



Original Article

## Assessment Of The D-Dimer Levels And Their Correlation With Lymph Node Involvement In Carcinoma Breast

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### ABSTRACT

**Background:** increasing evidence indicated that D-dimer levels could be regarded as markers of advanced breast cancer.

**Methods:** D-dimer measurement was done before any surgical intervention, and clinical staging was done including; tumor size, site, nodal involvement, distant metastases (TNM).

**Results:** In the present study, mean D-Dimer levels among the patients of stage I, stage IIA, stage IIB, stage IIIA, stage IIIB, stage IIIC, and stage IV was 0.22 µg/mL, 0.8725 µg/mL, 1.3271 µg/mL, 1.71883 µg/mL, 2.3762 µg/mL, 3.2636 µg/mL and 3.9012 µg/mL respectively. Significant results were obtained while comparing the mean D-Dimer levels in between the patients according to the staging of breast carcinoma (P value < 0.05).

**Conclusion:** D-dimer was found to be an independent predictive and supportive factor to the conventional sentinel node biopsy method to find out the lymph node metastasis in the axilla in cases of breast cancer.

**Keywords:** Lymph Node, breast cancer, clinical staging.

### INTRODUCTION

For decades together, cervical cancer was the most common cancer in women in India, and more deaths in women in India were attributed to cervical cancer than any other cancer. It accounts for more than 1 in 10 new cancer diagnoses each year. It is the second most common cause of death from cancer among women in the world. Anatomically, the breast has milk-producing glands in front of the chest wall.<sup>1, 2</sup>

Mammography is a widely used screening approach in the detecting of breast cancer and proved to help reduce mortality effectively. Other screening methods, such as Magnetic Resonance Imaging (MRI), which is more sensitive than mammography, have also been implemented and studied during the last decade. There're numerous risk factors such as sex, aging, estrogen, family history, gene mutations, and unhealthy lifestyle, which can increase the possibility of developing breast cancer.<sup>3</sup>

D-dimer (or D dimer) is a fibrin degradation product (or FDP), a small protein fragment present in the blood after a blood clot is degraded by fibrinolysis. Plasma D-dimer is a hypercoagulability and fibrinolytic system marker, which is formed when factor XIIIa (cross-linked fibrin) is degraded by plasmin. It is increased in various solid tumor patients including breast cancer. D-Dimer is the only test that directly tells about both thrombin and plasmin generation i.e. generation of thrombin resulting in a cross-linked fibrin clot and of plasmin resulting in the lysis of cross-linked fibrin clot. Extracellular remodeling of fibrin is essential for angiogenesis in tumors, and activation of intravascular fibrin formation and degradation has been shown to occur in the plasma of breast cancer patients.<sup>4-7</sup> Hence; the present study was undertaken for assessing the d-dimer levels and their correlation with lymph node involvement in carcinoma breast.

### MATERIALS AND METHODS

The present study was conducted in the Department of General Surgery, GGS Medical College and Hospital, Faridkot. The study was conducted on 50 patients with carcinoma breast who reported to the department of surgery as per the following criteria:-

Blood venous samples (3 ml) were collected from all patients for d-dimer measurement before any surgical intervention, and clinical staging was done including; tumor size, site, nodal involvement, distant metastases (TNM). Ultrasound/ CT of abdomen and chest x-ray/ CT were done for each patient. Grading of the disease was done by a histopathological study including lymph-involvement, lymphovascular invasion, and the number of lymph nodes involved by the tumor. After completion of the study, observations obtained were tabulated and analyzed using appropriate statistical methods.

## RESULTS

34 percent and 32 percent of the patients belonged to the age group of 41 to 50 years and 51 to 60 years respectively. In 54 percent of the patients, the left side was involved while the remaining 46 percent of the patients, the right side were involved. 22 percent of the patients had stage IIIC of breast carcinoma while 16 percent of the patients each had stage IV and stage IIA of breast carcinoma. 14 percent and 12 percent of the patients had stage IIB and stage IIIA of breast carcinoma. No lymph node involvement occurred in 20 percent of the patients while up to four lymph node involvements occurred in 32 percent of the patients. Five to nine lymph node involvement occurred in 20 percent of the patients while ten or more lymph node involvement occurred in 30 percent of the patients.

**TABLE 1: DISTRIBUTION OF PATIENTS ACCORDING TO STAGING OF BREAST CARCINOMA**

Stage	Number of patients	Percentage
I	2	4
II A	8	16
II B	7	14
III A	6	12
III B	8	16
IIIC	11	22
IV	8	16
Total	50	100

**TABLE 2: DISTRIBUTION OF PATIENTS ACCORDING TO NUMBER OF LYMPH NODE INVOLVEMENT**

Number of lymph nodes	Number of patients	Percentage
Zero	10	20
One to four	16	32
Five to nine	10	20
Ten or more	15	30
Total	50	100

**TABLE 3: DISTRIBUTION OF PATIENTS ACCORDING TO D-DIMER LEVELS**

D-Dimer levels (µg/mL)	Number of patients	Percentage
≤0.25	2	4
0.26 to 1	7	14
1.01 to 2	15	30
2.01 to 3	7	14
3.01 to 4	16	32
More than 4	2	4
Total	50	100
Mean ± SD	2.2628 ± 1.1784	

**TABLE 4: D-DIMER LEVELS ACCORDING TO STAGING OF BREAST CARCINOMA**

Stage	Mean	SD
I	0.2200	0.0141
II A	0.8725	0.2158
IIB	1.3271	0.3546
IIIA	1.7183	0.3029
IIIB	2.3762	0.3986
IIIC	3.2636	0.3225
IV	3.9012	0.0764
Overall	2.2628	1.1784
F-value	123.486	
p-value	0.000 (Significant)	

**TABLE 5: D-DIMER LEVELS ACCORDING TO NUMBER OF LYMPH NODE INVOLVEMENT**

Number of lymph nodes	Mean D-Dimer levels	SD
Zero	1.1930	0.6907
One to four	1.4268	0.6433
Five to nine	3.0710	0.9455
Ten or more	3.4050	0.3994
F-value	36.718	
p-value	0.000 (Significant)	

## DISCUSSION

The present study was conducted in the department of general surgery of Guru Gobind Singh Medical College, Faridkot and it included an assessment of d-dimer levels and their correlation with lymph node involvement in carcinoma breast.

A total of 50 subjects were enrolled. Following observations were made:

In the present study, the mean age of the patients was 48.52 years. Our results were in concordance with the results obtained by previous authors who also reported similar findings in their respective studies. The mean age of the breast carcinoma patients in the study conducted by Patel S et al was 46 years. In another study conducted by Srivastava et al, 70 percent of the patients were within the age range of 41 to 70 years.<sup>8</sup>

In the present study, Mean D Dimer levels were found to be 2.2628 µg/mL. In 32 percent of the patients, mean D-dimer levels were found to be between 3.01 to 4 µg/mL while in 30 percent of the patients, mean D-dimer levels were between 1.01 to 2 µg/mL. In a study conducted by Dirix et al, mean D-Dimer levels were found to be 2.1 µg/mL. In another study conducted by Khan MZ et al, 58 percent of the patients had D-Dimer levels between 0.26 to 0.5 µg/mL while 40 percent of the patients had D-Dimer levels between 0.5 to 2 µg/mL.<sup>9, 10</sup>

In another study conducted by Ghadhbhan BR et al, 57.1 percent of the patients and 31.4 percent of the patients had D-Dimer levels between 0.5 to 2 µg/mL and between 0.26 to 0.5 µg/mL respectively.<sup>11</sup>

In the present study, mean D-Dimer levels among the patients of stage I, stage IIA, stage IIB, stage IIIA, stage IIIB, stage IIIC, and stage IV was 0.22 µg/mL, 0.8725 µg/mL, 1.3271 µg/mL, 1.71883 µg/mL, 2.3762 µg/mL, 3.2636 µg/mL and 3.9012 µg/mL respectively. Significant results were obtained while comparing the mean D-Dimer levels in between the patients according to the staging of breast carcinoma. Our results were in concordance with the results obtained by previous authors who also reported similar findings in their respective studies.

In the study conducted by Harish S et al, mean D-Dimer levels among the patients of stage IIA, stage IIB and stage IIIA were 1.31 µg/mL, 1.74 µg/mL, and 2.87 µg/mL respectively. They also observed significant results while comparing the mean D-Dimer levels in between the patients according to the staging of breast carcinoma. In another study conducted by Choudhary G et al, mean D-Dimer levels among the patients of stage I, stage IIA, stage IIB, stage IIIA, stage IIIB, stage IIIC, and stage IV was 0.2 µg/mL, 0.233 µg/mL, 0.383 µg/mL, 0.605 µg/mL, 0.650 µg/mL, 2.30 µg/mL and 1.1 µg/mL respectively. They also reported significant results while comparing the mean D-Dimer levels in between the patients according to the staging of breast carcinoma.<sup>12, 13</sup>

In the present study, Mean D-Dimer levels among the patients with one to three lymph node involvement were 1.3635 µg/mL while among the patients with four to nine lymph node involvement occurred in 2.8 µg/mL. In patients with ten or more lymph node involvement, mean D-Dimer levels were found to be 3.405 µg/mL. Significant results were obtained while assessing D-Dimer levels according to the number of lymph node involvement in breast carcinoma patients.

Our results were in concordance with the results obtained by Srivastava V et al and Choudhary G et al who also reported a significant positive correlation between the number of lymph nodes involvement and mean D-Dimer levels.<sup>8, 12</sup>

In the study conducted by Srivastava V et al, the mean D-dimer levels amongst the patients with 1-3 lymph node involvement were 0.454 µg/mL while among the patients with 4-9 lymph nodes involvement occurred in 0.478 µg/mL. In patients with ≥10 lymph node involvement, mean D-Dimer levels were found to be 0.772 µg/mL.<sup>12</sup>

## CONCLUSION

D-dimer was found to be an independent predictive factor for lymph node metastasis thus providing an easy, simple, convenient, and easily reproducible objective test. D-dimer can be used as an additional supportive parameter to the conventional sentinel node biopsy method to find out the lymph node metastasis in the axilla in cases of breast cancer.

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