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Effects of Yoga for Degree of Shoulder Movement with Quality of Life among Breast Cancer Patients Modified Radical Mastectomy

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ABSTRACT

Koontalay A, Ngowsiri K, Sangsaikeaw A. Effects of Yoga for Degree of Shoulder Movement with Quality of Life among Breast Cancer Patients Modified Radical Mastectomy. **JEPonline** 2019;22(3):124-135. The purpose of this study was to compare the effects of shoulder movement Yoga on life quality of breast cancer patients after modified radical mastectomy. The sample group consisted of 60 breast cancer patients who received modified radical mastectomy, selected by criteria-based purposive sampling. The sample group was divided into 2 equal Test Group and Control Group of which the subjects in each group had similar age, marital status, income, stage of disease, personality, and body mass index. The Control Group received normal treatment and advice, while the Test Group received Yoga training in 3 steps: (a) relationship forming; (b) medical information giving; and (c) 45-min Yoga sessions 3 times·wk⁻¹ for 12 wks. In addition, the Test Group was encouraged to practice Yoga at home via a phone. The data collection tools consisted of a personal information questionnaire, Yoga training form, shoulder movement degree assessment form, WHOQOL assessment form, and clinical information plan on breast cancer and shoulder training via Yoga. Content validity was verified by the expert to be 0.90. Data analysis was done by using statistics, percentage, standard deviation and *t*-test. The study found that the average degree of shoulder movement in the breast cancer patients after modified radical mastectomy was significantly increased ($P < 0.05$) post-test versus the pre-test

value, and there was no limb swelling or other complications. Average life quality score, both overall and in detail (e.g., physical, mental, social, and environmental factors) were good. Also, after Yoga training, life quality of the Test Group was significantly higher ($P < 0.05$) than the Control Group.

Keyword: Breast Cancer, Degree of Shoulder Movement, Quality of Life, Modified Radical Mastectomy, Yoga

INTRODUCTION

Breast cancer is the most common cause of mortality and morbidity in women worldwide, and the most common type of cancer found in women. In the United States in 2015, there were 231,840 new patients or 29% of the population and 40,209 died due to breast cancer or 15% of the patients (1). Also, breast cancer is the top cause of death in Thailand, and it is increasing every year. The death rate of 100,000 people since 2007 increased from 84.9 to 95.2 in 2011 (18).

Treatment of breast cancer is complicated, lengthy, and multidiscipline in nature including surgery, radiation, chemotherapy, hormonal therapy, and medicines. Such treatment must be personalized to the patient. Surgery is an important and effective method that is used in almost every early-stage patient (12) in order to remove cancerous tissues. There are many surgical procedures, but the most popular is the modified radical mastectomy because it is believed that patients with lumps in breasts have more advanced stage (metastasizing) of cancer. Also, depending on the patient, surgery might be used in conjunction with radiation or chemotherapy to improve efficiency (31).

Breast cancer surgery leads to physical, mental, social, and spiritual complications. In fact, 80% of the patient experience physical complications might include one or more of the following: pain, accumulation of blood and lymph, bleeding, infection, arm swelling, limited ability to move the shoulder and arm, necrosis near the surgical cut, stiff shoulder joint, numbness in the upper arm and leg, and Pneumothorax (21). Shoulder and arm movement is found to be a significant problem when monitoring patients 3 to 15 months after surgery. Limited ability to rotate the shoulder joint is 30% and stiff shoulder joint is 40% in rate of discovery (16). Limitation in shoulder joint movement results in bad quality of life, loss of shoulder joint function, and the inability to resume normal life, which is largely an irreversible, cause of difficulties in living and image loss (24). Limitations of shoulder and arm movement and arm swelling are related and disrupt everyday life. Such limitations often result in inability to self-care after surgery, thus requiring assistance from a nurse (22).

Given these health and well-being concerns, Yoga is a skill that needs training to optimize the result, thus the patient requires teaching, nurse support, and systematic guidance in order to improve self-care capability (19). Still, the patient is usually faced with complications after surgery, such as reduced shoulder functions (8 to 70%), numbness in the arm (58.5%), accumulation of blood and lymph under the surgery incision (30%), arm weakness (25 to 27%), infection (12%), arm swelling (13 to 27%), bleeding, and necrosis of incision rim and arm pain (2 to 10%) (10,11). Reduced shoulder function is the most common complication after total mastectomy with axillary lymph node dissection (34 to 67%) (21) and breast

conserving therapy (7 to 18%) (22), which removes cancerous tissue, breast, and chest muscle that result in destruction and shortening of chest tissue. Removal of the axillary lymph nodes also enlarges the incision. As both methods inevitably destroy nerve tissue and muscle on the chest and arm, inward shoulder rotation and arm spreading abilities are reduced along with the occurrence of shoulder joint retraction and pain (21).

In addition, as the patient avoids using the shoulder before removal of lymph draining tube, a membrane forms on the shoulder joint that either reduces the shoulder's ability to rotate or freezes it in place. The total mastectomy with axillary lymph node dissection method impacts shoulder movement more so than breast conserving therapy, and if the operation is performed on the dominant side, the ability to use the shoulder is decreased even further. Also, if the patient lacks knowledge and skills in post-surgery self-care or is too afraid to exercise the shoulder due to fear of splitting the incision or dislocation of drainage tube, the obvious result is atrophy of the shoulder muscles and the inability to overcome the membrane. Shrinkage of chest and armpit muscles after lengthy disuse might result in frozen shoulder (2,19,29).

After surgery, the breast cancer patient starts exercising the shoulder joint within 24 to 48 hrs using 9 postures, each for 5 to 10 times, $3 \text{ times} \cdot \text{d}^{-1}$ ($30 \text{ to } 40 \text{ min} \cdot \text{session}^{-1}$) $3 \text{ d} \cdot \text{wk}^{-1}$ for 4 wks (16). However, the patient's ability to spread and bend the arms after the program is still less than before the surgery (15.7%), the shoulder exercise is inadequate, despite the 4-wk program. In fact, the patient is unable to abduct, bend or rotate arms externally as much as before surgery (13). Yoga is a science that integrates holistic care. It covers physical, mental, and spiritual care with the principle of uniting the practitioner through Yoga Sutra. In this case, Asana is used as a guideline to improve the practitioner's attitude, optimism, and serenity (10). Slow flexing, constant attention to bodily movements, breath-movement synchronization, and deep relaxation provide comfort and stimulate the parasympathetic nervous system. The mind and body relax, thus helping the post-surgery patient to improve concentration in addition to reducing arm and shoulder joint pain (4).

The total mastectomy with axillary lymph node dissection directly affects the patient by decreasing self-image that influences quality of life. Thus, the improvement of the patient's life quality during illness is an important goal in care of cancer patients. Life quality is an important care quality index (5). The patient's life quality is reduced during the first 3 months after surgery and then improves to pre-surgery level in the 4th month, while in the 5th and 6th month life quality is better than pre-treatment (15). For these reasons, it is important to better understand the application of Yoga in rehabilitating the body by exercising the shoulder and arm joints, promote movement, and reduce the chance of a frozen shoulder to improve life quality of post-surgery breast cancer patients.

Thus, the purpose of this study to focus on Yoga and its role in the improvement of the patients' physical, mental, emotional, and social well-being after a modified radical mastectomy. This method is novel compared to the traditional method that focuses only on physical management, which does little to provide mental training to help maintain bodily balance, treat disease, and improve quality of life in long term care of breast cancer patients.

METHODS

Subjects

The subjects in this study consisted of 60 breast cancer patients who were admitted to the female surgery unit in a tertiary hospital between January and October 2018. The patients were divided into a Test Group (30 subjects who received Yoga training) and a Control Group (also 30 subjects who received conventional treatment).

This study used a pretest post-test design for the 2 groups to examine the effect of shoulder Yoga on life quality of breast cancer patients who received a modified radical mastectomy. Evaluation was done before and after to determine the effect of Yoga shoulder movements on breast cancer patients after a modified radical mastectomy.

Ethics Statement

All subjects received information regarding the risks and potential benefits of participation in the study. Subsequently, each subject signed a written informed consent before screening. The consent form and the study protocols were in accordance with the ethical standards of the Human Ethics Committee of the Human Research Ethics Committee of Rajabhat Sunan Sunanta University, as well as the 1964 Helsinki declaration and its later amendments.

Experimental Design

This study specified a sample group by using the power analysis table developed by Polit and Hungler (20). Statistical confidence was set at an alpha level of 0.05 and power was set at 0.08. The effect size was also set to be similar to a study by Nesvoid et al. (19) who determined the effect of Yoga on shoulder movement.

Both groups consisted of cancer patients with similar age, marital status, income, cancer stage, personality, body mass index, surgery method, and a total mastectomy with axillary lymph node dissection. The selection of the subjects was done by convenience sampling with criteria of stage 1 to 3 patients who had gone through total mastectomy for the first time. The patients' signature was required for participation in the study. Patients were excluded from participation if they had: (a) gone through more than one operation; (b) an infection subsequent to surgery; and (c) swelling of the arm.

Research Instruments

Part 1. General Information Form

First, patient information was obtained regarding age, profession, education, faith, admission date, diagnosis, cancer progress, progress, surgery type, location of surgery, surgery date, number of removed lymph nodes, pectoralis minor muscle removal, and Yoga experience. Second, pre- and post-operation shoulder motion range assessment form was implemented. It consisted of 8 postures, which included vertical flexion, vertical extension, horizontal flexion, horizontal extension, abduction, adduction, internal rotation, and external rotation. A goniometer was used to measure patients' range of motion and to determine if the surgery resulted in a decrease (30). Third, at-home Yoga practice recording form which was suppose to be recorded after daily questioning on the duration of Yoga practice, emotional conditions, and post-session relaxation. The form was validated by 3 experts: (a) a nurse instructor; (b) a breast cancer care specialist; and (c) a medical instructor. The Cronbach's Alpha Coefficient

was .89. Fourth, the Thai version of the World Health Organization Quality of Life assessment instrument (WHOQOL-BREF-THAI) was used (17). The assessment instrument consisted of 26 questions that were developed from 100 QOL indicators and divided into 4 facets: physical health, psychological health, social relationship, and environment. The 3 levels of rating and criteria: (a) 26 to 60 points means bad life quality; (b) 61 to 95 means moderate life quality; and (c) 96 to 130 means good quality of life. The Cronbach's Alpha Coefficient was .86.

Part 2. Experiment Tools

The teaching plan and manual for the use of Yoga in post-mastectomy shoulder exercise covers at least 1 month. Subjects in the Test Group were allowed to study the manual, which consisted of information regarding the modified radical mastectomy, the post-operation complications and care of the operated arm and chest to prevent complications, the use of Yoga to exercise the shoulder and arm joint after surgery as well as the general principles of Yoga. In particular, the manual explained Yoga breathing and breathing synchronization with each posture to maximize oxygen absorption, drain waste, and reduce muscular contraction. It also highlighted the importance of slow, controlled movement without excessive pushing (e.g., subjects with limitations were instructed to practice only the breathing and warm-up postures). Two to 3 times a week the subjects were instructed to concentrate on the training, avoid chatting with other subjects, and/or competing during practice. It was important that the subjects paused and relaxed by slow breathing 6 to 8 times to relax muscle and restore heart rate to normal levels.

Specific postures were used during the warm-up that included anuloma viloma, stretching, "carry the plate", shoulder twist, shoulder rotation, cow pose, rabbit pose, and Savasana. A session took ~45 min and there were at least 3 sessions·wk⁻¹ for 12 wks to prevent frozen shoulder. The subjects started practicing Yoga ~1 month after surgery of which each Yoga session was recorded along with the subjects' conditions and post-session relaxation. The manual was validated by 3 experts, revised, and then tested for validity index (CVI), which is .95. The program was also tried on 20 throat and cranium cancer patients after radiation therapy and was deemed valid and suitable. The Cronbach's Alpha Coefficient was .90.

The tool used in shoulder motion range measurement was a 360° goniometer that is made of plastic and measured motion in degrees. If differences between pre- and post-surgery shoulder motion range was more than 20°, there was limitation in the subject's shoulder and arm motion range (30).

Data Collection

This study was approved for data collection by the Human Research Ethics Committee of Rajabhat Suan Sunanta University, COA. 1-002/2018. The researcher select sample groups according to the criteria, then self-introduce, and explain objective and research method to request cooperation from the sample group. Upon receiving consent, the researcher divided the sample population into sample groups. Pre-test data were collected 1 day before the operation and post-test information was collected 6 wks after discharge, both on shoulder joint movement range and functionality.

Regarding the experiment activities, each subject was encouraged to practice Yoga in accordance with the manual, watch self-care instructional videos and Yoga demonstration for doing so at home. The experiment consisted of the following 3 steps: (a) basic knowledge

preparation such as lecturing, demonstration and practice in Yoga, and promotion of self-practice at home; (b) training and learning the self-regulation skills in Yoga training; and (c) follow-up on the 7th, 14th, 21st, 28th, and 35th day after the operation. The subjects were introduced to various Asana Yoga postures, such as the warm-up, Anuloma Viloma, stretching, “carry the plate”, shoulder twist, shoulder rotation, cow pose, rabbit pose, and Savasana.

They were also introduced to the manual that covered all the postures. The dedicated time for 1 session was $45 \text{ min}\cdot\text{d}^{-1}$ of which it was recommended that the subjects engage in 3 sessions $\cdot\text{wk}^{-1}$ for 12 wks. Information was collected 1 month after surgery, which included personal information, motion range of shoulder and arm, arm circumference, ability to exercise shoulder and arm, and functionality of shoulder and arm. Life quality was assessed, then, the researcher followed-up over the phone to monitor and motivate the shoulder Yoga 3 times $\cdot\text{wk}^{-1}$ for 1 month. After that, the range of motion of the shoulder and arm, arm circumference, ability to exercise shoulder and arm, functionality of shoulder and arm, and life quality were assessed again.

The subjects in the Control Group received individual information and advice along with a handbook that covered the necessary health and follow-up information for breast cancer patients.

Statistical Analyses

Demographic characteristics of the 2 Groups were calculated for percentage, average, frequency, and standard deviation. The average score was compared using paired *t*-test. Differences between the pre-test and the post-test shoulder motion range in the Test Group and Control Group were compared using the independent *t*-test.

RESULTS

With regards to Part 1, the demographic characteristics of the sample group indicated that 50% of the subjects who had received a modified radical mastectomy were 31 to 40 yrs of age. They were married (60%) and had a monthly income between 6,001 to 10,000 baht (43.8%). Approximately 27% of the subjects had third stage cancer. Generally speaking, they were cheerful (18.8%). Their BMI was between 18 and 24 (45.3%).

As to Part 2, comparison of pre-test and post-test shoulder joint motion range shows that the post-test motion range improved with statistical significance. Likewise, comparison of pre-test and post-test life quality showed an improvement both overall and in details (Table 1).

Regarding Part 3, comparison of the subjects' average life quality score between the Test Group and the Control Group before and after Yoga training found that both Groups had a different level of life quality score with statistical significance (refer to Tables 2 and 3, respectively).

Table 1. Comparison of Pre-Test and Post-Test Shoulder Joint Motion Range.

Variables	Pre-Test		Post-Test		df	t	P-value
	Mean	SD	Mean	SD			
Shoulder Motion Range	84.88	2.20	89.31	0.86	29	-10.13	.000

Table 2. Comparison of Pre-Test and Post-Test Average Life Quality Score of the Test Group.

Variables	Pre-Test		Post-Test		df	t	P-value
	Mean	SD	Mean	SD			
Overall Life Quality	85.84	17.59	102.54	4.95	29	-7.13	.000
Physical Health	21.00	3.41	26.70	2.61	29	-6.65	.000
Mental Health	17.43	5.45	25.20	2.65	29	-8.48	.000
Social Relationship	11.80	3.19	12.87	1.33	29	-2.01	.000
Environment	12.84	4.78	31.07	4.26	29	-17.60	.000

Table 3. Comparison of Pre- and Post-Test Average Life Quality Score between the Test Group and the Control Group.

Variables	Control Group		Test Group		F	df	t	P-value
	Mean	SD	Mean	SD				
Overall Life Quality	73.37	17.59	102.54	4.95	77.65	33.57	-8.73	.000
Physical Health	19.24	5.00	25.70	2.61	6.94	43.75	-6.27	.000
Mental Health	18.20	3.86	25.20	2.65	3.53	51.42	-8.17	.000
Social Relationship	9.70	2.81	12.86	1.33	13.81	41.34	-5.56	.000
Environment	16.67	4.85	31.06	4.25	0.23	57.01	-12.20	.000

DISCUSSION

The results of the present study indicate that Yoga improves life quality of the practitioners. The subjects in the Test Group underwent continuous training for 12 wks (3 sessions·wk⁻¹, 45 min a session) that significantly (P=0.05) improved their physical health, mental health, social relationship, and environment). Also, the 12-wk Yoga training program increased the subjects' range of motion of their shoulders. Yoga is an exercise that incorporates mental concentration and breath control to improve the mind and unite the body and spirit as one (14), which is in agreement with a study by Chandwani et al. (8). They reported that Yoga training in breast cancer patients who had received radiation therapy twice a week for 6 wks improved their consciousness and life quality.

One important principle of Yoga training is breath control to optimize gas exchange (7,11). Continuous Yoga training stimulates the sympathetic nervous system, refreshes the body, reduces muscular contraction, and stimulates the limbic part of the brain that slows cancer progress (4,10). Yoga training promotes positive thinking, improves mood (28), increases shoulder range of motion, decreases arm swelling and frozen shoulder, and improves flexibility (25). Muscular vertical flexion, vertical extension, horizontal flexion, horizontal extension, abduction, adduction, internal rotation, and external rotation help to alleviate frozen shoulder and pain, improve restoration of shoulder function (21), stimulate autonomic nervous system, improve blood circulation, gas exchange, and metabolism, and muscular contraction (2). Breath control also reduces lactic accumulation, which improves recovery and reduces the chance to having a frozen shoulder. Two months of continuous Yoga practicing improved muscular strength and flexibility, lung expansion, blood circulation, and cardiac function (4,10,29).

Likewise, Vadiraja et al. (28) compared the effects of a 6-wk Yoga program on life quality and supportive care in early-stage breast cancer patients. They found that Yoga significantly decreased anxiety, depression, and perceived stress in the Yoga group compared to the control group. Chandwani et al. (8) also reported that Yoga statistically and clinically significant improvements in aspects of quality of life and self-worth in women with breast cancer undergoing radiotherapy. Similarly, Blank et al (3) reported that over 60% of the women improved mood and had less anxiety as well as improving sleep quality, reducing depression after 3 months of practicing Yoga. Levine and Balk (15) studied Yoga training in breast cancer patients with low life quality and found that after 6 months of training, their quality of life, mood and work were significantly improved. These findings are similar to the reported conclusions by Lauridsen et al. (14) who evaluated the effects of team instructed physiotherapy.

Ulger and Yagli (27) studied the effect of Yoga on quality of life and found that after training, life quality of the patients was significantly improved (6). Cancer patients must face various problems throughout the illness including symptoms, side-effects from therapy, mental and social impact and the realities in each stage of cancer, whether future uncertainty, recurrence of disease, or anxiety about treatment. Yoga is one option to help free the patient from such burden and improve concentration, mental strength, and reduce pain, especially in breast cancer patients (9). Practicing Yoga at least 6 times, 2 hrs, or 45 min each session before surgery can to significantly improve post-surgery recovery and pain management with (6,9).

Weekly over-the-phone Yoga follow-up stimulates and motivates the patient to self-practice, reduce shoulder joint pain and fatigue, and relax the mind. Also, this process formulates awareness of Yoga's importance and allows the patient to ask for correct practices. The patient's relatives are also able to participate in stimulation and provision of mental support while the patient is at home. After 12 wks, the patients have improved quality of life compared to before training. The bottom line is that Yoga training in mastectomy patients improves quality of life, keeps the shoulder fit, and prevents post-operation frozen shoulder (6,27).

Limitations in This Study

Yoga training in patients with chronic disease or physical limitations requires a high level of care. Patients received total mastectomy must have at least one month of post-surgery recovery time and are approved for training by experts. Training in each posture must not be excessive. Therefore, Yoga training will focus on Asana Yoga that relaxes the muscle and joint, control breathing and concentrates the mind simultaneously. Limitations generally are postures that excessively use a chest or arm muscle as the patients are not able to rotate their shoulders as much and there is a risk of injury and contraction. Postures to be avoided are a snake, bow, shoulder stand, headstand, and crane.

Recommendations

Public and private service providers in breast cancer patient care can apply this study in rehabilitation and shoulder/arm joint exercise in breast cancer or thoracic surgery patient to improve post-operation life quality.

CONCLUSIONS

Yoga is an alternative, holistic healthcare science commonly used, consisting of exercise, meditation, and breath control to unite the body, mind, and spirit as one. Yoga is good for health, body, and mind. Continuous practicing of Yoga improves blood circulation, gas exchange, metabolism, muscular flexibility and endurance, and the patient's life quality. The findings in the present study indicate that breast cancer patients who practice Yoga after modified radical mastectomy have a better quality of life versus not practicing Yoga.

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