

Research article

Home-based physiotherapy program for shoulder function, quality of life and physical capacity in female breast cancer survivors

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ABSTRACT

Breast cancer is one of the most common cancer which is prevalent in females worldwide. Mastectomy is a common surgical method used to treat breast cancer. Women may experience many complications post-surgery such as reduced range of motion, pain, lymphedema, shortening of muscles, fatigue and decreased functional capacity which affects the quality of life of the breast cancer survivors. Early physical therapy may benefit the patient in all these aspects. This study aimed to evaluate the effect of Home-based tailor-made protocol in breast cancer survivors. This interventional study was conducted in SDM Hospital, Dharwad, Karnataka. Convenient sampling was done. 40 eligible participants were included in the study. Duration of the study was 6 weeks. The participants were evaluated on EORTC scale for quality of life, SPADI for shoulder function and pain and 6MWT for functional capacity. Baseline evaluation was done on the day of discharge post mastectomy, 2nd visit was done after 4 weeks of discharge and 3rd evaluation session was done at 6th week. The participant received a call on weekly basis. Data was statistically analyzed. There was a significance in effect size and the p-values. Physical therapy improved shoulder function, quality of life and functional capacity post 6 weeks of home-based intervention. Home-based Physiotherapy Program for 6 weeks improves shoulder range of motion, quality of life and physical capacity in Female Breast Cancer Survivors and prevents breast cancer related lymphedema, shortening of muscles, pain at the operated site and chest complications.

Keywords: Cancer-related fatigue, Breast cancer, lymphedema, Barriers, Quality of life, physical and functional capacity, Physiotherapy.

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INTRODUCTION

In Karnataka breast cancer is the leading cause or factors to 28% of the cancer among women as per the state health and family welfare data. Prime reason for late detection were lack of awareness, ignoring the subtle changes even in educated population, greater urbanization and changing life styles. The Cancer beginning from lobules are known as lobular carcinomas and the one which start from conduits are known as ductal carcinoma. It typically begins spreading from bosom tissues generally from the lobules that supply the conduits with milk or from the internal covering of milk channels [1]. 40-year-old females are having higher frequency of Breast Cancer. Despite the fact that the focal point of general wellbeing has been for the most part on irresistible infections in the agricultural nations, noncommunicable illness like malignancy additionally negatively affect assets [2]. Early recognition and further developed finding and treatment have brought about expanded endurance rates [3].

Anyway because of huge upgrades in screening conventions determination and therapy in the course of recent many

years, bosom malignant growth mortality has continuously diminished [4]. A few examinations have shown that patients with Breast Cancer, who free piece of all their bosom tissue can encounter changes in self-idea, self-perception, feelings, relational peculiarities and the job of the Breast Cancer patient in family. Negative self-perception among bosom malignancy survivors among the individuals who have gone through a mastectomy incorporates disappointment with appearance, seen loss of womanliness and body respectability, hesitance to see one self's bare, feeling less visually captivating and reluctant with regards to appearances. Another psychosocial complexity of mastectomy is misery and burdensome issues. Fears and concerns in regards to death and reoccurrence of bosom malignancy are significant issues that should be managed [5]. Change in word related status is another repercussion that might occur, such a change can possibly influence the connection between the patient and her family or society [6].

Cancer-related Fatigue (CRF) is perhaps the most widely

recognized and complex symptom experienced by patients determined to have malignant growth. Weakness prompts decreases in enthusiastic, psychosocial, and actual capacity. It is fundamental to comprehend the connection among weakness and exercise inside generally short periods of time to decide the portion reaction relationship and regardless of whether exercise could be recommended to decrease weariness [7][8].

Rehabilitation for women who have undergone a mastectomy should be broader and more proactive to include physical and psychological. It is the role of the physiotherapist to not only aid with the physical symptoms but also the psychological to improve the quality of life of the woman [9]. The satisfaction gained from the results achieved during exercises and physical fitness necessary for the performance of various social roles translates into restored self-esteem and fulfilment in professional as well as family life, if physiotherapy is commenced early. Therefore, physiotherapy should be incorporated pre and postmastectomy [10].

Return to work in the cancer survivorship is more focused as increased survival rates are seen in modern cancer care. Cancer rehabilitation has a key role in improving patients' quality of life, functional performance and participation [11]. Pain, frailty; fatigue, weight loss, and reduced physical function are common among cancer patients. Due to such complications, quality of life of breast cancer patients and survivors gets affected. There are more complications but this study will be focusing on complications mentioned above such as range of motion of shoulder joint, functional capacity to improve quality of life [12].

Several studies have shown that cancer patients and noncancer patients achieve comparable functional gains from inpatient rehabilitation programs, as measured by the Functional Independence Measure (FIM), but the incidence of transfer back to acute care from rehabilitation is higher in cancer patients. One study that examined reasons for transfer found that infection was more common in cancer patients than in controls [13][14].

Many barriers are faced by the breast cancer patients. Exercise and its benefits are not routinely discussed with cancer survivors which can be a contributing aspect. Additional factors may be the unique exercise barriers that cancer survivors' face [15].

Depending on the patients' circumstances, a home-based exercise program is an important addition to clinic exercise and in some cases might be the only choice due to the barriers mentioned above. A home-based program is even considered by the patients living in urban areas with access to clinic if mobility, transport and/or cost is a barrier or they are feeling too unwell to come to the clinic. A home-based program is recommended in current situation where patients cannot come to hospital due to COVID-19 [16].

Therefore, the need arises to determine the effectiveness of 6 weeks home based program for

Shoulder function, Quality of life and functional capacity in female breast cancer survivors. The primary aim and objectives of the study included to evaluate the effectiveness of home-based Physiotherapy intervention in breast cancer survivors on quality of life, shoulder function and physical functional capacity however the secondary is to find out the barriers and facilitators in home-based physiotherapy program in Indian female breast cancer survivors.

MATERIALS AND METHODS

Ethical clearance was obtained from the Institutional Ethical Committee of SDM College of Medical Science and Hospital, before commencement of the study. Study population consists of female breast cancer survivors who were operated in SDM Medical College and Hospital, Dharwad, Karnataka. The inclusion criteria included breast cancer with no evidence of recurrent or progressive disease referred by oncologist, 18-75 years of age, undergone mastectomy as treatment with radiotherapy, and/or chemotherapy, consent to participate in study and cognitive functions good enough to understand the questionnaire. The exclusion criteria included acute or chronic respiratory disease, mental issues, pre-existing severe musculoskeletal impairment which may be a barrier for exercise, and existing evidence of recurrent or metastatic disease. The duration of the study was 1 year.

The study was interventional study subjecting 40 patients who had undergone mastectomy were included with non-probability sampling technique. The study protocol was approved by ethics committee of S.D.M University, Dharwad, Karnataka. Participants were recruited from S.D.M Medical hospital, Dharwad, Karnataka. Convenient sampling was done and all the breast cancer patients who had undergone the eligibility of the admitted breast cancer patients was determined according to the inclusion criteria. Eligible participants and their care takers were educated about the condition, briefed and counselled about the study. The complications that might occur due to the condition and how the physiotherapy treatment would help to prevent and manage those complications were explained. Then patient and the family members were given 1 day to decide whether to participate in the study or not. Written consent was taken from the patients those who were willing to participate in the study.

After giving their preliminary consent to the study the participants and their family members were offered detailed information about the intervention and had opportunity to ask questions. Then those participants were taught some exercises and were asked to performed till the day of discharge. The exercises included active range of motion exercises for operated side as well as non-operated side, lower limb exercises, ergonomics were explained,

breathing exercises to avoid chest complications and ambulation. On the day of discharge participants were assessed on EORTC scale for evaluation of quality of life, SPADI for level of shoulder disability and 6MWT for physical functional capacity. The main aim of the intervention was to determine the effectiveness of home-based physiotherapy treatment after 6 weeks. Each patient according to their evaluated scores on the scale were prescribed with a tailor-made home-based exercise protocol. Ideally the participant had to exercise 5 days per week. The patients were asked to maintain a diary in which they were asked to mark the days of week when they performed the exercise and number of times in a day. The patients were asked to perform the exercises twice a day, if in case the patient skipped the exercise, they had to mark that particular date and the reason due to which they skipped the exercise. Only 2 days off for exercise were allowed. The patient was given pictures and videos of exercise that had to be performed. In order to increase compliance, the patients received a phone call on weekly basis. Participants had 3 sessions for assessments. i.e., first was post-surgery on the day of discharge (baseline), second after 4 weeks and third 2 weeks after second visit. Due to the pandemic participants could not come to the hospital for evaluation after exact 4 weeks so the participants were evaluated over video calls. Each participant was evaluated once post home-base physiotherapy program in person. Not all patients could be assessed post 6 weeks at exact given date so they were assessed between 6 to 8 weeks. Improvement was observed in all the participants.

The exercises included in the study were brisk walking, stretching exercises, active range of motion exercises for upper and lower extremities, Codman's exercises, strengthening exercises etc.

Effectiveness of the Treatment was determined by changes in the primary outcome from baseline to sixth-week. Later the data was sent for statistical analysis.

Outcome measures used for the study were the EORTC quality of life questionnaire (QLQ), the Shoulder Pain and Disability Index (SPADI), and 6MWT.

RESULTS AND DISCUSSION

Table 1: Normality test using Kolmogorov-Smirnov

Variable	Time frame	z-value	p-value
ST	Pre	0.255	0.001
	Post	0.235	0.001
HL	Pre	0.282	0.001
	Post	0.403	0.001
AS	Pre	0.166	0.034
	Post	0.223	0.001
BS	Pre	0.278	0.001
	Post	0.398	0.001
BI	Pre	0.270	0.001
	Post	0.368	0.001
FU	Pre	0.228	0.001
	Post	0.385	0.001
SEF	Pre	0.288	0.001
	Post	0.344	0.001
SEE	Pre	0.387	0.001
	Post	0.443	0.001
SPADI SCORE	Pre	0.149	0.088
	Post	0.118	0.200
6MWT	Pre	0.207	0.002
	Post	0.211	0.001

All Variables in Data set are not normally distributed since the small sample Kolmogorov-Smirnov test has revealed significant outcome indicating non-normality of the data set.

Table 2: Data variables in terms of frequency

Particular	Frequency	Percent
Extended Radical Mastectomy	2	7%
Extended Simple Mastectomy	8	27%
Modified Radical Mastectomy	13	44%
Radical Mastectomy	3	10%
Simple Mastectomy	4	13%
Total	30	100%

Table 3: Pre and post treatment variables of quality of life

Variable	Pre		Post		Diff		Effect size	z -value	p -value
	Mean	SD	Mean	SD	Mean	SD			
ST	15.50	10.83	8.50	4.02	7.00	10.00	0.70	3.833	0.001*
HL	20.97	26.89	28.63	16.75	-7.67	31.02	0.25	1.354	0.186
AS	30.47	21.67	14.67	16.17	15.80	13.80	1.14	6.270	0.001*
BS	13.60	12.15	3.13	9.36	10.47	12.95	0.81	4.426	0.001*
BI	84.03	25.19	87.27	24.14	-3.23	9.42	0.34	1.881	0.070
FU	64.70	32.52	62.53	20.90	2.17	22.87	0.09	0.519	0.608
SEF	22.97	28.70	12.97	16.96	10.00	19.34	0.52	2.832	0.008
SEE	16.83	28.82	11.27	20.43	5.57	19.93	0.28	1.530	0.137

Where, ST=Systemic therapy, HL=Hair loss, AS=Arm Symptoms, BS=Breast Symptoms, BI=Body Image, FU=Future Perspective,

SEF=Sexual Functioning, SEE=Sexual Enjoyment

Table 4. Pre and post treatment SPADI score and 6MWT

Variable	Pre		Post		Diff		Effect size	z -value	p -value
	Mean	SD	Mean	SD	Mean	SD			
SPADI Score	55.47	21.73	37.23	15.53	18.23	10.24	1.78	9.755	0.001*
6MWT	548.00	88.84	590.33	86.12	42.33	19.42	2.18	11.940	0.001*

Figure 1: Pre and Post Scores Wilcoxon test

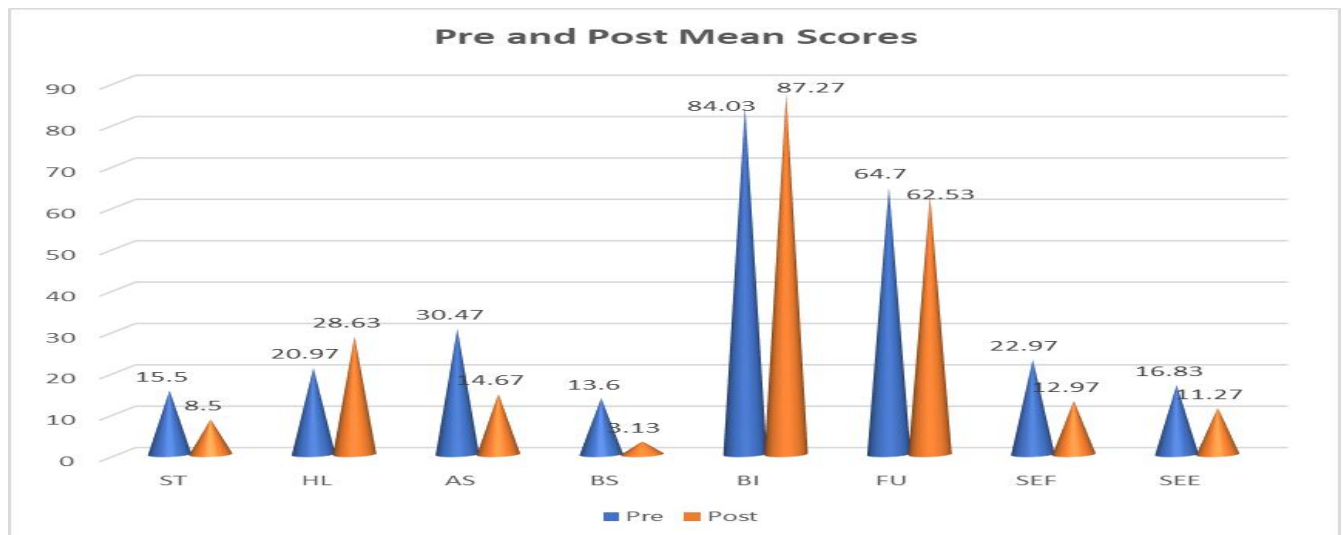
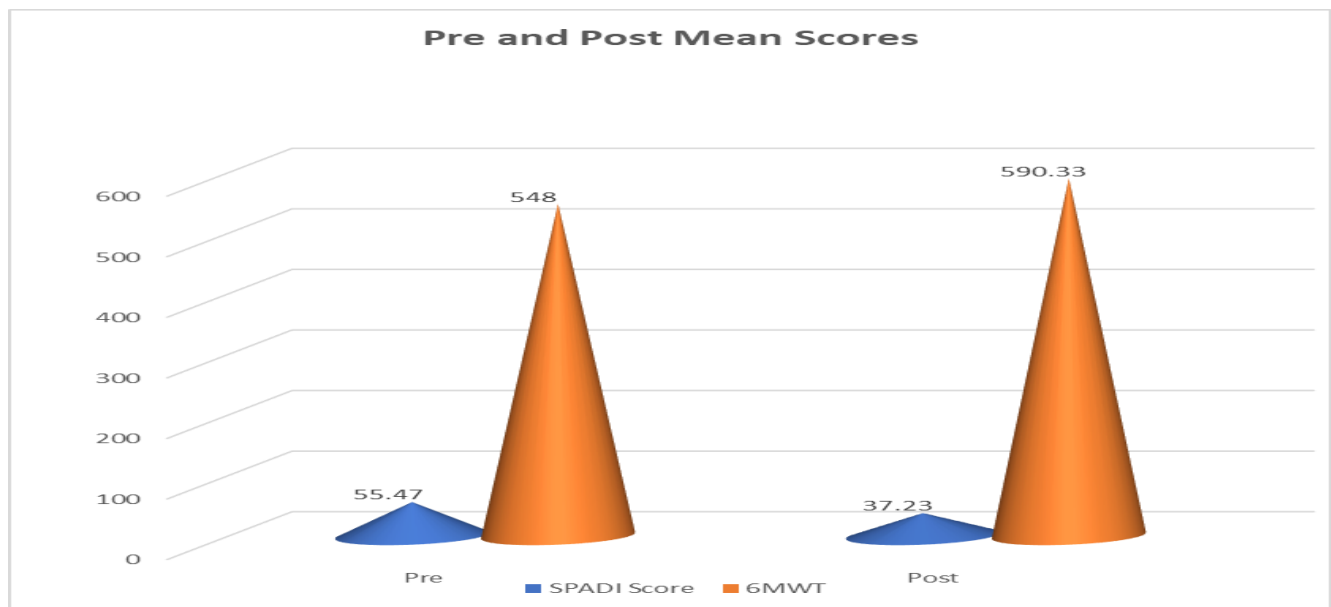


Figure 2: Graphical representation of pre and post mean scores



Home Based Physiotherapy Program For 6 Weeks Improved Shoulder Function, Quality of Life and Physical Functional Capacity in Female Breast Cancer Survivors post mastectomy in our study. The study was conducted in SDM Medical hospital, Dharwad, Karnataka. This study did prove impediment in all the complications followed by breast cancer surgery. In this study we focused on shoulder mobility, functional capacity and the quality of life in women who underwent the surgical procedure, i.e., mastectomy. Improvements were noted significantly with a noteworthy effect size. Also, it helped in preventing breast cancer related lymphedema, shortening of muscles due to lack of mobility, bad posture and chest complications. Three outcome measures were used in this study EORTC-BR23 for quality of life in breast cancer patients, SPADI for shoulder functions and 6 MWT for functional capacity. Same outcome measures were used to evaluate the effect of exercise pre

and post home-based physiotherapy program.

EORTC QLQ – BR23 scale covers 8 domains that affect the quality of life in breast cancer survivors. The domains are side effects caused by systemic therapy, hair loss, arm symptoms, breast symptoms, body image, future perspective, sexual functioning and sexual enjoyment [17]. Systemic therapy is any therapy of cancer treatment that targets the entire body. E.g. hormone therapy, chemotherapy, immunotherapies. All these therapies are mandatory in treating the cancer and because of them several side effects might occur. The common side effects are nausea, vomiting, loss of hair, loss of appetite, sore in mouth [18].

According to the results there were changes in the mean and standard deviation of pre and post treatment values. The value noted for mean and SD was lower post treatment. The effect size was 0.70 and the p-value was less than 5% significance level ($0.001 < 0.05$)

which indicates that the therapy was useful. Even though the issues that are addressed here cannot be solved by exercises. Constant counselling, encouragement to perform exercises and support of family members helped them improve. It is also observed that those issues usually stop few weeks after the systemic therapy sessions.

According to the results there were changes in the mean and standard deviation of pre and post treatment values. The value noted for mean were higher and SD were lower post treatment. The effect size was 0.25 and the p-value was more than 5% significance level ($0.186 < 0.05$). There were no improvements observed in this domain as hair loss cannot be treated by physical therapy.

Almost every participant experienced pain in either low or high intensity. The patients were educated properly about the complications and how the physical therapy would help them [19]. Active range of motion exercises were taught, mild stretching, Codman's exercises, hand pumps etc. improved the complications [20]. The results concluded that changes were observed in the mean and standard deviation of pre and post treatment values. The value noted for mean and SD were lower post treatment. The effect size was 1.14 and the p-value was less than 5% significance level ($0.001 < 0.05$) which indicates physical therapy was helpful. All the participants had pain around the operated breast at the baseline evaluation due to the surgical procedure. The intensities varied on the individual. The results concluded that there was difference in mean and standard deviation of pre and post treatment values. The values noted were lower post treatment. The effect size was 0.81 and the p-value was less than 5% significance level ($0.001 < 0.05$) which indicates physical therapy was helpful.

According to the results there were changes in the mean and standard deviation of pre and post treatment values. The values noted for mean were higher and SD were lower post treatment. The effect size was 0.34 and the p value was more than 5% significance level ($0.070 > 0.05$) which indicates that the therapy was not useful. According to the results changes were noticed in the mean and standard deviation of pre and post treatment values. The value noted for mean and SD were lower post treatment. The effect size was 0.09 and the p value was more than 5% significance level ($0.608 > 0.05$) which indicates that the therapy wasn't helpful in this aspect.

Results concluded that there was difference noticed in mean and standard deviation pre and post treatment. The value noted for mean and standard were lower post treatment. The effect size was 0.52 for sexual functioning (SEF) and 0.28 for sexual enjoyment (SEE) with the p-value more than 5% significance level ($0.08 > 0.05$) and ($0.137 > 0.05$) respectively. This indicates that physical therapy for wasn't helpful in this aspect. Counselling and educational interventions by professionals may be a great help here.

Several studies concerned with physical therapy of breast cancer which focuses on shoulder mobility, lymphedema, shortening of pectoral muscles and increased kyphosis [21,22]. SPADI was used to evaluate the shoulder disability pre and post treatment. This scale consists of 13 questions out of which 5 measures the severity of pain while performing specific activities and other 8 questions measure the difficulty of performing certain movements. The exercise program consisted active range of motion exercises, stretching, wand exercises, Codman's exercises, finger ladder, hand pumps etc. [23,24]. All the participants were explained and educated properly about the exercises. Women were worried about their independence as reduced range of motion in shoulder joint, pain and fatigue may affect their activities of daily living [25]. They performed it 5 days per week. And if they skipped the exercise, they would write the reason in their diary. Results showed a significant difference which was less than 5% ($0.001 < 0.05$) with the effect size of 1.78. The values indicate that there was a difference in pre and post values. Therefore, it justifies that physical therapy improved shoulder range of motion and prevented other complications.

The 6 Minute Walk Test is one of the easy, reliable and submaximal exercise tests that involves measurement of distance walked over a span of 6 minutes [26]. It was used in this study to provide information regarding functional capacity. 30 meters distance was marked and the participants were asked to walk in their normal speed for 6 minutes. The surface was long, straight with no obstacles. Functional capacity may compromise in breast cancer survivals because of its pathology of the disease, therapeutic regimens, weight gain and inactivity secondary to treatment [27]. Further decrease in functional capacity disturbs the quality of life as well. Research has provided evidences for safety, feasibility and effectiveness of exercise training in breast cancer patients and survivals. The participants were asked to perform brisk walking or slow jogging. All the participants did brisk walking as it was feasible. Some meta-analysis showed an improvement in functional capacity with resistance exercises and aerobic exercises. This test was done pre and post physiotherapy program to observe the difference in the values. Aerobic training involves large muscle groups in arms, legs and hips. Brisk walking makes breathing faster and deeper, this maximizes the amount of oxygen in blood. Regardless of age or weight aerobic exercises are effective in increasing functional capacity. These exercises also boost the mood due to which patient feels motivated to perform exercises [28].

Results showed the improvement post physiotherapy treatment. The mean and standard deviation showed changes in the value with the effect size of 2.18 which is high in the parameters. Based on the paired Wilcoxon test analysis the p-value was less than

5% significance level ($0.001 < 0.05$) which indicates improvements in the functional capacity [29]. In this present study the participants were assessed on the day of discharge from hospital. They were prescribed a tailor-made home-based exercise program. The participants were evaluated on EORTC for quality of life, SPADI for shoulder function and pain and 6 MWT for Physical functional capacity. They were asked to perform exercise 5 days a week, twice a day where each session was of 45 mins. The exercise from Ca guidelines which are supported by the Cancer Council Western Australia's patient booklet, Exercise for the people living with cancer [30,31,32]. The home-base exercise program included aerobic exercises of 30mins (walking), resistance exercises for 15-20 mins, 2 sets, 10 repetitions twice a day (chest press, leg curl, triceps extension, biceps curl, core stability exercises, finger ladder, wand exercises, Codman's exercises, hand pumps) and flexibility exercises for 30secs, 2 sets a day for upper, lower and trunk. Activity and nutrition both play a significant role in reducing cancer recurrence and mortality and may combine to achieve an even greater effect. The American cancer society has published along with 150 mins a physical activity cancer patient should consume 5 servings of fruits and vegetables each day [33]. But a majority of cancer survivors do not meet the Physical activity or 5-A-Day recommendations.

Cancer survivors report many exercise barriers such as illness/other health problems, joint stiffness, pain, weakness and as predicted, fatigue. Environmental factors also can affect like lack of facilities for cancer survivors, weather extremes, motivational factors and safety concerns are important issues [34,35]. Also, additional barriers were reported in this study such as financial barriers, transportation barriers and the pandemic [36]. The major facilitator in this study was electronic media such as mobile phones, internet through which we could supervise the participants and correct them also we could evaluate them and they were give opportunity to solve their queries. Home-based exercises were essential in this period as participants could not visit hospital on daily basis. On the basis of some articles it is mentioned that supervised and structured exercise programs be prescribed to breast cancer survivors, regardless of treatment stage as a means to improve quality of life [37]. Many studies are conducted on unsupervised exercises for breast cancer patients which had their own limitations but, in this study, home-based exercises were prescribed but the participants received a video call every week in which the patients and care takers had opportunity to ask questions and therapist could also see whether the exercises were done correctly. Physical therapy did help in aspects such as range of motion, pain, fatigue but did not show improvement in aspects such as body image, hair loss, sexual functioning as exercises could not improve these. Other psychological, dietary interventions

could help in these aspects. Impaired body image reduced sexual enjoyment and sexual functioning in patients must be considered in long-term survivors of breast cancer to improve their overall quality of life [38]. The physical therapist could recommend them to such professionals respectively. All these factors lead to the conclusion that home-based physiotherapy sessions and counselling could help to prevent and reduce secondary complications in patients after breast cancer surgery. This emphasizes the role of home-based physiotherapy program in the awareness, prevention and treatment of secondary complications. Hence 6 weeks home-based physiotherapy program was beneficial for the shoulder function, quality of life and functional capacity in female breast cancer survivors

CONCLUSIONS

Home-based Physiotherapy Program for 6 weeks improves shoulder range of motion, Quality of Life and physical capacity in Female Breast Cancer Survivors and prevents breast cancer related lymphedema, shortening of muscles, pain at the operated site and chest complications.

Author's Contribution

All authors contributed equally to the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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