

Yoga on Quality of Life among Women with Breast Cancer Related Lymphoedema (BCRL): A Randomised Control Trial

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Abstract. Breast cancer-related lymphoedema (BCRL) is a global healthcare issue that has a significant impact on the emotional and life quality of breast cancer survivors. This study aims to evaluation of the effect of yoga on quality of life and emotional factors in women who have breast cancer related lymphoedema (BCRL). The subjects (women = 40) over the age of 18 from HCG Sola, Civil, and other hospitals in Ahmedabad were divided randomly into two groups; one was the experimental group (n = 20) and the other was the control group (n = 20). An unpaired t-test of all domains of the "LYMQOL ARM Lymphoedema Quality of Life Tool" was performed between the pre-data of the experimental group and the pre-data of the control group. By conventional criteria, this difference was considered to be not statistically significant. The study design was a randomised-control trial. All participants and witnesses signed the consent form. The scale used to measure the lymphoedema quality of life level of the subjects before and after the intervention of both groups was the "LYMQOL ARM Lymphoedema Quality of Life Tool" Scale, The experimental group had an eight-week yoga-based intervention. Sessions were held five days a week. The analyzed data was calculated by the dependent sample (paired) 't'-test. The experimental group's function domain score was statistically significant (p 0.0001), and due to the control group's self-management was similarly significant (p = 0.031). The experimental group's appearance score was statistically significant (p 0.0001), but the control group's was not (p = 0.1256). The experimental group's symptom score was statistically significant (p = 0.0265), but the control group's was not (p = 0.2371). The experimental group's emotional score was statistically significant (p 0.0001), but the control group's was not significant (p = 0.1041). The experimental group's quality of life score was statistically significant (p 0.0001), but the control group's was not (p = 0.2141). Thus study, supported yogic intervention mediated improvement in quality of life and general wellness for women with breast cancer-related lymphoedema (BCRL).

Keywords. Breast cancer related Lymphoedema, Yoga, Quality of life, Emotional health

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PUBLISHED BY

Dev Sanskriti Vishwavidyalaya Gayatrikunj-Shantikunj Haridwar, India

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Introduction

Breast cancer is the most common type of the cancer in women, accounting for 14% of all the cancers in Indian women. According to the 2018 report on breast cancer statistics, there were 1,62,468 new cases registered and 87,090 reported deaths. Breast cancer in stages 3 and 4 affects more than half of Indian women. Breast cancer accounts for 25% to 32% of all female cancers in cities such as Mumbai, Delhi, Bengaluru, Bhopal, Kolkata, Chennai, and Ahmedabad, accounting for more than a quarter of all female cancers. Almost half of all cases are between the ages of 25 and 50. Furthermore, more than 70% of cases in the advanced stage had poor survival and high mortality [1]. Breast cancer is now the most common type of cancer in women all over the world. Simultaneously, advances in diagnostics, treatment, and care have resulted in an increased survival rate, posing new challenges for the healthcare system in terms of how to support patients in achieving optimal rehabilitation. Pain, lymphoedema, fatigue, and depression are all common side effects of the disease or treatments. Furthermore, reduced health-related quality of life (HRQoL) and psychosocial consequences such as reduced social contacts and psychological distress, as well as difficulty resuming functional activity and life roles, and unmet information needs, have been reported. Because of this, people with BC may need physical, mental, social, and existential rehabilitation. More research is needed to figure out the best way to help these people [2].

The lymphatic system is part of the circulatory system and a vital part of the immune system, comprising a network of lymphatic vessels that carry a clear fluid called lymph (from Latin, *lympha* meaning water directionally towards the heart). Lymph nodes are part of the lymphatic system that can be found widely distributed throughout the entire body. They are responsible for trapping foreign particles and filtering pathogens found within the body. There are between five and six hundred lymph nodes in the human body, many of which are grouped into clusters in different regions, such as the underarm and abdominal areas. Lymph node clusters

are commonly found at the base of limbs (groin, armpits) and in the neck [3].

Breast cancer-related lymphoedema (BCRL) is a treatment-related complication that can occur as a result of axillary lymph node surgery and/or external beam radiation therapy (XRT) [4]. BCRL causes swelling of the affected arm as a result of protein-rich fluid accumulation in the interstitium and changes to the adipose tissue, which can make the arm more susceptible to infections such as cellulitis [5]. Breast cancer-related arm lymphoedema (BCRL) is one of the most common and feared side effects of breast cancer treatment, affecting more than 1 in 3 patients who undergo axillary lymph node dissection [6]. According to reports, the incidence of BCRL varies and is approximately 20% after one year and increases to 40% after ten years of breast cancer treatment, with a cumulative incidence of 28%. Lymphoedema can appear within days of surgery and can persist for up to 11 years after treatment for breast cancer [1]. Patients struggle with BCRL for the rest of their lives due to its irreversible and progressive nature. Self-management interventions hold great promise for slowing the progression of BCRL. It teaches patients about BCRL and how important it is to prevent it, and it empowers them to take safe actions. A variety of interventions, including upper extremity exercise, physical therapy, manual lymph drainage, compression garments, and yoga, have been applied to the subclinical and mild stages of BCRL [7].

The extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions are referred to as emotional regulation [8]. These techniques can vary by culture, but one common belief is that individuals must exert some control over their emotions. Physical exercises (asanas) may improve a patient's physical flexibility, coordination, and strength, whereas breathing exercises and meditation may calm and focus the mind to develop greater awareness and reduce anxiety, resulting in a higher quality of life [9]. Yoga is the practice of combining breath with body movements to promote spiritual, emotional, and physical balance in an individual. According to research,

yoga reduces the activity of the hypothalamic-pituitary-adrenal (HPA) axis and the sympathetic nervous system (SNS), which are activated in normal stress responses by the release of cortisol and catecholamine [10]. Yoga, as an integrated practice, has been studied for its benefits for women during and after breast cancer treatment, with improved QOL, mood and acceptance, immunity, and decreased fatigue, joint pain, anxiety, and depression in those who suf-

fer from arm impairment reported an improvement in their overall well-being [5].

This study aims to investigate the efficacy of a yoga-based programme that includes adapted asanas, pranayama, relaxation (savasana), and meditation in improving quality of life in women with breast cancer and lymphoedema. This paper reports the results of quality of life tests in women with BCRL.

Criteria	Inclusion	Exclusion
Age	18	17
Medical status	Cancer therapy completed; 6 month post surgery	Active cancer Uncontrolled hypertension; Congestive heart disease BMI 42kg/m ²
Exercise status	Able to participate in gentle exercise; Able to attend all measuring appointments; Able to attend all yoga classes.	Already involved in a structured exercise program or unable to participate in gentle exercise. Unable to attend any measuring appointments or yoga classes
BCRL therapy	Not currently receiving BCRL reduction treatment	Current BCRL reduction treatment

Table 1: Inclusion and exclusion factors of the study

Sr.	Yoga Practice	Time Duration
1	Prayer (Om sahnavaatu...)	5 minutes
2	Sukshma Vyayam	15 minutes
3	Asana	20 minutes
4	Pranayama and or savasana or meditation	15 minutes
5	Omkar and Counseling	5 minutes
	Total	60 minutes

Table 2: Plan for yoga Intervention program

Methodology

Assessment using Breast Cancer Related Lymphoedema (BCRL) Quality Of Life Control Questionnaire (BCRL LYMQOL) standardized by Dr V L Kelley (Consultant in Palliative Medicine, Lymphoedema Clinic, Royal Derby Hospital, Uttoxeter Rd, Derby. DE223NE) for pre and post data was done. The effect of lymphoedema on a patient's quality of life (QoL) has been widely underestimated. It is now clear,

though, that it can cause physical and emotional symptoms, as well as a loss of physical and social function by severe decrease in their quality of life [11]. BCRL may cause upper extremity range of motion problems as well as discomfort, heaviness, and numbness in the arms. In addition to a decrease in self-confidence caused by a disruption in the mental picture of the body, anxiety disorders, anger, and bereavement enhance the likelihood of psychological difficulties [12].

Ethics approval was granted by Research Ethics Committee. 40 samples (>18 years) were taken from hospitals in Ahmedabad like HCG Sola, Shubham hospital, GCRI civil, Dr Shakuntalaben etc. and randomly assigned to control (n=20) and experimental (n=20) groups by using concealed methods. Before starting the intervention, statistical analysis was performed by using a t-test calculator graph pad. An unpaired t-test of all domains of the "LYMQOL ARM Lymphoedema Quality of Life Tool" was performed between the pre-data of the experimental group and the pre-data of the control group. By conventional criteria, this difference was considered to be not statistically significant. The study design was a randomised-control trial.

Assessment

All participants and witnesses filled in and signed the consent form. General health-related questions answered by the participants. The scale used to measure the lymphoedema quality of life level of the subjects before and after the intervention of both groups was the "LYMQOL ARM Lymphoedema Quality of Life Tool" Scale, which was standardized by Dr. V. L. Kelley (Consultant in Palliative Medicine, Lymphoedema Clinic, Royal Derby Hospital, Uttoxeter Rd, Derby, DE223NE). The scale consists of 21 questions and 5 response Domains as 'function', 'Appearance', 'Symptoms', emotion, and overall quality of life. A lymphoedema self-management and risk-reduction education seminar was attended by both the groups prior to the intervention. An eight-week yoga-based intervention that includes adapted asanas, pranayama, relaxation (savasana) and meditation was conducted for the experimental group. Sessions were held five days a week. The participants took part in an eight-week yoga program. The intervention consisted of two batches, in the morning and evening. All the participants were allotted to their respective batches. A total of 40 sessions of 60 minutes each were conducted for the intervention among BCRL patients. Attendance at the group yoga sessions was high (98%).

Table 2: Plan for yoga Intervention program

This protocol is based on the three yoga protocols. The research by Loudon et al. [13] is based on the actual text of Swami Satyananda Saraswati, while Fisher et al. [14] did not mention any textual or traditional sources. The third method is SR Narahari's [15] yoga regimen. The procedure was then evaluated by a lymphedema specialist and a physiotherapist. When the intrathoracic pressure drops during inspiration, lymph drains into the venous system, while expiration permits lymph to flow from the extremities. Controlled breathing, along with contractions of the rectus abdominis, diaphragm, and intercostal muscles, causes pressure variations in the abdominal and thoracic areas, as in Bhastrika. Because of these pressure variations, lymph might flow toward the thorax. The inhalation is extended in breathing (pranayama) exercises such as Ujjayi, Anuloma Viloma, Suryabhedana, and Rechaka kumbhaka. Bhastrika's continuous exhale strokes try to entirely empty the thoracic cavity of air. This type of yoga improves lymphatic drainage by making the diaphragm and abdominal muscles move strongly across the belly. This helps to move lymph fluid out of the body's edges [15]. The approach has prioritised meditation, which is most likely to promote stress reduction.

Results

1. The domain function score included how much the swollen arm affects daily activities (Q:1 a-h), leisure activities (Q:2), and dependency on others (Q:3) (Table 1). 2. The domain appearance score included how much the swollen arm affects appearance, finding clothes to fit, finding clothes to like to wear, how one feels about oneself, and relationships with other people (Q: 4,5,6,7,8) (Table 2). 3. The domain symptom score included swollen arm causing pain, numbness, feeling of 'pins and needles' or tingling, swollen arm feeling heavy, swollen arm feeling week, one feels tired (Q: 9,10,11,12,13,14) (Table 3). 4. The domain emotion score included sleep trouble, concentrating on things, feeling tense, worried, irritable, and depressed in the past week (Q: 15,16,17,18,19,20) (Table 4). 5. The score of overall quality of life (Q21) is scored as the value

marked by once, between 0-10 (Table 5). Statistical analysis was performed using a t-test calculator graph pad. A dependent sample (paired) 't'-test was used to analyse the collected data.

Group	Pre test Mean	Post test Mean	Mean difference	t Ratio	p value
Experimental group	20.4	17.85	2.55	4.95	< 0.0001
Control group	23	24.15	-1.15	2.33	0.031

Table 3: Lymphoedema Quality Of Life (LYMQOL) Score of Function Domain (Functions Q1,2,3 (Total Score) Minimum =10, Maximum = 40). Table 3 indicates that the received "t" ratio of the experimental group is 4.95, which is > 1.729, which is considered to be statistically significant (at $p < 0.0001$), whereas the "t" ratio of the control group is 2.33, which is > 1.729, which is considered to be statistically significant (at $p = 0.031$). Because of their self-management, the outcomes of the control group were statistically significant in the function domain.

Group	Pre test Mean	Post test Mean	Mean difference	t Ratio	p value
Experimental group	20.4	17.85	2.55	4.95	< 0.0001
Control group	23	24.15	-1.15	2.33	0.031

Table 4: Lymphoedema Quality Of Life (LYMQOL) Score of Appearance Domain (Appearance Q4,5,6,7,8 (Total Score) Minimum = 05, Maximum=20). Table4 indicates that the received "t" ratio of the experimental group is 7.198, which is > 1.729, which is considered to be statistically significant (at $p < 0.0001$), whereas the "t" ratio of the control group is 1.602, which is <1.729, which is considered to be not statistically significant (at $p = 0.1256$).

Group	Pre test Mean	Post test Mean	Mean difference	t Ratio	p value
Experimental group	17.3	16.6	0.7	2.405	0.0265
Control group	17.3	17.7	-0.4	1.221	0.2371

Table 5: Lymphoedema Quality Of Life (LYMQOL) Score of Symptoms Domain (Symptoms Q9,10,11,12,13,14 (Total Score) Minimum =06, Maximum=24). Table5 indicates that the received "t" ratio of the experimental group is 2.405, which is > 1.729, which is considered to be statistically significant (at $p = 0.0265$), whereas the "t" ratio of the control group is 1.2201, which is <1.729, which is considered to be not statistically significant (at $p = 0.2371$).

Discussion

In comparison to the control group, the experimental group showed significant improvement in all domains of LYMQOL, namely, the LYMQOL score of the function domain, the LYMQOL score of the appearance domain, the LYMQOL score of the symptoms domain, the LYMQOL score of the emotion domain, and the rate of overall quality of life at present. Be-

cause of their self-management, the outcomes of the control group were statistically significant in the function domain. The goal of the study was to find out how yoga improved the quality of life of BCRL patients. This was done by comparing different aspects of quality of life between BCRL patients in the experimental group and those in the control group. Yoga has been shown to improve quality of life in breast can-

Group	Pre test Mean	Post test Mean	Mean difference	t Ratio	p value
Experimental group	16.6	10.65	5.95	9.318	<0.0001
Control group	14.6	15.85	-1.25	1.7071	0.1041

Table 6: Lymphoedema Quality Of Life (LYMQOL) Score of Emotion Domain (Emotion Q15,16,17,18,19,20 (Total Score) Minimum =06, Maximum=24). Table6 indicates that the received "t" ratio of the experimental group is 9.318, which is > 1.729 , which is considered to be statistically significant (at $p < 0.0001$), whereas the "t" ratio of the control group is 1.701, which is < 1.729 , which is considered to be not statistically significant (at $p = 0.1041$).

Group	Pre test Mean	Post test Mean	Mean difference	t Ratio	p value
Experimental group	5.5	7.7	2.65	6.0648	<0.0001
Control group	5.35	5.55	0.2	1.2854	0.2141

Table 7: Rate of Overall quality of life at Present (Overall quality of life (Q21) is scored as the value marked between 0-10). Table7 indicates that the received "t" ratio of the experimental group is 6.0648, which is > 1.729 , which is considered to be statistically significant (at $p < 0.0001$), whereas the "t" ratio of the control group is 1.2854, which is < 1.729 which is not statistically significant (at $p = 0.2141$).

cer survivors in some studies. One relevant study, "Effect of yoga on psychological functions and quality of life in women with breast cancer: A meta analysis of control trials," included six studies with a total of 382 patients. According to the meta-analysis, yoga can improve QoL in women with breast cancer. Yoga improved QoL significantly (standard mean difference = 0.27, 95 percent confidence interval [0.02, 0.52], $p=0.03$). Although the effects of yoga on psychological function outcomes such as anxiety, depression, distress, and sleep were positive, they were not statistically significant ($p > 0.05$). Fatigue showed no statistically significant difference ($p > 0.05$) [14]. Another supported study is "Yoga management of breast cancer-related lymphoedema: A randomised controlled pilot-trial". Following baseline testing, participants were randomly assigned to either an 8-week yoga intervention ($n = 15$) consisting of a weekly 90-minute teacher-led class and a 40-minute daily DVD session, or a usual care wait-listed control group ($n = 13$). The primary outcome measures were lymphoedema arm volume measured by circumference and extracellular fluid mea-

sured by bioimpedance spectroscopy. Secondary outcome measures included tonometry-measured tissue induration; a visual analogue scale (VAS) for sensations, pain, fatigue, and their limiting effects; and the Lymphoedema Quality of Life Tool for quality of life (LYMQOL). Baseline, week 8 (post-intervention), and week 12 measurements were taken (four weeks after the cessation of the intervention). The study's findings at week 8, the intervention group had a greater decrease in tissue induration of the affected upper arm ($p = 0.050$) and a greater reduction in the symptom sub-scale for QOL ($p = 0.038$). In week 8, there was no difference in lymphoedema or extracellular fluid arm volume between groups; however, at week 12, arm volume increased more for the intervention group than the control group ($p = 0.032$) [15].

One study looked at the effect of yoga on arm volume, quality of life, self-reported arm function, and hand grip strength in female breast cancer survivors with lymphedema caused by the disease [16]. Six women BCRL aged 49 to 69 years old with no history of other chronic medical conditions participated in modified Hatha yoga

3x/week for 8 weeks. Arm volume significantly decreased from baseline ($2423.3\text{ml}\pm 597.2$) to final measures ($2370.8\text{ml}\pm 577.2$) ($p=.02$). No significant changes in QOL ($p=.12$), self-reported arm function ($p=.34$), or hand grip strength ($p=.26$) were found [16].

Limitations of the Study were that i) diet, lifestyle, daily routine, habits, and social and family circumstances could all have an impact on the study's findings, and ii) the weather conditions such as atmospheric temperature, humidity, and meteorological factors during collecting data and training periods were also not considered.

Conclusion

This study concluded that the effect of regular yoga practices helps in stress management, improves the quality of life, and increases the level of problem solving among BCRL patients. According to Cramer's study, yoga is recommended as a supportive intervention for improving health-related quality of life and reducing fatigue and sleep disturbances compared to no therapy and for reducing depression, anxiety, and fatigue compared to moderate-quality evidence-based psychosocial/educational interventions [17]. Yoga for BCRL will target the soft tissue parts of the breast and maintain the lymphatic fluid circulating through the channels rather than slow it down and clog it. Lymphoedema cannot be reversed, although it might be controlled. The development of a deeper state of relaxation will counteract mental and physical tension, which is critical to the health, well-being, and recovery of patients. Yogasana and breathing exercises (pranayama) can assist in protecting the chest tissue from shrinking and promoting physical and mental recovery. Yoga assists patients in regaining control of their lives and feeling good about themselves.

It is therefore recommended that the results of the study may be used by yoga therapists and health trainers to give more emphasis on health. It helped women who have had mastectomy (post-operative women) to make use of yoga training to assess the problems regarding lymphoedema. Yoga practice helped individuals

to maintain their body, mind, and spirit and to promote healthy well-being. Trials with longer interventions and larger samples, as well as more other variables, It should be conducted. Further geographical areas may be included for further studies on health-related physical, mental awareness, and physiological variables of lower income groups other than Ahmedabad. Attempts should be made to educate all classes of women (rural and uneducated groups, urban, hilly and coastal) about the importance and involvement in yoga and an active lifestyle in life, so as to lead a healthy life.

Compliance with ethical standards Not required.

Conflict of interest The authors declare that they have no conflict of interest.

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