display in Table 2.

Table 2: Average values of variables with respect to histo-pathological determination

Variants	Benign	Malignant	P
Age	39.49 ± 10.41	55.44 ± 14.35	<0.001
BIRADS	3.19 ± 0.25	4.33 ± 0.33	<0.001
Elasto-graphy Score	2.21 ± 0.31	4.33 ± 0.31	<0.001
Strain Ratio	1.41 ± 0.43	4.34 ± 1.16	<0.001

According to histopathological analysis, fibroadenomas made up the bulk of benign lesions (77.03%), and they were followed by benign fibroepithelial lesions (6.76%), abscesses (5.41%), fibrocystic disease (9.46%), and sclerosing adenosis (1.35%). Invasive mucinous carcinoma and intraductal carcinoma (67.31%) (13.46%), invasive poorly differentiated carcinoma (I.L.C.; 5.77%), medullary carcinoma, papillary carcinoma, and phylloid; 1.92 % constituted the majority of malignant cases. as seen in Table 3.

Table 3: Histo-pathological determination amongst malignant and benign lesions

HPE RESULTS	Number Of Cases	Percentage (%)
Benign (n=148)		
Fibroadenoma	114	77.03%
Fibrocystic disease	14	9.46%
Benign fibroepithelial lesion	10	6.76%
Abscess (ABS)	8	5.41%
Sclerosing adenosis	2	1.35%
Malignant (n=104)		
Invasive ductal carcinoma	70	67.31%
Invasive mucinous carcinoma	14	13.46%
Invasive poorly differentiated carcinoma	8	7.69%
ILC	6	5.77%
Medullary Ca	2	1.92%
Papillary Ca	2	1.92%
Phylloids	2	1.92%

The combination of the Ultra-sound Score + Elasto-graphy Score + Strain Ratio yielded decent results overall, but there were several notable exceptions. These were susceptibility, accuracy, NPV, PPV, and the following order of diagnostic accuracy: 96.00%, 96.05%, 96.03%, 94.12%, and 97.33%. We examined susceptibility, accuracy, diagnostic accuracy, NPV, and PPV for the elasto-graphy score, strain ratio, ultra-sound score, and combined elasto-graphy score and strain ratio, as indicated in Table 4.

Table 4: Comparison of susceptibility, accuracy, For the strain ratio, ultra-sound score, combined elasto-graphy score and strain ratio, combined scores, diagnostic accuracy, NPV, and PPV

Parameter	Elasto-graphy Score	Strain Ratio	Ultra-sound Score	Elasto-graphy Score + Strain Ratio	Ultra-sound Score + Elasto-graphy Score + Strain Ratio
Susceptibility (%)	83.36	86.25	88.32	93.44	96.00
Accuracy (%)	92.38	93.49	92.34	94.41	96.25
Positive Predictive Value (%)	85.36	88.05	86.33	92.00	94.06
Negative Predictive Value (%)	91.33	92.43	93.42	96.25	97.16
Accuracy (%)	89.34	91.14	91.14	94.22	96.15

4.DISCUSSION

An enhanced sonographic technique called sonoelastography is performed in conjunction with a traditional B-mode Ultrasonogram to evaluate suspected breast tumours. By averaging the pressures applied to the tissues, sonoelastography may measure their elasticity9. The sonoelastography's susceptibility ranged from 67% to 83%, and its accuracy ranged from 86.7% to 90%. According to studies, elastographic findings can

increase the receptivity and precision of traditional B-mode U.S.G. In a survey by El Said NAet al., lesions in the BI RADS III and the above categories exhibited a susceptibility of 84% for sonoelastography and 88% for M.R. mammography, respectively.[10-15]. Sonoelastography accuracy was 84% in the study, and M.R. mammography accuracy was 80%. In line with several earlier investigations, combining ultrasonic characteristics and elastography parameters (E.S. and S.R.) produced better results than each measure used alone in each category. Out of 90 individuals in the Kumar A.M.S. et al. study, 46 lesions were benign, and 44 were malignant. B-mode U.S.G.'s susceptibility, accuracy, and diagnostic accuracy were calculated to be 71.74%, 90.91%, and 81.11%, respectively, while elastography's values were 95.65%, 68.18%, and 82.22%. They concluded that elastography could supplement traditional B-mode U.S.G. and enhance diagnostic performance. Similar results were reported in the current study. When a cutoff value of 3 was utilized for the elasticity score, Sinha R et al. discovered a susceptibility of 97.0% and an accuracy of 86.7% in their study of 120 patients with breast lumps[16-18].
When a strain ratio (S.R.) cut-off of 3.8 was utilized, an accuracy of 95.5% and susceptibility of 93.3% were noted. In every instance, the vascular involvement, local or contiguous spread, and extent of the disease, as anticipated by the ultrasound elastography study, agreed with the cytological findings. Jishan.Ahmed16 investigated 106 individuals and discovered 31 malignant tumours and 74 benign lesions on H.P.E. To diagnose a malignant breast lump, the USE and F.N.A.C. tests have respective sensitivity, accuracy, positive and negative predictive values of 88%, 98.57%, 95.65%, 95.79%, and 89.28%, 100%, 100%, and 96.05%. Similar results were reported in the current study[19-21]. The ultra-sound elastography approach is more effective in diagnosing breast cancer than other diagnostic modalities. Ultrasound elastography's sensitivity was 0.9907 and 0.9, respectively, compared to biopsies. The A.U.C. value of mammary carcinoma ultra-sound screening increased from 0.77 for classical ultra-sound to 0.86 when the classical ultra-sound B.I.R.A.D.S. score was upgraded or downgraded based on both qualitative and semiquantitative elastographic data ("B.I.R.A.D.S. TM"). With quantitative elastography and S.R., U.S.G. accuracy is enhanced, breast cancer can be found early in the subcentimeter range, and fewer biopsies are required.

5.CONCLUSION

The ability to distinguish between ultra-sound score has good susceptibility, accuracy, and diagnostic accuracy. In a clinical setting, strain elasto-graphy is helpful in determining whether to intervene or follow patients with imaging. Elasto-graphy has limitations since the degree of tissue compression affects the results. Light pressure should be maintained for tissue determination because strong pressure can cause misdetermination. The elasticity score may be impacted by large malignant lesions that have necrosis, bleeding, or sarcomatous components.

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