

## Correlation between mammographic findings and tumours characteristics in patients suspected with breast cancer

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**Conflicts of Interest:** Nil

### Abstract:

**Introduction:** Breast cancer is the most common cancer in women worldwide. Risk factors are age, race, menopausal status, age of menarche and menopause, nulliparity, family history among others. High breast density on mammography has been shown to be a strong, independent risk factor.

**Objectives:** To study the correlation between mammographic findings including breast density and microcalcification with tumours characteristics in patients suspected with breast cancer.

**Methodology:** A Prospective study was conducted in the department of MMIMSR, Mullana from March 2021 to March 2023 and included 60 patients. All patients enrolled in the study underwent a complete clinical examination and relevant investigations including Mammography and were staged according to the AJCC TNM staging criteria. Demographic data, patient,

tumours and treatment characteristics were documented.

Qualitative description of the mammographic breast density and microcalcification were reported as per BI-RADS 2013. This was followed by FNAC/ TRU-CUT Biopsy.

**Results:** All patients were females. The age of majority of the patients (33.33%, 20 patients) was between 51 and 60 years. On mammography, majority of patients 76.67% (46 patients) had no chest wall invasion and 23.3% (14 patients) had chest wall invasion. 63.33% (38 patients) had no axillary lymph node and 36.67% (22 patients) had axillary lymph nodes present on mammography.

**Conclusion:** There was a significant correlation found between the chest wall invasion groups on mammography with percentage positive lymph nodes on histopathology. There was a positive correlation between pathological tumour size and positive lymph node percentage which was statistically significant. Mammography findings have

a week correlation with the histopathological findings. Mammography cannot be taken as a definitive investigation for patients suspected with breast cancer; needs to be supported by histopathology for the confirmation of the diagnosis. Mammography can be used as a good screening tool in the older age women.

**Keywords:** FNAC/ TRU-CUT Biopsy, AJCC TNM, Mammography etc.

### **Introduction**

Breast cancer is the most common cancer in women worldwide, representing nearly a quarter (25%) of all cancers<sup>1</sup>. It is a heterogenous disease that develops through different pathways with varying clinical, pathological and morphological features leading to complexities in detection and challenges in tailoring treatment<sup>2</sup>. The well-established epidemiological risk factors of breast cancer are age, race, menopausal status, age at menarche and menopause, nulliparity, age at first child birth, family history of breast cancer, personal history of breast cancer, past use of exogenous estrogens, lack of breast feeding, body mass index (BMI) after menopause, alcohol and tobacco consumption<sup>3</sup>.

The extent of radiologically dense breast tissue, referred to as mammographic density, varies among women and reflects differences in breast tissue composition. High breast density has been shown to be a strong, independent risk factor for breast cancer with relative risk increasing almost linearly with increasing density<sup>4</sup>. It has been estimated that a third of all breast cancer cases can be explained by high mammographic density. Mammographic breast density may reflect exposure to hormones and growth factors that stimulate cell division in breast stroma and epithelium<sup>5</sup>.

Mammographic density was first described by Wolfe who categorized it on the basis of qualitative parenchymal

patterns. Later, BI-RADS was established for standardization of mammographic reporting and included qualitative descriptors of mammographic density. Quantitative definitions were added in 2003 by American College of Radiology (ACR) and include corresponding percentages of density of breast tissue<sup>6</sup>.

In addition to increased risk of developing breast cancer, high breast density has also been linked to cancers which are larger and have positive lymph nodes, although reports vary considerably. Also, an association with Carcinoma in situ has also been demonstrated even though it is slightly weaker than for invasive breast cancer.

The studies conducted till date have been inconsistent in determining the association between mammographic density and breast cancer according to tumours characteristics. While some studies in the past have suggested no clear association, others have reported an association with tumours size and axillary lymph nodes. This study was conducted to explore any correlation between mammographic breast density and microcalcification and tumours characteristics namely primary tumours size, invasiveness, margin positivity and percentage positive axillary nodal status so that surgery can be tailored accordingly.

### **Methodology**

#### **Aims and objective**

To study the correlation between mammographic findings including breast density and microcalcification with tumours characteristics in patients suspected with breast cancer.

#### **Study Design**

Our study was a prospective study conducted in the department of MMIMSR Mullana from March 2021 to Sept 2023. All patients fulfilling the inclusion and

exclusion criteria were recruited after signing an informed consent form.

**Inclusion Criteria**

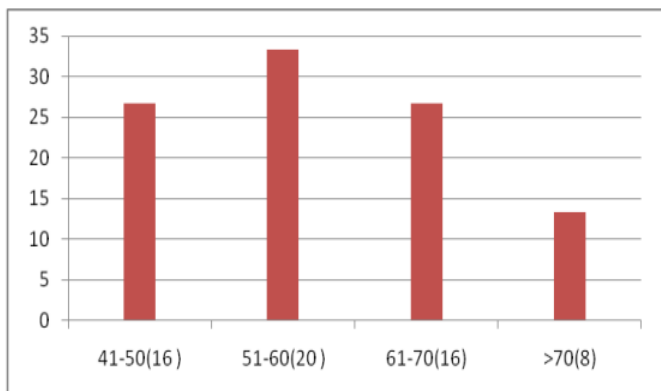
All the patients with histopathological confirmed breast cancer who underwent surgery as part of cancer directed therapy getting admitted in various units of the Department of Surgery.

**Exclusion criteria**

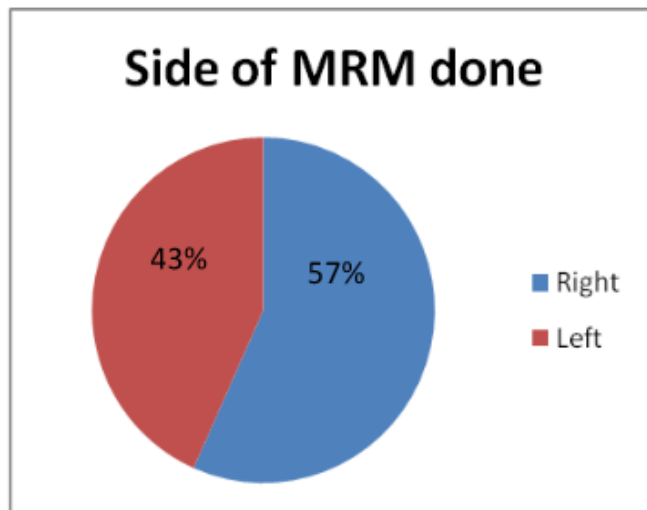
Patients not giving consent for participation in his study. All patients enrolled in the study underwent a complete clinical examination and relevant investigations including Mammography and Bilateral Breast sonography and were staged according to the AJCC TNM staging criteria. Demographic data, patient, tumours and treatment characteristics were documented as per protocol. Qualitative description of the mammographic breast density and microcalcification were reported as per BI-RADS 2013. This was followed by FNAB/TRU-CUT Biopsy. The type of surgery done was noted and histopathology report of the specimen was followed.

**Results**

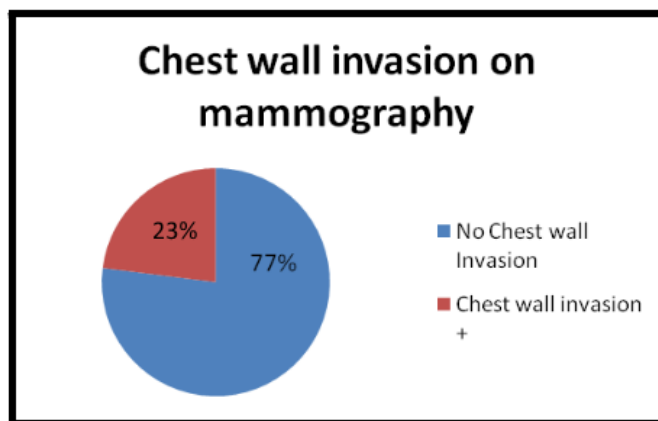
A total of 60 patients suspected with Breast Cancer who presented to the Department of General surgery were studied. All patients underwent Modified Radical Mastectomy.



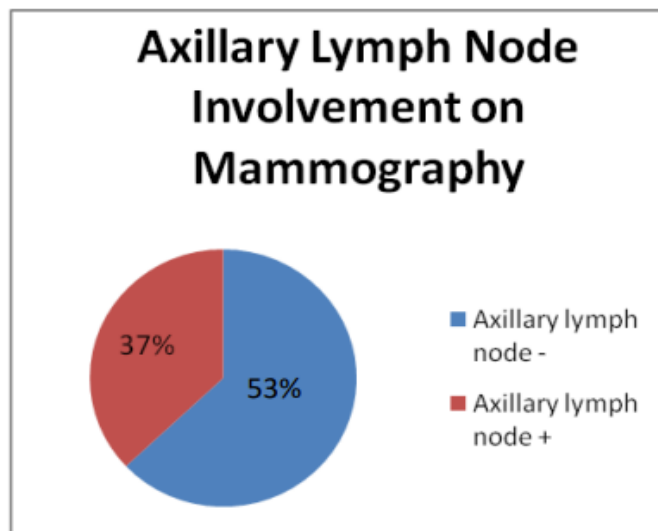
Graph 1: Age distribution of carcinoma breast patients



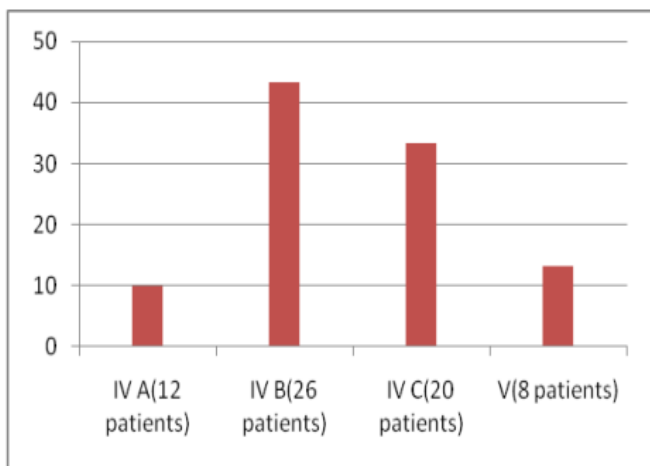
Graph 2: Side of MRM Done



Graph 3: Chest wall invasion on mammography



Graph 4: Axillary Lymph Node Involvement on Mammography



Graph 5: Distribution of BI-RADS Scoring in patients

Table 1: Correlation between no. Of axillary lymph node removed, no. Of axillary lymph node involved and % positive axillary lymph node and histopathological type.

	HISTOPATHOLOGICAL TYPE											Mann-Whitney U (z)	p-value	
	INVASIVE LOBULAR SUBTYPE					INVASIVE NST								
	N	Mean	Standard Deviation	Median	Quartile-I	Quartile-III	N	Mean	Standard Deviation	Median	Quartile-I			Quartile-III
NO. OF AXILLARY LN REMOVED	8	15.50	2.78	17.00	14.00	17.00	52	15.27	4.84	15.00	12.00	20.00	.349	.727
NO. OF AXILLARY LN INVOLVED	8	11.75	7.46	15.00	6.50	17.00	52	4.77	5.83	1.50	0.00	9.00	2.216	.027*
% POSITIVE AXILLARY LN	8	47.85	31.30	55.00	25.00	73.20	52	24.32	22.97	18.64	6.66	39.13	1.993	.046*

A statistically significant correlation was obtained between percentage positive axillary lymph nodes and Number of axillary lymph nodes involved with invasive lobular histopathological subtype.

Table 2: Correlation between no. of axillary lymph nodes removed, no. Of axillary lymph node involved and % positive axillary lymph node and chest wall invasion on mammography

	CHEST WALL INVASION (MAMMOGRAPHY)										Mann-Whitney U (z)	p-value		
	PRESENT					ABSENT								
	N	Mean	Standard Deviation	Median	Quartile-I	Quartile-III	N	Mean	Standard Deviation	Median			Quartile-I	Quartile-III
NO. OF AXILLARY LN REMOVED	14	15.29	3.02	15.00	12.00	18.00	46	15.30	5.01	15.00	11.00	20.00	.210	.833
NO. OF AXILLARY LN INVOLVED	14	7.71	6.72	9.00	1.00	13.00	46	5.09	6.32	2.00	0.00	9.00	1.282	.200
% POSITIVE AXILLARY LN	14	45.42	29.78	50.00	7.69	75.00	46	21.99	21.18	17.27	0.00	39.13	2.720	.007*

A statistically significant correlation was obtained between percentage positive axillary lymph nodes and chest wall invasion on mammography.

**Discussion**

The aim of our study was to correlate mammographic breast density with tumours characteristics and to explore any relationship between mammographic breast density and percentage positivity of axillary lymph nodes. This prospective study recruited a total of 60 patients with histologically confirmed carcinoma breast. The highest number of patients in our study were in the 51- 60years age group (33.3%). Studies suggest that the disease peaks at 41-50 years in Indian women. Checka et al demonstrated a negative correlation between age and mammographic breast density<sup>7</sup>.

**Birads score**

The BIRADS Score ranged from 4 to 5. 52 patients (86.6%) had a BIRADS score of 4; maximum patients with IV B (26 patients or 43.3%) while 20 patients (33.3%) were of IV C category. Sirous M et al concluded that majority (80%) of the women with known breast cancer had extremely dense breasts. Breast cancer risk was found to be higher in women with dense breasts<sup>8</sup>. A few studies such as by Kim et al have demonstrated a higher tumours size with BIRADS score of 5 and 6, but

no such significant correlation was found in our study<sup>9</sup>.

#### **Mammographic density and microcalcification**

43.3% of the participants in this study had qualitative mammographic density A, 36.6% had qualitative mammographic density B, 16.6% had qualitative mammographic density C and 3.3% of the participants had qualitative mammographic density D. There was no significant difference between qualitative mammographic density groups in terms of radiological tumours size. This can be explained on the basis of higher breast density making it difficult to define the tumours margins leading to discrepancies in the radiological tumours size measurement. There was no significant difference between qualitative mammographic density groups in terms of distribution of axillary lymph node involvement. There was no significant difference between qualitative mammographic density groups in terms of pathological tumours size and positive lymph node percentage on histopathological examination.

#### **Mammographic features and their correlation with percentage positive axillary lymph nodes on histopathology**

There was a significant correlation found between the chest wall invasion groups on mammography with percentage positive lymph nodes on histopathological examination.

There was a positive correlation between pathological tumours size and positive lymph node percentage which was statistically significant. The relationship between tumours size and axillary lymph node involvement in invasive lesions can be used to find the best candidates for full axillary dissection. Orang et al in their study showed a significant correlation between primary tumours size and axillary lymph node invasion. Greater involvement of lymph nodes, blood vessels, skin and nipple areola tissue

were also seen with increase in tumours size. Tumours size is a significant predictor of axillary lymph node involvement and involvement of surrounding tissue, so an exact estimation of the size of primary tumours is necessary prior to surgery in order to make the best decision for management of patients with breast cancer.

#### **Conclusion**

The study conducted on the study population of 60 patients diagnosed with carcinoma breast aimed to correlate the mammographic findings with tumours characteristics and to explore any relationship between mammographic density and microcalcification and percentage positivity of axillary lymph nodes. Our conclusion is as follows:

The demographic details of our study suggested that the highest number of the patients in our study were in the 51-60 years age group.

There was a positive association seen between chest wall invasion on radiological examination and percentage positivity of axillary lymph nodes.

We also obtained a positive correlation between the percentage of positive lymph nodes and histopathological size of the tumours.

Based on the current findings that mammographic density in general is highest earlier in life, primary prevention efforts might best be targeted to younger ages, reducing breast density later in life, leading to a lower cumulative mammographic density across life.

Mammography findings have a weak correlation with the histopathological findings. Mammography cannot be taken as a definitive investigation for patients suspected with breast cancer; needs to be supported by histopathology for the confirmation of the diagnosis. Mammography can be used as a good screening tool in the older age women.

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