

# Impact of Bone Scan on Management of Breast Cancer Patients

\* Masood Ahmed Qureshi, \* Mushtaque Ahmed Abbasi, \*\* Muhammad Sharif Awan, \*\*\* Muhammad Nawaz Abro, \*\*\*\* Imtiaz Ali Langah, \*\*\*\*\* Aijaz Hussain Awan, \*\*\*\*\* Naeem Karim Bhatti

## ABSTRACT

**Objective:** To determine the impact of bone scan on breast cancer management its benefits and harms.

**Methods:** This multicenter prospective observational study was conducted at surgical Unit III of Peoples University of Medical and Health Sciences for women, Jinnah Medical Center and NORIN Cancer Hospital, Nawabshah, from Jan 2014 to Dec 2016. In this study 150 females breast cancer patients diagnosed on histopathology without any prior systemic therapy were included. Triple assessment, including detailed history, clinical examination, radiologic assessment and histopathology for confirmation of type of carcinoma was performed in all patients. Bone scan was advised to observe the bone metastasis. Inclusion criteria were all recently diagnosed patients with breast carcinoma. Exclusion criteria were recurrent disease and the patients received oncology treatment such as radiotherapy, chemotherapy or hormone therapy. Data analysis done on SPSS 21 version

**Results:** There was wide variation of age ranging from 30 to 65 years. The mean age was  $41 \pm 3.2$  years. Risk factors of breast cancers were age over 40 years in 109 (72.66%) cases followed positive family history of breast cancer in 51 (34%) cases. The size of malignant breast lumps ranged from 2.2 cm to 13 cm with a mean size of  $6.6 \pm 2.7$ . On examination, findings were irregular margins in 98 (65.33%) cases, hard consistency in 120 (80%), firm to hard consistency in 30 (20%), tumor size  $\geq 2$  cm 136 (90.66%) patients. 7 (4.66%) patients of stage III had positive skeletal metastasis while 11 (7.33%) patients of stage IV had positive skeletal metastasis.

**Conclusion:** We conclude that bone scan should be done in stage III breast cancers. Presence of such lesion in association with normal radiograph appears highly suspicious of occult metastases.

**Key Words:** Bone Scan, Bone Metastases, Breast Cancer.

**Article Citation:** Qureshi MA, Abbasi MA, Awan MS, Abro MN, Langah IA, Awan Ah, Bhatti NK. Impact of Bone Scan On management of Breast Cancer Patients. J Peoples Uni Med Health Sci. 2018;8(2):88-92.

## INTRODUCTION:

Uncontrolled growth and dissemination of abnormal cells are the characteristics of cancer<sup>1,2</sup>. According to Ferlay reports that about 12.8 million new cases and 6.9 million death resulted in 2008<sup>3</sup>.

\* Assistant Professor, Surgical Unit-II, PUMHSW SBA.  
 \*\* Professor Surgical Unit-III, PUMHSW SBA  
 \*\*\* Consultant Oncologist, NORIN Cancer Hospital, SBA  
 \*\*\*\* Senior Registrar, Surgical Unit-II, PUMHSW SBA.  
 \*\*\*\*\* Senior Registrar, Anesthesia, PUMHSW SBA.

### Correspondence to:

**Dr. Masood Ahmed Qureshi**

Assistant Professor, Surgical Unit-II  
 PUMHSW-SBA

Email: drmasood2001@hotmail.com

The cancer is universally reported as a second cause of mortality and disability in females. In developing world, about 50% of cancers occur in peoples under 65 years of age<sup>4</sup>, it has been reported that in developing world, the diagnosis of cancer is too late for cure in majority (65%) of cases<sup>5</sup>.

The breast malignancy is thought to be leading cause of female cancer deaths, responsible for 23% of total cancer cases and 14% mortality rate<sup>6</sup>. In USA, the second leading cause of cancer death was breast cancer in 2002, and more than a million new cases were diagnosed during same period<sup>7</sup>.

Cancer incidence is increases in developing countries<sup>8</sup>. The mortality rate was increased upto

64% in the year 2008, which was attributed to some alterations in the cancer hazards including, precarious sex, reduced physical work, unhealthy food, over weight obese peoples, contaminants, ultraviolet or ionizing radiation, occupational or environmental exposure, aging, ethnicity or race, heredity and infectious diseases<sup>9</sup>. It is documented that heredity factors are involved in 5-10% of cases<sup>10</sup>.

A bone scan is used to determine the bone for damage caused by cancer or any other disease. It is different from DEXA Scan measure bone density. A bone scan is a nuclear imaging test that is done by using small amount of technetium 99m phosphate complexes to diagnose different problems of bones<sup>11</sup>. A bone scan carries no more risk than conventional X-Rays and remains the mainstay for detection of bone metastasis in current practice<sup>12</sup>. Bony metastasis occurs in about 20-80% cases of breast cancers<sup>13</sup>, and recurrence with distant metastasis occurs in 20 -30% of cases<sup>14</sup>. The mortality rate increases when the tumor is metastasizes to bone. Thus there is a find predictive factors for the occurrence of bone metastasis at earlier stage of breast cancer<sup>15,16</sup>. Thus this study has been designed as prospective study to assess bone scan results with all stages of breast cancer in systemic chemotherapy of the patients.

#### METHODS:

This multicenter study was conducted after permission of head of the departments. Data was collected of 150 females having breast carcinoma, diagnosed on histopathology, admitted in surgical Unit III of PMC hospital, Nawabshah, Jinnah Medical Center and Nuclear Medicine and Oncology Radiotherapy Institute (NORIN) Nawabshah, All patients underwent base line investigations and bone scanning along other investigations like X- Ray chest, ultrasound abdomen and CT scan chest & abdomen. Inclusion criteria were all recently diagnosed patients with breast carcinoma. Exclusion criteria were recurrent disease and the patients received oncology treatment such as radiotherapy, chemotherapy or hormone therapy. All information were documented on pre designed proforma and analyzed by SPSS 21 version.

#### RESULTS:

We collect the data of 150 breast carcinoma cases. There was wide variation of age ranging from a minimum of 35-65 years. The mean age was  $43 \pm 3.2$ , the maximum (37.33%) number of cases were found in 41-50 years age group, and the minimum (10%) cases were detected above 60 years of age. (Table No: I). The commonest breast cancer risk was age above 40 years in 109 (72.66%) cases followed by positive family history of breast cancer in 51 (34%) cases (Table No.II).

The size of malignant breast lump ranged from 2.2cm to 13cms with mean size of  $6.6 \pm 2.7$ cm. Local examination findings were irregularity in 98 (65.33%), hard consistency in 120 (80%), firm to hard consistency in 30 (20%), size  $\geq 2$ cm 136 (90.66), skin tethering in 130 (86.33%), peud orange in 65 (43.33%), nipple defacement/retraction in 60 (40%) and chest wall fixation in 75 (50%) cases. Axillary lymph nodes were palpable in 83 (55.33%) cases. (Table No. III).

Out of 150 patients, 97(64.67%) patients had infiltrating ductal carcinoma. 19 (12.67%) patients with lobular carcinoma, 13 (8.67%) patients had medullary carcinoma and 5 (3.33%) patients had malignant phylloides tumors. (Table No. IV). According to TNM classification 7 (4.66%) patients of skeletal scintigraphy showed positive metastatic skeletal involvement in stage-III while 11 (7.33%) patients had metastatic involvement in stage-IV. (Table No. V)

**Table-I: Age Distribution**

Age of the Patients (Years)	No. of Patients (n=150)	Percentage (n=150)
35-40	15	10.67%
41-45	56	37.33%
46-50	25	16.67%
51-55	18	12%
56-60	20	13.33%
61-65	15	10%

**Table-II: Risk Factors for Breast Cancer**

Age of the Patients (Years)	No. of Patients (n=150)	Percentage (n=150)
Age above 40 years	109	72.66%
Positive Family History	51	34%
Early Menarche	39	26%
Use of Contraceptive Pills	41	27.33%
Nulliparous	16	10.66%

**Table-III: Examination Findings**

Age of the Patients (Years)	No. of Patients (n=150)	Percentage (n=150)
Irregularity	98	65.33%
Hard Consistency	120	80%
Firm to Hard Consistency	30	20%
Size > 2cm	136	90.66%
Skin Tethering	130	86.33%
Peud Orange	65	43.33%
Nipple Defacement/Retraction	60	40%
Chest Wall Fixation	75	50%
Axillary Lymph Nodes Palpable	83	55.33%

**Table-IV: Histopathological Finding**

Age of the Patients (Years)	No. of Patients (n=150)	Percentage (n=150)
Invasive Ductal Carcinoma	97	64.67%
Invasive Lobular Carcinoma	19	12.67%
Medullary Carcinoma	13	8.67%
Invasive Papillary Carcinoma	09	6%
Mucinous Carcinoma	07	4.67%
Malignant Phylloides Tumor	05	3.33%

**DISCUSSION:**

Breast carcinoma is the most frequent malignancy in women and therefore the most important cause of cancer related death worldwide, accounting for 23% (1.3 million) of all new cancer cases and 14% (458400) of all deaths due to cancer in 2008<sup>17</sup>. Pakistan has one of the highest incidence rate in Asia. Unlike the west epidemiology, the disease tends to occur at the younger age, has larger tumor size and shows a higher frequency of metastases to regional lymph nodes<sup>18</sup>.

Approximately 50% of cases belong to 4<sup>th</sup> and 5<sup>th</sup> decade of life. The mean age was 43±3.2 years. While in the study of Shaikh NA et al<sup>19</sup> reported the maximum number of cases were in 4<sup>th</sup> 23.52% and 5<sup>th</sup> 35.29% decades of life.

**Table-V: Bone Scan**

TNM Stage of breast cancer		Bone Scan	No. of Patients (n=150)	Percentage (%)
Stage I	T1N0M0	Negative	20	13.33
		Positive	00	00
Stage II A	T0N1M0, T1N1M0, T2N0M0	Negative	20	13.33
		Positive	00	00
Stage II B	T2N1M0, T3N0M0	Negative	11	7.33
		Positive	01	0.67
Stage III A	T0N2M0, T1N2M0, T2N2M0, T3N2M0	Negative	18	12
		Positive	01	0.67
Stage III B	T4N0M0, T4N1M0, T4N2M0	Negative	16	10.67
		Positive	03	02
Stage III C	Any TN3M0	Negative	14	9.33
		Positive	03	02
Stage IV	AnyTAnyNM	Negative	32	21.33
		Positive	11	7.33

The exact pathogenesis and cause of development of breast cancer are still unclear. These factors include early age menarche, late menopause and late age of first full term pregnancy. There are studies suggesting that the earlier full term pregnancy will decrease the susceptibility of breast tissue to develop neoplastic changes. Furthermore, after the age of 40 years the risk of breast cancer increases in nulliparous while it is decrease in those having multiple pregnancies<sup>19-21</sup>. Data from Pakistan about the possible risk factorseg. Nulliparity, infertility, old age, early menarche, late menopause and positive family history have been identified, yet to our knowledge no study have commented on the role of dietary fat as the possible etiological factor of breast cancer in our population. In this study the common breast cancer risk factors were age above 40 in 109(72.66%) followed by positive family history in 51(34%) cases. However another study reported age above 40 in 110(34%) cases, fatty diet in 94(62.67%), family history of breast cancer in 51(34%) and history of breast trauma in 23(15.33%) cases<sup>22</sup>.

Most of reporters in Pakistan focused on malignant diseases or benign breast diseases, in our study histopathology results were 97 (64.67%) patients had infiltrating ductal carcinoma, among 19(12.67%) patients with lobular carcinoma, 13(8.67%) had medullar carcinoma, 5(3.33%) patients had phylloid tumors. However in the study of Shaikh NA<sup>19</sup>, reported ductal carcinoma as commonest 789(29.3%). Others include invasive lobular carcinoma 38(1.4%) medullary carcinoma 21(0.8%), papillary carcinoma 16(0.6%), mucinous carcinoma 14(0.5%) and malignant phylloides tumor 11(0.4%). Patients with multiple lesions on bone scans are associated with a higher rate of metastasis compared to those with single or double lesions. Lesions located on rib combined with other sites are more likely to be bone metastasis than other site lesions, it could be interpreted that increase number of lesions result in higher incidence of metastasis. Previous studies have shown larger tumor size and positive lymph node were risk factors for bone metastasis in breast cancer patients after diagnosis of disease<sup>23,24</sup>, our results showed that in breast cancer patients with bone scan abnormalities, significantly increased rate of

bone metastasis were observed in patients with multiple lesions, large tumor size and lymph node involvement. We observed 7(4.66%) patients of skeletal scintigraphy showed positive skeletal involvement in stage III followed by 11(7.33%) patients was metastatic skeletal involvement.

### CONCLUSIONS:

We conclude that bone scan for breast cancer should be performed in stage III breast cancer. The presence of such lesion is associated with a normal radiograph appears to be highly suspicious of occult metastases.

### REFERENCES

1. Mathur G, Nian S, Sharma PK. Cancer: An Overview. *Academic J Cancer Res.* 2015;8(1):1-9.
2. Jemal A, Desantis C, Ward EM. Global Patterns of Cancer Incidence and Mortality Rates and Trends. *Cancer Epidemiol Biomarkers Prev.* 2010;19:1893-907.
3. Ferlay J, Shin HR, Bray F, Forman D, Mathers C, Parkin DM. Cancer Incidence And Mortality Worldwide. International Agency for Research on Cancer GLOBOCAN. 2008;1-2.
4. International Atomic Energy Agency IAEA. Setting up a Radiotherapy Programme: Clinical, Medical Physics, Radiation Protection and Safety Aspects. Vienna, 2008. Available from; <http://www.iaea.org/books>
5. Sohail S, Alam SN. Breast Cancer in Pakistan-awareness and early detection. *JCPSP.* 2007;17:711-2.
6. Elsayed MA, Ahmed RH, Aymen MA. Correlation Breast Cancer Subtypes Based on ER/PR and HER2 Expression with Axillary Lymph Node Status. *Cancer Oncol Res.* 2014;2(4):51-7.
7. Angulo M, Vesquez F, Hortobagyi N. Overview of Resistance to Systemic Therapy in Patients with Breast Cancer. *Adv Exp Med Biol.* 2007;608:1-22.
8. Shamsi FB, Naseem N, Nagi AH, Axillary lymph node status in primary breast carcinoma; association of axillary lymph node status with ER/PR,HER2/neu and MMP-1 in primary breast carcinoma. *Professional Med J.* 2015;22(5):627-31.

9. Higman S. Understanding the Burdon of Cancer in Developing Countries. 2010. Available from; [http://www.globalhealth.org/images/pdf/cancer\\_slide\\_1.pdf](http://www.globalhealth.org/images/pdf/cancer_slide_1.pdf)
10. Rees G, Fry A, Cull A and Sutton S. Illness Perception and Distress in women at Increased Risk of Breast Cancer. *Psychol Health*. 2004;19(6):749-65.
11. Davies CJ, Griffiths PA, Preston BJ, Moris AH, Elston CW, Blamey RW, et al. Staging of Breast Cancer: Role of Bone Scanning. *Br Med J*. 1977;2(6087):603-5.
12. Coolen A, Leunen K, Menten J, Van steenberg, Neven P. False-Negative Tests in Breast Cancer Management. *J Med (Netherland)*. 2011;69(7/8):324-9.
13. Houssami N, Costelloe M. Imaging Bone Metastases in Breast Cancer; evidence on comparative test accuracy. *Ann Oncol*. 2011;22:1-10.
14. Kennecke H, Yershalmi R, Woods R, Cheang MCU, Vodue D, Sprees CH, et al. Metastatic Behaviour of Breast Cancer subtypes. *J Clin Oncol*. 2010;28(20):3271-7.
15. Chen J, Zhu S, Xie XZ, Guo SF, Tong LQ, Zhou S, et al. Analysis of clinico pathological factors associated with bone metastasis in Breast Cancer. *J Huazhong Uni Sci Technol*. 2013;33(1):122-5.
16. Liu T, Cheng T, Xu W, Yan WL, Liu J, Yang HL et al. A meta-analysis of 18 FDG-PET, MRI and bone scintigraphy for diagnosis of bone metastasis in patients with Breast Cancer. *Skeletal Radiol*. 2011;40(5):623-31.
17. Jamel A, Bray F, Center MM, Jacques-Ferlay ME, Ward E, Forman D. Global cancer statistics. *CA Cancer J Clin*. 2011;61(2):69-90.
18. Shamsi FB, Naseem N, Nagi AH. Axillary lymph node status with ER/PR, HER2/neu and MMP-1 in primary breast carcinoma. *Professional Med J*. 2015;22(5):627-31.
19. Shaikh NA, Ujjan I, Chang F, Rajput JA. Breast diseases Pattern at LUMHS, 10 years experience of consecutive referrals to public sector medical university at Hyderabad/Jamshoro. *Professional Med J*. 2012;19(3):45-50.
20. Bhattyacharya S, Adhinkary S. Evaluation of risk factors, diagnosis and treatment in carcinoma of breast retrospective cohort. *Katmandu Uni Med J*. 2006;4(1):54-60.
21. Walter C, Stampfer MJ, Colditz GA, Rosner BA. Dietary Fat and the Risk of Breast Cancer. *N Engl J Med*. 1987; 316:22-8.
22. Holmes MD. Association of Dietary Intake of Fat and Fatty Acids with Risk of Breast Cancer. *JAMA*. 1999;281(10):914-20.
23. Solomayer EF, Diel IJ, Meyberg GC, Gollan C, Bastert G. Metastatic Breast Cancer: clinical course, prognosis and therapy related to the first site of metastasis. *Breast Cancer Res Tr*. 2000;59:271-8.
24. Colleni M. Identifying Breast Cancer Patients at High Risk for bone metastases. *J Clin Oncol*. 2000;18:3925-35.