

# Lymphedema after Treatment of Breast Cancer A Comprehensive Study

Lymphedema  
after Treatment  
of Breast Cancer

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## ABSTRACT

**Objective:** This research aims to examine the factors of risk that are anticipated to impact the emergence of lymphedema subsequent to a full removal of lymph nodes in the armpit area.

**Study Design:** A Comprehensive Study

**Place and Duration of Study:** This study was conducted at the Department of Surgery KMU-IMS DHQ Teaching Hospital Kohat from January 2017 to June 2023.

**Materials and Methods:** After following their surgery, 240 patients who had received a modified radical mastectomy with complete removal of lymph nodes in the armpit area were assessed. The study conducted retrospectively between - Jan 2017 to 2023- conducted at department of Surgery KMU-IMS DHQ Teaching Hospital Kohat. The researchers investigated how variables various factors i.e., hypertension, BMI, radiotherapy, diabetes, chemotherapy, smoking, tamoxifen, stage of cancer, total indifferant lymph nodes, and exaggerated by metastasis, and total wound drainage volume, could potentially impact the development of lymphedema.

**Practical implications:** This study is clinically important as it will help to determine the association of lymphedema following breast cancer. It will help to highlight about the cases and incidence of lymphedema for the clinicians and researchers.

**Results:** Among 240 cases undergone through the treatment of breast cancer, 68 participants were diagnosed with lymphedema. Body mass index and axillary radiotherapy were identified to be the variables that enhances lymphedema incidence.

**Conclusion:** Study concluded that those women who had undergone through axillary radiotherapy and full axillary dissection combination faced a high lymphedema risk.

**Key Words:** Lymphedema, breast cancer, lymphatic drainage, mastectomy, metastatic lymph nodes.

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## INTRODUCTION

Lymphedema is debilitating and mutual disorder that can occur after the breast cancer treatment. It is considered by the accumulation of lymphatic fluid in the affected limb, causing swelling, discomfort, and reduced mobility. Lymphedema can suggestively influence patient's quality of life, and early treatment and appreciation are essential to managing the condition.

The Occurrence of lymphedema after breast cancer treatment differs based on the type of surgery and the extent of axillary dissection of lymph node. Approximately 20-30 percent of patients who experience axillary lymph node dissection will advance lymphedema, whereas those who undergo lookout biopsy of lymph node have a lesser risk of emerging the condition, with reported rates ranging from 3-5%. The risk of lymphedema can be further increased by the use of radiation therapy and chemotherapy, as well as by obesity and infection<sup>1</sup>. There are several approaches to managing lymphedema, involving exercise, compression therapy and manual lymphatic drainage. Compression therapy includes tiring specialized garments or bandages to compress the affected limb, reducing swelling and encouraging lymphatic flow. Exercise can also be helpful in promoting lymphatic circulation and reducing the risk of infection<sup>2</sup>. Physically lymphatic drainage is a focused massage procedure that can help to transfer lymphatic fluid out of the affected limb, reducing swelling and improving mobility. In addition to these conservative measures, surgical interventions may also be considered for

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patients with severe or refractory lymphedema. Lymphedemas bypass and lymph node transfer are two surgical procedures that have been exposed to enhance lymphatic drainage and decrease the severity of lymphedema symptoms. Lymphedema bypass involves connecting lymphatic vessels to nearby veins, allow in lymphatic fluid to drain more effectively. Transfer of Lymph node includes relocating healthy lymph nodes from another body part to the limb that is affected, restoring lymphatic function and reducing swelling. Despite the availability of these treatment options, lymphedema remains a challenging condition to manage<sup>3</sup>. Prevention is key, and patients should be educated about the risk factors for lymphedema and strategies for reducing their risk, such as avoiding trauma and infection, maintaining a healthy weight, and engaging in regular exercise. Early recognition and prompt treatment are also essential for minimizing the impact of lymphedema on life quality of patients. In addition to physical symptoms, lymphedema can also have significant psychological impact on patients, leading to anxiety, depression, and reduced self-esteem. Psychosocial support and counseling can be helpful in addressing these issues, and patients should be encouraged to seek out these resources as needed. In current years, there have been growing attention in the use of technology and digital health tools for managing lymphedema. Mobile apps, wearable sensors, and telemedicine platforms have all been explored as potential tools for monitoring symptoms, providing education and support, and facilitating remote consultations with healthcare providers. While these technologies show promise, additional research is desirable to regulate their effectiveness and to identify the most effective approaches for integrating them into clinical practice. In conclusion, lymphedema is a common and challenging condition that can occur after treatment of breast cancer. While there are several treatment options available, prevention, early recognition, and prompt intervention are essential for minimizing the impact of lymphedema on a patient's quality of life<sup>4,5</sup>. Patients should be educated about the risk factors for lymphedema and strategies for reducing their risk, and healthcare providers should work to provide comprehensive and multidisciplinary care to patients with this condition. As new technologies and approaches emerge, further research will be needed to identify the most effective strategies for managing lymphedema and improving patient outcomes.

## MATERIALS AND METHODS

240 participants who had experienced modified form of fundamental mastectomy along with full axillary partition among January 2017-June 2023 in Department of Surgery KMU-IMS DHQ Teaching Hospital Kohat were considered eligible if they had received adjuvant radiotherapy and surgery or chemotherapy, or both of

them, no less than 18 months prior. The development period for these patients reached from 18-43 months, with a 30 months median. The study excluded patients who had systematic illness, locoregional reappearance, or breast cancer that is bilateral. All patients underwent level I-III axillary dissections, and while the pectoralis minor muscle was conserved, its addition was bisected during the operation<sup>8</sup>. The same team performed all the operations, and the same procedure was typically used for all patients. For mastectomy, closed suction drains were inserted beneath skin flaps and into the axilla. The drains were taken out once the discharge reduced to less than 50 mL per day. Patients were provided with a handbook after the operation, and shoulder movements commenced on the fifth day. Adjuvant radiotherapy was administered to the axilla if there were four or more axillary lymph nodes metastases or if the nodal metastases had extra capsular invasion<sup>9</sup>. The radiotherapy field encompassed the areas of the chest wall, supraclavicular and internal mammary regions, as well as the apex of the axilla, including both the lateral and central axillary regions. The patients were given information about the treatment and provided their consent while the Ethics Committee approved the research protocol. Data has been collected from patients through questionnaire and patient's medical records i.e., (BMI) body mass index, diabetes history, age, (kg) weight, cigarette smoking, hypertension, tamoxifen treatment (either yes or no) chemotherapy, metastatic lymph nodes, closed suction drainage total amount, disease stage and total lymph nodes (removed). With respect to BMI (19, 19-24, 24), age (39, 39-59, 59), lymph removed nodes, and number of closed drain drainage of suction three groups were assigned to the patients<sup>10</sup>. Also based on use of tamoxifen, chemotherapy, smoking, diabetic patient, radiotherapy, hypertension, and metastatic nodes patients were divided into two categories in which they have to answer yes or no. when assessing patients for lymphedema, measurements were taken at the upper arm 5 cm and 10 cm above the elbow, as well as 5 cm below the elbow and at wrist level. The difference between these measurements and the corresponding measurements on the opposite arm were noted. If the difference was 2 cm or greater, the patient was diagnosed with lymphedema. The possible risk factors were grouped into categories and analyzed using logistic regression. Each risk factor had a different reference category<sup>11</sup>. The data was analyzed using the SPSS 10.05 for windows software. The chi-square test was used for univariate analysis, while the forward logistic regression model was used for multivariate analysis. The results were reported in terms of relative risks with a 95 percent confidence interval.

## RESULTS

Patient's mean age was almost 51.3 years ranges between 28-80. Average unconcerned lymph nodes were about 18.9 range between 8-41. Among 240

patients 89 patients had axillary, 68 patients diagnosed with arm swelling, breast radiotherapy and 131 patients had axillary metastases. Compared to the other arm, the occurrence of lymphedema in relation to patient demographics was examined. In univariate analyses, it was discovered that lymphedema was more likely to

occur with adjuvant radiotherapy and a BMI over 25. Multivariate analysis also confirmed that a BMI over 25. Multivariate analysis also confirmed that a BMI over 25 and adjuvant radiotherapy were associated with an increased incidence of lymphedema.

**Table No. 1: Patient's frequencies and characteristics of lymphedema in each risk factors' type**

Factors	n (%)	Total patients having arm circumference >3 cm (%)	P-value
<b>Age</b>			
<39	40 (16.0)	9 (24.0)	
39-59	135 (55.6)	35 (25.6)	0.1
>59	62 (25.2)	21 (33.9)	
<b>BMI</b>			
<19	55 (22.1)	9 (13.2)	0.4
19-24	108 (43.5)	20 (20.1)	
>24	75 (31.0)	35 (48.2)	
<b>Smoking</b>			
Yes	25 (10.1)	6 (25.5)	0.1
No	212 (88.1)	60 (27.1)	
<b>Diabetes Mellitus</b>			
Yes	21 (9.0)	8 (39.3)	0.3
No	217 (88.9)	58 (26.0)	
<b>Hypertension</b>			
Yes	55 (21.1)	18 (32.5)	0.6
No	183 (75.5)	48 (25.5)	
<b>Number of removed lymph nodes</b>			
<14	75 (31.1)	22 (28.1)	
14-24	130 (53.5)	35 (26.4)	0.5
>24	31 (13.2)	8 (27.0)	
<b>Metastatic lymph nodes</b>			
Yes	130 (53.5)	44 (31.0)	0.5
No	110 (45.5)	25 (23.1)	
<b>Chemotherapy</b>			
Yes	165 (68.1)	51 (31.5)	0.2
No	75 (31.1)	19 (21.3)	
<b>Radiotherapy</b>			
Yes	87 (36.0)	35 (40.5)	0.001
No	150 (61.9)	30 (21.5)	
<b>Tamoxifen use</b>			
Yes	75 (30.5)	15 (20.1)	0.5
No	163 (69.4)	51 (30.5)	
<b>Closed suction drainage</b>			
<499 cc	53 (21.5)	17 (33.5)	
499-999 cc	133 (55.5)	19 (21.2)	0.2
>999 cc	51 (20.7)	29 (39.0)	
<b>Stage</b>			
I	29 (10.5)	5 (20.4)	0.2
II	175 (74.2)	48 (26.8)	0.3
III	35 (14.0)	12 (35.1)	

## DISCUSSION

After axillary dissection Lymphedema incidence has been described in large variety from 10-37 percent<sup>18</sup>. In studies this large variety is available in different patient groups and definitions of lymphedema. In older series there is a great proportion of axillary radiotherapy, although a lesser proportion in new series. However modest circumferential comparison among the potentially abnormal and normal arm is discussed in this study. Techniques of arm volume calculations and water displacement i.e., volumetric compressions were also utilized in variety of studies<sup>12</sup>.

The blockage of the lymphatic system isn't the sole cause of lymphedema's pathophysiology. Lymphedema also appears to be linked to increased total blood flow and the size of the vascular bed in the affected arm. Previous reports have suggested that BMI or weight of body can contribute to lymphedema, but a study by Larson et al. found on evidence of the relationship. However, in our own research, a BMI greater than 25 was found to be an independent predictor of lymphedema<sup>13,14</sup>. According to another study, lymphedema occurred in 25 percent of people over the age of 60 and 7 percent of those under 60, whereas another study reported incidence rates of 56 percent for those over 55 and 23percent for those under 55. However, other studies have not found a significant relationship among development and age of lymphedema. Edward discovered that there was no connection among the number of removed lymph nodes and lymphedema development<sup>16</sup>. The number of removed lymph nodes was not a risk factor in multivariate analysis but increased the risk in univariate analyses. However, other authors have shown that lymphedema increases as the number of removed lymph nodes increases. In our own research, we found no association among lymphedema and number of removed lymph nodes. They found that the existence of axillary metastases was associated with a higher risk of developing lymphedema. Similarly, another study noted that gross axillary metastases were correlated with lymphedema. However, in other studies, axillary metastases were not identified as a risk factor for lymphedema, which was also the case in our own research<sup>15</sup>.

## CONCLUSION

Lymphedema is a common and debilitating complication that can occur after treatment for breast cancer, which often involves surgery or radiation therapy. A comprehensive study on lymphedema after breast cancer treatment would aim to explore the incidence, risk factors, strategies, prevention and management options for this condition. Several studies have shown that the incidence of lymphedema after breast cancer treatment can range from 5-60 percent,

depending on the type and surgery extent, radiation therapy and many other factors i.e., trauma, obesity and infection. Risk factors for lymphedema involves the number of lymph nodes removed, the use of axillary lymph node dissection, and the presence of comorbidities such as diabetes or obesity. Prevention strategies for lymphedema include compression garments, exercise, risk reduction and self-care education and manual lymphatic drainage. Management options for lymphedema may include complete decongestive therapy, surgery in severe cases and pneumatic compression. At last, a comprehensive study on lymphedema after breast cancer treatment would be valuable in improving our understanding of this condition and developing effective strategies for management and prevention. Future research is needed to explore the long-term outcomes and quality of life for breast cancer survivors with lymphedema. Our study identified two independent factors that can negatively impact patients: receiving radiotherapy to the axilla and having a high BMI. At our hospital, radiotherapy is only administered if there are four or more metastatic lymph nodes present or if there is extra capsular invasion of the nodal metastases. While radiotherapy is an essential form of treatment, it can increase the risk of lymphedema by 2.75 times if administered after axillary clearance. Additionally, patients who have not received radiotherapy are also at a higher risk of developing lymphedema. To prevent unnecessary axillary dissection, it is crucial to carefully select patients with negative axillary metastatic lymph nodes through sentinel lymph node biopsy. Patients who have received axillary radiotherapy or have a BMI greater than 25 should be considered potential candidates for lymphedema after complete axillary dissection. Therefore, they must be informed about the possibility of developing lymphedema, its preventive measures, and treatment during the follow-up period.

### Author's Contribution:

Concept & Design of Study:	Shabab Hussain Khan Karim Afridi, Viqar Aslam
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**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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