

# Effect of Music Therapy and Shoulder Exercises on Shoulder Disability, Pain and Quality of Life in Post-Operative Breast Cancer Patients: A Pre-Post Experimental Study

Erohit Khanna<sup>1</sup>, Dr. Renu Pattanshetty<sup>2</sup>

<sup>1</sup>MPT 2<sup>nd</sup> year Post Graduate Student, <sup>2</sup>Associate Professor,  
Department of Oncology Physiotherapy KAHER Institute of Physiotherapy, Nehrunagar, Belagavi-590010,  
Karnataka

Corresponding Author: Erohit Khanna

## ABSTRACT

**Background:** According to World Health Organization, cancer is said to be the second leading cause of death globally. One of the main leading causes of death in women is the breast cancer among the age group of 18 to 65 years. Pain, restricted range of motion, fatigue and depression are common problems experienced by cancer subjects after undergoing breast surgery. The present study aimed to evaluate the effect of music therapy along with shoulder exercises on pain, range of motion, level of depression and quality of life in post operative breast cancer survivors.

**Materials and Methodology:** 30 (thirty) post operated female cancer subjects between the age group of 18-65 years received music therapy along with exercises for 3 (three) sessions. Baseline data including pain, range of motion, disability, anxiety and depression was obtained and the values were compared after 3 (three) sessions of intervention.

**Results:** Pre and Post treatment values showed statistically significant results for all the subjects for all the outcome measures i.e. pain, quality of life, depression and anxiety, shoulder pain and disability index, shoulder range of motion and neck range of motion with  $p \leq 0.001$ .

**Conclusion:** Combination of music therapy and shoulder exercises demonstrated positive effect on pain reduction, improving shoulder and neck range of motion, reducing depression and anxiety level and reducing level of disability.

**Key words:** Breast cancer, shoulder pain and disability index, functional assessment of cancer therapy, hospital anxiety and depression scale, modified radical mastectomy.

## INTRODUCTION

Cancer is defined as large group of diseases that is characterized by the abnormal growth of cells beyond their usual boundaries and spreads to adjoining parts of the tissues and spreads to other organs. [1] In India, the incidence of breast cancer is low, but rising, over 100,000 new breast cancer subjects are estimated to be diagnosed annually in India. [2]

Breast cancer is generally diagnosed through either screening or a symptom (e.g.,

pain or a palpable mass) that prompts a diagnostic exam. [3] Breast surgeries include lumpectomy, mastectomy, lymph node removal, breast reconstruction. [4] Mastectomy is the predominant procedure for almost all stages of breast cancers. [5] Modified radical mastectomy (MRM) after or without neo adjuvant chemotherapy (NACT) is the norm in most centers in India. [4]

Complications of breast cancer surgeries include neck and shoulder pain,

lymphedema, changes in posture, fatigue, neuropathy, scar adhesions and functional deficits. Chronic pain in breast cancer has shown to be contributed to impaired functioning and psychological distress. [6] Arm problems are frequent after operation for breast cancer, and these problems appear to increase the likelihood of psychological distress. [7]

Physical therapy management care plan provided in the early post-operative period is effective in maintaining the recovery of shoulder movement over the first 2 years after breast cancer surgery. [8] Post-operative exercises given to maintain movement of the arm are believed to increase the amount of fluid production following surgery. [9] As an adjunct form of pain management, music therapy has been shown to be proven some of these hardships by providing subjects with an alternative effective means to reduce their subjective experiences of pain. [10]

However, there is dearth in literature regarding effect of combined effect of music therapy and shoulder exercises to decrease shoulder disability in terms of range of motion, pain, and improve quality of life in breast cancer subjects. Hence, it was hypothesized that music therapy combined with shoulder exercise would help in

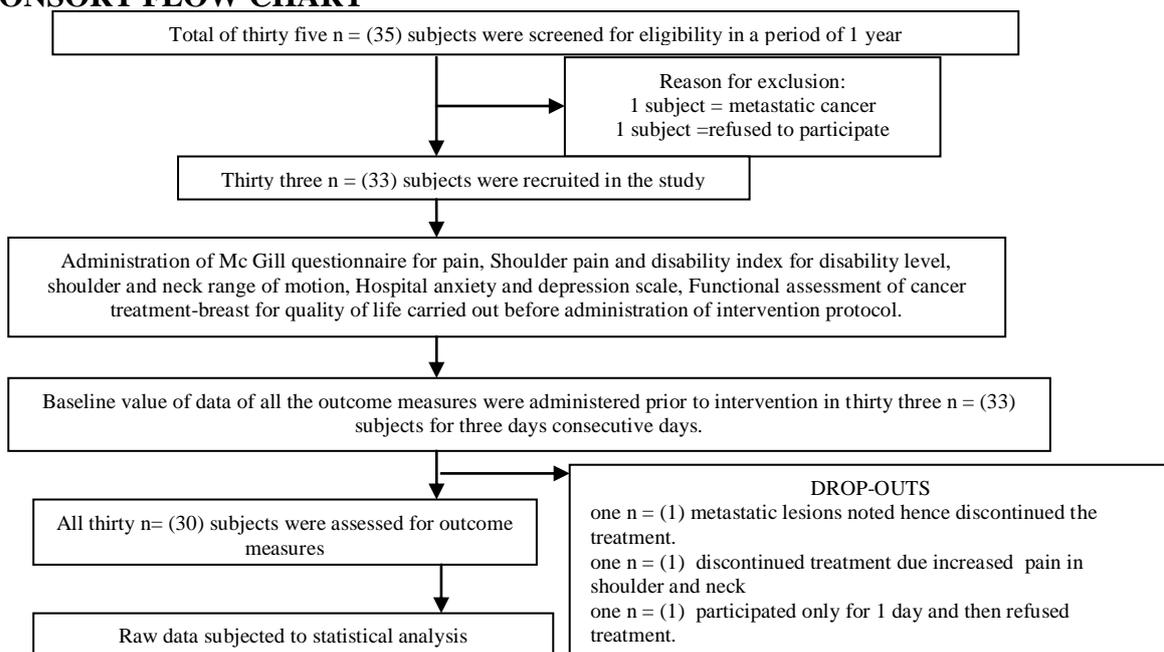
reducing pain and anxiety in hospitalized breast cancer survival.

## METHODOLOGY

After obtaining the approval from Institutional ethical review committee, thirty two (32) post operative breast cancer subjects were screened and thirty (30) subjects were recruited in the study after fulfilling the inclusion criteria of cancer subjects ranging in the age group of 18 to 65 years and willing to participate in the study. Subjects were excluded with unilateral and bilateral hearing impairments, epilepsy and vertigo and metastatic lesions. Purpose of the study was explained and then written informed consent was taken from all the subjects.

Thirty five (35) subjects were screened, out of which one refused for treatment and one had metastatic cancer. Functional Assessment of Cancer Therapy (FACT - B Questionnaire), Hospital Anxiety And Depression Scale (HADS), Shoulder Pain And disability Index (SPADI), Short form Mc-Gill Pain Questionnaire were used as outcome measure. Shoulder range of motion and the neck range of the motion were measured with universal goniometer.

### CONSORT FLOW CHART



### Intervention Procedure <sup>[12]</sup>

All subjects were introduced to music names in Apple 5c mobile headset. They were instructed to select the music, control the music volume and listen through Apple 5c mobile handset with earphones. Choice of the music was Indian classical instrumental and Chinese Buddhist instrumental. <sup>[11]</sup> All Subjects were given music therapy twice a day (15 min per session), once in the morning (9 am - 10 am) and once in evening (5 pm - 6 pm) along with shoulder active range of motion exercises.

Subject was instructed to start with arms pointing into the sternum, arms were slowly opened and moved outwards until

they reach full extension while person takes in deep breaths. When arms reach full extension all arms muscles are tightened and breathe was held. The person relaxes the arm muscles moves arm back towards the starting position while breathing out. Exercise along with deep breathing included active range of motion exercises for the shoulder. Shoulder flexion, Shoulder Abduction, Scapular exercises (protraction, retraction), Hand pumps. All the above exercises were performed along with breathing pattern.

**Dosage:** Each exercise was performed for 5 repetitions, with 1 minute rest and 10 minutes regime.



**Shoulder exercises and hand pumps along with music therapy**

### STATISTICAL ANALYSIS

Data was computed and analyzed using Statistical Package of Social Sciences (SPSS) software version 21. Nominal data of thirty (30) subject's including demographic data i.e. age, height, weight, body mass index, type of breast cancer and type of surgery performed were noted, Pre and post values of range of motion for shoulder and neck, pain, disability index and quality of life were analyzed using student's paired t-test. Probability values  $P \leq 0.05$  was considered to be statistically significant.

### RESULTS

A total of thirty (30) female subjects participated in the study with a mean age of  $47.77 \pm 11.05$  suggesting middle aged women mainly affected with breast cancer. The mean body mass index (kg/m<sup>2</sup>) of the

females was  $22.56 \pm 3.10$  suggesting that these females had low or near normal body mass index (BMI). The pain score was statistical significant different in all the subjects in the study with  $p = 0.0001$ . The pre- test and post- test comparison of FACT-B questionnaire showed statistical significant improvements in the physical, emotional and additional components of FACT-B questionnaire with  $p \leq 0.001$ . However, social being and functional being components of FACT-B demonstrated no statistical significance ( $p = 0.95$  &  $0.15$  respectively). The SPADI score was statistical significant in all the subjects in the study with  $p = 0.0001$ . The HADS score showed statistical significance of  $p = 0.0001$ .

**Table 1: Demographic Data of all the subjects in the study**

PARAMETERS	Mean±SD
AGE	47.77±11.05
HEIGHT (cm)	157.10±5.10
WEIGHT (kg)	55.50±9.42
BMI	22.56±3.10
<b>TYPE OF CANCER (No. of Patients)</b>	
Cancer of left breast	19
Cancer of right breast	11
<b>TOTAL</b>	<b>30</b>
<b>TYPE OF SURGERY (No. of Patients)</b>	
Left modified radical mastectomy	19
right modified radical mastectomy	9
right breast excision surgery	2
<b>TOTAL</b>	<b>30</b>

except shoulder external rotation which was not found to be affected in post operated breast cancer subjects. Cervical range of motion also demonstrated statistical significant results with  $p \leq 0.05$ .

**Table 2: Comparison of pre-test and post - test pain using Short form Mc gill pain Questionnaire of all subjects in the study.**

Time points	Mean±SD	% of change	Paired t value	p-value
Pretest	6.50±2.91			
Posttest	2.80±2.06	56.92	9.1487	<b>0.0001*</b>

\*Level of significance:  $p \leq 0.05$

Pre and post Shoulder range of motion values demonstrated statistical significance

**Table 3: Comparison of pretest and posttest scores of FACT B of all the subjects in the study.**

Variables	Time points	Mean±SD	% of change	Z Z- value	p-value
<b>Physical being</b>	Pretest	20.90±3.78			
	Posttest	23.33±4.68	-11.64	3.7970	<b>0.0001*</b>
<b>Social being</b>	Pretest	21.40±4.12			
	Posttest	21.20±4.14	0.93	0.0568	0.9547
<b>Emotional being</b>	Pretest	17.80±4.02			
	Posttest	19.60±3.29	-10.11	4.1973	<b>0.0001*</b>
<b>Functional being</b>	Pretest	17.93±5.45			
	Posttest	18.50±5.42	-3.16	1.4285	0.1532
<b>Additional concerns</b>	Pretest	29.77±12.11			
	Posttest	31.77±14.27	-6.72	2.7781	<b>0.0055*</b>
<b>Total</b>	Pretest	102.37±19.80			
	Posttest	109.47±19.36	-6.94	4.2371	<b>0.0001*</b>

\*Level of significance :  $p \leq 0.05$

**Table 4: Comparison of pretest and posttest scores of Shoulder Pain and Disability Index (SPADI) of all the subjects in the study.**

	Time points	Mean	% of change	Paired t value	p-value
<b>SPADI (%)</b>	Pretest	34.00±34.96			
	Posttest	25.73±30.43	24.31	6.4709	<b>0.0001*</b>
<b>1. Pain</b>	Pretest	25.50±21.74			
	Posttest	18.50±19.20	27.45	5.2785	<b>0.0001*</b>
<b>2.Difficulty</b>	Pretest	16.00±17.36			
	Posttest	14.17±17.25	11.46	2.1143	<b>0.0432*</b>

\*Level of significance:  $p \leq 0.05$

**Table 5: Comparison of pretest and post test scores of Hospital Anxiety and Depression Scale (HADS) of all the subjects in the study.**

Variables	Time points	Mean±SD	% of change	paired t value	p-value
<b>Anxiety</b>	Pretest	6.27±3.76			
	Posttest	4.10±3.42	34.57	9.0229	<b>0.0001*</b>
<b>Depression</b>	Pretest	5.67±3.79			
	Posttest	3.87±3.07	31.76	4.6782	<b>0.0001*</b>

\*Level of significance:  $p \leq 0.05$

**Table 6: Comparison of pre test and post test scores of shoulder range of motion (in degrees) of all the subjects in the study.**

Sr.No	Shoulder Range of motion	Baseline	Post Test	% of change	p-value
		Mean±SD	Mean±SD		
<b>Shoulder flexion</b>	Right	155.50±37.47	157.70±35.62	-1.41	0.0015*
	Left	144.70±36.11	147.50±34.30	-1.94	0.0001*
<b>2.2. shoulder extension</b>	Right	33.10±7.43	33.80±6.79	-2.11	0.0180*
	Left	31.77±5.66	33.07±5.61	-4.09	0.0007*
<b>shoulder abduction</b>	Right	33.10±7.43	33.80±6.79	-2.11	0.0180*
	Left	31.77±5.66	33.07±5.61	-4.09	0.0007*
<b>4. shoulder internal rotation</b>	Right	79.63±15.51	80.07±14.98	-0.54	0.0277*
	Left	74.77±19.64	75.77±18.43	-1.34	0.0033*
<b>5. shoulder external rotation</b>	Right	76.40±13.18	76.93±13.16	-0.70	0.0180*
	Left	72.23±16.27	72.33±15.65	-0.14	0.2367

\*Level of significance:  $p \leq 0.05$

**Table 7: Comparison of pretest and posttest scores of cervical range of motion in (degrees) of all the subjects in the study.**

Sr.No	Neck range of motion	Baseline	Post Test	% of change	p-value
		Mean±SD	Mean±SD		
1.Neck flexion		44.27±1.20	44.33±1.18	-0.15	-
2. Neck Extension		43.40±2.19	43.50±2.13	-0.23	-
3.Neck lateral flexion	Right	41.77±3.00	42.47±2.75	-1.68	0.0191*
	Left	41.83±3.01	42.70±2.96	-2.07	0.0051*
4.Neck rotation	Right	55.83±17.36	56.17±17.36	-0.60	0.0679
	Left	57.10±18.03	57.47±18.00	-0.64	0.0277*

\*Level of significance:  $p \leq 0.05$

## DISCUSSION

The present study showed the positive effect of music therapy and shoulder exercise on post operated breast cancer subjects in terms of improvement in outcome measures like pain, shoulder and neck range of motion, depression and anxiety level, disability index and quality of life.

In the present study the mean age of females with breast cancer was  $47.77 \pm 11.05$ , females approaching menopause. Similar findings were noted by Nessa et al wherein mean age of females with breast cancer was  $46.24 \pm 7.4$  years, suggesting that younger age groups were more affected with breast cancer compared with elder females in western countries. [13] Brandt et al suggested age as risk factor to breast cancer of younger age group (<40 years) or  $\geq 80$  years. [14] The incidence rates of breast cancer in India is said to begin to rise in the early thirties and peak at ages 50-64 years. [15]

In the current study, majority number of females with breast cancer had mean BMI  $22.56 \pm 3.10$  that is slightly lower or near to normal. This may be attributed to weight loss during cancer treatment. Mathew A et al also demonstrated that prior to menopause, increased body weight is inversely related to breast cancer risk. However, it is said that both pre-menopausal and post-menopausal breast cancer, the mechanisms of body weight and obesity affect most of the risks have been related to estrogenic activity. [16]

Modified radical mastectomy and breast excision surgery are usually common surgery options in breast cancer. For most women with early-stage breast cancer,

modified radical mastectomy is a choice to preserve pectoralis muscle. [17] In the present study majority of the subjects underwent modified radical mastectomy than breast excision, hence reducing the chance of reoccurrence of breast cancer. As in modified radical mastectomy, removal of breast tissue and lymph nodes are done there are less chances of recurrence whereas excision involves removal of only breast tissue. [18]

Clinically relevant observation made in study was the reduction in pain levels after three sessions of music therapy and shoulder exercises. Listening to music has the potential to lower blood pressure, which further stimulate peripheral vasodilation, decrease heart rate and create an overwhelming sense of wellbeing as demonstrated by many groups, including our own. [19,14] Music therapy aims to promote relaxation, alteration in mood, a sense of control and self expression. [20]

As seen in present study, there was reduction in stress and anxiety level as Music also has calming effects which have a large emotional component, which involves the brain's motivation and reward pathways, which also has a strong opiate signaling component as determined by the presence of morphine immune reactive neurons and fibers in limbic structures. [21] According to Dr. Erkkila music enriches communication, stimulates and even evokes speech, and through these qualities is an excellent way to deal with and consider mental problems that are emotional by nature. [22] Music stimulates the mind and triggers images, metaphors, and emotions that often are preconscious by nature as explained by Jaakko. [23] Alpha and theta changes in

fronto-temporal and temporoparietal areas in electroencephalogram activity in brain indicate Music therapy action and treatment effects on cortical activity in depression, suggesting an impact of Music therapy on anxiety reduction. [24]

Music therapy along with exercises also improved various aspects of functional wellbeing including physical, emotional and personal concerns. [25] Exercise encourages skeletal muscle contractions to provide the primary pumping mechanism for lymphatic and venous drainage and therefore stimulate the contraction of lymph vessels because these vessels are innervated by the sympathetic nervous system. [26] As McKenzie and Kalda suggested, upper-body exercise may “re-set” the sympathetic drive to lymph vessels and thus assist in the long-term management of lymphedema. [27] Dorothy N.S proved that early introduction of exercises was valuable in avoiding deterioration in range of shoulder motion. [28]

Exercise influences quality of life by reducing the muscle wasting and fatigue, improving range of motion of operated site. Exercise may also reduce the feelings of depression, anxiety, anger, helplessness and increase energy levels. [29] Early Post-operative exercises given to maintain movement of the arm are believed to increase the amount of fluid production following surgery. Exercise help in maintaining or increasing lean tissue content in healthy elderly and various patient populations in which muscle and bone loss are problematic, however resistance exercise might be more appropriately termed “anabolic exercise.” It is not surprising, therefore, that the many cardiovascular exercise interventions with cancer patients have produced mixed results as such exercise does not provide a strong anabolic effect for muscle and bone and may not elicit the changes in endocrine status that are desirable in these patients. [30] This may be the reason for mixed results in neck and shoulder range of motion in cancer subjects.

Though the study has demonstrated improvements in terms of pain, shoulder disability, anxiety and depression and quality of life in post operative breast cancer survivors, however study needs to be carried out in larger sample size in similar clinical settings to generalize the results.

However music therapy combined with shoulder exercises and neck exercises may be considered as treatment option in acute hospitalization phase for post - operated breast cancer subjects to decrease pain, shoulder disability level, anxiety and depression.

### ACKNOWLEDGEMENT

We are grateful to the medical director for giving us permission to conduct the study, statistician for statistical assistance and the participants without whom this study would not be possible.

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How to cite this article: Khanna E, Pattanshetty R. Effect of music therapy and shoulder exercises on shoulder disability, pain and quality of life in post-operative breast cancer patients: a pre – post experimental study. *Int J Health Sci Res*. 2018; 8(7):146-153.

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