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# Effects of Exercise Intervention on Pain, Shoulder Movement, and Functional Status in Women after Breast Cancer Surgery: A Randomized Controlled Trial

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**Abstract**
**Background:** Breast cancer is one of the most important types of cancer among women worldwide and is a significant stressor in women's life that may affect functional health status. The present study was aimed to determine the effect of selected exercises program on pain, shoulder disability, and functional outcomes in women after breast cancer surgery**Methods:** Quasi experimental research design was conducted in the Oncology Department and Oncology Center at Mansoura University Hospital. The data were collected from 60 adult patients with breast cancer surgery. Data were collected utilizing the following tools: 1) Inventory Functional Status-Cancer (IFS-CA) to measured Functional Status of breast cancer women. 2) Numerical rating scale: to measure pain intensity; 3) Universal goniometer: to measure shoulder ROM; 4) A structured questionnaire to collect data related to socio-demographic data**. Findings:** The mean age of the studied women 43.10 and 45.06. The majority of the women in both groups were married and housewives. There was a highly significant difference in patients' level pain intensity, shoulder movement and functional status of the study group as compared to the control group ($p < 0.05$). This means that the educational program had positive effect in reducing patients' pain, improve shoulder movement, post program and after three month of implementation of the exercise program.**Conclusions:** The results of this study suggest that there are improvement in shoulder movement and decrease pain level as well as improve functional status and overall quality of life.
**Keywords:** Breast cancer, Pain, shoulder disability, functional status.

## I. Introduction

Breast cancer is the most common cancer in women worldwide. It is also the principal cause of death from cancer among female globally. Breast cancer is the most common malignancy in women in the United States. According to estimates from the American Cancer Society, up to 3.1 million women living in the United States have a history of invasive breast cancer, and 232,000 new breast cancer diagnoses were expected in 2014, [1,2] and ranks second overall (10.9% of all cancers)[3]. Although effective in treatment of cancer, treatment is often associated with side effects which may affect a patient's function and quality of life.[4] Breast cancer treatment is often followed by a decline in upper body function, even at some time distant from therapy.[5]

Pain is more likely when breast surgery includes the removal of lymph nodes in the underarm area (axillary dissection). Twenty-five to 70 percent of women have some degree of pain following axillary dissection.[6] Postoperative pain control remains a common problem for patients undergoing breast cancer surgery. A recent survey showed that patients' number one concern leading up to surgery is pain.[7] Uncontrolled, acute postoperative pain can lead to an increased surgical stress response. This then has an effect on endocrine, metabolic, inflammatory, and immune functions, which can further stress various organ systems.[8] Appropriate pain control can lead to improved postoperative outcomes as well as decreased pulmonary and cardiac complications.[9,10] In addition, uncontrolled acute postoperative pain is associated with longer hospital stays, decreased patient satisfaction and quality of life, and increased costs.[11-14]

More than 2.6 million breast cancer survivors currently reside in the United States. [15] Although improvements in the medical management of women diagnosed with breast cancer have resulted in a 5-year survival rate of 89%, curative treatments often are associated with adverse effects that affect physical function[16-18]. Shoulder and arm morbidity (eg, loss of range of motion [ROM] and strength and pain due to axillary web syndrome and cording, in addition to lymphedema) is highly prevalent in patients undergoing breast cancer treatment.[19-22] This condition may lead to difficulty with activities of daily living (ranging from overhead reaching and lifting and carrying objects to caring for family and returning to work). [23-24] As a result of these impairments, women often attenuate their activities after treatment, which leads to poor activity tolerance and diminished quality of life. [19]

Upper-limb dysfunction is commonly reported as a side effect of breast cancer treatment and may include one or more of the following impairments: decreased shoulder range of motion (the range through which a joint can be moved) (ROM) and strength, pain and lymphedema (an accumulation of lymphatic fluid in the tissue of the hand, arm, breast and/or trunk) ).[25-26] A systematic review examining upper-limb symptoms following surgery and radiation therapy found a wide variation among studies in the reported prevalence of impaired shoulder ROM (< 1% to 67%), arm weakness (9% to 28%), shoulder/arm pain (9% to 68%), and

 

lymphedema (0% to 34%) ).[28] Despite the reported variability, it is clear from the literature that many breast cancer survivors present with upper-limb dysfunction that may persist for many years following treatment).[27,29] More recently; the presence of upper-limb dysfunction in breast cancer survivors has been found to have a negative impact on quality of life ).[30] Thus, it is important to develop methods to reduce acute pain after breast cancer surgery and to reduce chronic pain for breast cancer survivors.

Functional status has been used as a primary outcome measure in recent decades. It is a complex multi-dimensional assessment of the physical, psychological and social well-being of individuals. The physical dimensions include ability to work and physical functioning; the psychological dimensions include coping ability, self-acceptance, perceived health status and adjustment to illness.[31,32] Rozema, Vollink, & Lechner [33] reported that that a negative illness perception has been associated with poorer functional status and emotional health. In our previous study also showed that a diagnosis of breast cancer and its treatment are stressful events that affect the long-term functioning of patients. [34] Furthermore, some studies showed that the functional status and QOL of breast-cancer patients decrease after diagnosis, at the start of treatment and post-treatment. [35-37]

Exercise has a role in the management or rehabilitation of cancer patients recover from treatment. Evidence for the benefits of exercise comes from post-operative studies, as well as from studies on women with, or at risk of, secondary lymphoedema. Post-operative progressive and supervised exercise for shoulder range of motion (ROM)[38] and strength,[39] assessed for two years, did not cause or exacerbate lymphoedema and reduced arm impairment. Post-treatment exercise of various modalities for women with or at risk of lymphoedema has also resulted in lymphoedema decreasing or staying the same, as well as in improvements in QOL and other physical parameters [40,41] and body image The exercises that increase shoulder and arm motion can usually be started in a few days.[42] Generally, exercises are essential to the prevention of shortening of the muscles, prevention of contracture of the joints, and improvement in lymph and blood circulation after mastectomy.[43] Previous research could have showed multimodal exercise and comprehensive rehabilitation including physical therapy also had physical and psychological health effects. Then, depending on the women's potential health risks or the goal of care target after breast cancer treatment, more feasible interventions could be applied to improve those women's health conditions.[44] Milne and colleagues reported the relationship between exercise and overall quality of life in a group of West Australia breast cancer survivor. The results showed increased quality of life in breast cancer survivors.[45]

**Operational definition**

For the purposes of this study, pain and functional status are defined as:

***1. Pain,*** with respect to breast cancer patients, is a physiological response that occurs from cancer, the treatment of cancer, or the blend of illness and treatment.[46]

***2. Functional status*** can best be defined as the level of activities performed by an individual to realize needs of daily living in many aspects of life including physical, psychological, social, spiritual, intellectual, and roles. Level of performance is expected to correspond to normal expectation in the individual's nature, structure, and conditions, [47] because the assessment of functional status can reflect insight into the patient's needs.

**Significance of the Study**

With breast cancer survivors living longer there is a need for making life more pleasant and manageable. Pain and other symptoms such as disability of shoulder function are bound to occur from not only breast cancer itself, but the medical treatment associated with this particular illness.[48] The data achieved by this study could provide an in-depth understanding of associates of functional status of this category of patients. Consequently, this could assist nurses and allied health care personnel in planning and implementing strategies for relevant effective care and ultimately assist breast cancer patients on treatment to lead quality life through improving their functional capabilities. In addition, It is important to assess non-pharmacological options such as exercise intervention that can be helpful in treating symptoms such as pain and disability of shoulder function in breast cancer patients and improves functional abilities and the ability to fight breast cancer more effectively, because regular practice of exercise, as soon as possible after surgery and during treatment, may reduce secondary effects.

**Aim of the Study**

The aim of this study was to determine the effect of selected exercises program on pain, shoulder disability, and functional outcomes in women after breast cancer surgery.

**Research hypothesis**

**H1:** Breast cancer patients receiving exercise in postoperative period will have less pain than those who do not receive.

**H2:** Breast cancer patients receiving exercise in postoperative period will have improve function of shoulder than those who do not receive.

**H3:** There is improvement of functional outcomes among breast cancer surgery patients receiving therapeutic exercises than who do not receive.

**Subjects and methods**

**Research design**

Quasi experimental research design was used in this study

**Study Setting**

The study was conducted in the inpatients ward and out patients of the Clinical Oncology and Nuclear Medicine Department at Main Mansoura University Hospital

**Study Subjects**

A convenience sample of sixty patients was included. They enrolled in this study according to the following inclusion criteria; unilateral breast cancer with age between 18 years to 60 years, and accepted to participate in the study. Patients with secondary breast cancer or previous history of cancer or previous history of chronic illness were excluded from the study subjects. Additionally, exclusion criteria were identified as those experiencing visual audible, or verbal communication difficulties; people with diagnosed mentally disability and previous exercise program**.** ***(Figure1: flow of participants through study)***

**2.6 Tools for data collection**

It was developed by the researchers after reviewing the relevant literature. This tool included three parts:

***Part I: Functional Abilities Assessment:***

Functional status was measured by the inventory of Functional Status Cancer (IFS-CA) adopted by Tulman et al., and El sayed [49,50]. It consists of 39 items, designed to measure functional status according to its four subscales items that tap functional status relevant to cancer patients :(a) Personal care activities (10 items ) such as bathing, dressing , eating, exercising, relaxing, resting, and sleeping; (b) Household and family activities (15 items) such as cleaning, cooking, doing dishes, shopping, and caring for spouse and children; (c) Occupation activities (8items) such as amount of work accomplished at one's job, amount of job responsibility, and hours worked and; (d) Social and community activities (6items) such as participation in community and religious organizations, socializing with friends and relatives and time spent on hobbies. Personal care activates subscale and occupational activities subscale, are using a 4-point rating scale, ranging from1 (never) to 4 (all of the time). While household and family activities subscale and the social and community activities subscale using a 4 –point rating scale ranging from,1 (not at all) to 4(full time), which is attached to each statement. Possible scores range from 39 to156, higher scores indicate better function status.[51] The test–retest reliability coefficient for the total IFS-CA was 98.5. In addition content validity was 0.91. This scale was chosen because of the easy administration and being comprehensive. IFS-CA requires approximately 10 -15 minutes to complete.

***Part 2: Pain Assessment Scale:***

***Numerical Rating scale*** was adopted from (**McAffery & Beebeg,**[52] to measure to measure pain intensity. It consists of 15 questions taking only 10 minutes to administer. Scoring system: 0 indicates no pain, 1-3 means mild pain, 4- 6 means moderate pain, 7-9 means severe pain and 10 mean worst pain. The pain intensity level was measured and recorded immediately before, 1 hour and repeated 2 hours after the exercise for both groups and follow up after 2 month. For both the experimental and control group analgesics were utilized based on study participants' request. Patients in the control group received only analgesics, whereas those in the experimental group received physical exercise with analgesic**.**

***Part 3: Range of motion of the shoulder (ROM)***

The measurement of shoulder ROM was performed by using a universal goniometer was developed by Riddle, Rothstein, & Lamb,[53] to assess active shoulder movements included forward flexion, abduction, and external rotation. Passive shoulder movements included forward flexion, abduction, external rotation, and horizontal abduction. The final score was recorded in degrees as the best of three attempts. The higher scores indicated the greater the range of motion.

***Part 4:*** **Socio-demographic and Medical data:**

Socio-demographic data was gathered from existing self-report and medical record review information collected during enrollment of the subjects. Data extracted for this study included age, sex, educational level, residence, employment status, household income and marital status. Clinical data: It includes hemoglobin level (Hb) of the patient, history of chronic diseases, treatment measures taken, family history of breast cancer, site and types of surgery.

**Ethical considerations**

An informed consent for participation in the study was taken verbally from patients after full explanation of the

 

aim of the study. Individual participation in the study was voluntary. Confidentiality was maintained by keeping privacy of all participants' information.

**Validity and reliability**

The developed questionnaires tools were reviewed by 7 panels of experts' medical and nursing field in order to ensure content comprehensiveness, clarity, relevance, and applicability. The test-retest reliability showed a value of 0.86. The questionnaires were translated from English into Arabic to help the patient understand them.

**Pilot study**

A pilot study was carried out on ten percent from the total sample size (six patients) to test the feasibility and clarity of the used tools; modifications were done based on the results. Subjects included in the pilot study were excluded from the main study sample.

**Procedure**

- Official written permissions to conduct this study were obtained from the head of outpatient diabetic clinics. Subjects who met the criteria for inclusion and exclusion were approached by the investigator. At that time, the purpose and nature of the study were explained.
- This study was conducted according to the following steps: 1st step: Designing the program to be implemented through review of related literature and research results regarding the exercise intervention program. It was written in a simple Arabic language and supplemented by photos and illustrations to help the patient understanding of the content.
- Also, study tools were tested for content validity by a jury of 7 experts in nursing and medical fields were sought to ensure content comprehensiveness, clarity, relevance and applicability. 2nd step; the researcher met with the selected patients from previous settings. At the initial visit, data were collected on socio-demographic data pertinent to age, sex, education…etc. Also pre test disease related information, pain assessment sheet, ROM assessment, and functional status were assessed for each subjects before exposure to the exercise intervention. Data were collected during 6 months from April 2014 to Sept. 2015. 3rd step; the exercise program was given to selected patients. The subjects of the study were divided into small groups 3 to 5 patients. The study subjects were exposed to exercise intervention, the researcher randomly assigned them to two groups (experimental & control group).
- The data related to the patients' age, sex, preoperative procedure and postoperative management had been considered in this study, the outcome was assessed through the changes in physical components between baseline and post intervention program and follow up (3 months), for both experimental and control groups.

**Intervention group**

The researcher taught exercise therapy (intervention practice) to the patients in the experimental group and practiced with them, Participants in the intervention group received exercise therapy bi-day / two mouth, at 30 minutes per intervention and the control group received nothing more than the routine healthcare, the researcher gave a handbook of guidelines for exercise technique to the subjects. Patients were encouraged to use the guidelines for practice whenever they wanted. Patients were encouraged to assume a comfortable position while performing the practice and researcher were available to ensure that the patient was not interrupted. The practice of intervention group was started for 10 minutes for exercise therapy the researchers assisted patients in reading and exercise therapy every day. They assessed pain and shoulder mobility m functional status before 1 hour and 2 after the intervention from exercise, and follow up after 2 month the subjects were measured for the pain, shoulder mobility and functional status profile scores. These data were used as a baseline to compare later changes shoulder mobility, pain and functional status profile scores.

**The Control Group**

Patients assigned to the control group received analgesic and routine care, i. e., no exercise intervention. The data collection procedure was the same for both groups. This study did not interfere with patients' medication regimens. Analgesics were given to patients in accordance with physician orders, ward routines.

**Statistical analysis**

Data entry and statistical analysis were done using SPSS 16.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations of score experimental and study groups. Chi-square use the comparative between experimental and study groups regarding some variables. T- Test use for compares the actual difference between two means in relation to the variation in the data.

**Results**

**Figure 2.** This figure revealed that most of patients (61.67% and 70%) were more than 50 years in in study groups.

**Table (1)** shows that socio demographic and medical characteristic of the participants. The mean age of patients was 43.1±2.5 years in experimental group, 45.5±3.6 years in control group. The most of participants were (41.66.0% and 36.66) had illiterate in both group, were housewives (60.7%) and nearly two third were married (58.33 and 60 %), Regards sites of surgery, more than half of participants (56.66 %and 58.33%) were in left side. In addition to, most of both group (61.66 % and 58.33%) were mastectomy.

**Table (2)** showed that there were significant differences in the pain severity after exercise therapy in the experimental and control group ($t=3.568$, $p<.001$). Also pain severity on week 4, the mean pain severity before exercise program in the experimental group was 2.85±.587and 3.25±0639 in the control group. Similarly, there were significant difference in the relative change of pain severity effects of group ($p<0.001$) and time ($p<0.001$).

**Table (3)** shows that measurement of central tendency and distribution of ROM among patients over three times of treatment, there was a significant between groups result In relation to abduction, flexion , internal rotation for the affected arm in the whole group ($p<0.05$). While no statistically significant study between both groups in external rotation ($p>0.05$).

**Table (4)** Shows that function status dimensions improvement over time from beginning of week 0 to 8 week after exercise therapy. As regard personal care (mean=23.62 to 26.04, at $p<0.001$). Moreover, an improvement in social activities was detected from (10.80 to 11.50, at $p=0.002$). Greatest changes occurred in mean score household activities from (17.18 to 24.86,at $p<0.001$ and TIFS-CA (63.19 to 72.93, at $p=0.010$).These difference indicated improvement over time.

**Table (5).** shows that correlation found between the exercise program with pain level, shoulder movement and functional status pre , post and follow up the implementation of the participations for the program ($p <0 .05$).

**Discussion**

Breast cancer and its treatment sequelae results in adverse side effects, such as : upper extremity restricted, fatigue, and pain.[54] All these side effects accompanied with breast cancer treatments negatively influence quality of life and daily activities, lead to non-compliance treatments, and ultimately affect prognostic and survival outcomes.[55,56] Research indicates that exercise interventions after diagnosis of breast cancer is linked with improvements in fatigue, functional capacity, prolonged survival and improved quality of life. [57,58] Moreover, The major finding of the trial was that the exercise program had a beneficial effect on shoulder pain and ROM. The improvement in pain was associated with increases in upper extremity strength and endurance. The findings are consistent with the hypothesis that reductions in pain may be mediated by improvements in muscular strength and endurance.

According to the current study finding, there was the marked and constant statistical significant difference in pain severity before and after exercise intervention. This result was furtherly supported by Wong et al., [59] stated that exercise program reducing breast and chest-wall pain in patients with breast cancer., In this regard, Visovsky & Dvorak[60] shows that home-based exercise programs could provide benefits for participants, ranging from improved QOL scores to enhanced self-esteem, improved mood, greater aerobic fitness, higher level of functioning, and decreased pain was observed following just one exercise session

The current study revealed that the improvements in the shoulder ROM in the actions of internal rotation, abduction, flexion and external rotation and in the strength actions of flexion, internal rotation, extension and horizontal adduction. This is congruent with McNeely, et al.,[61] who stated that ROM may be improved to a greater degree after exercise program. Furthermore, Box et al. concluded in their RCT that a postoperative physiotherapeutic protocol is effective in facilitating and maintaining the recovery of shoulder movement.[62] similarly; study by Thomas-MacLean, et al.,[63] investigated the effect of exercise on breast cancer-related arm morbidity. In their randomised controlled trial (RCT) in 2005, Lauridsen et al reported that physiotherapy can improve shoulder function significantly, even when instituted as long as six months post-operatively[64].

Results of the current study showed a statistically significant improvement in the total functional status scores among patients over time ($p < 0.010$). This improvement were demonstrated by personal care activities, and household activities ($p <0.001$), as well as social activities ($p = 0.002$) which may be attributed to breast cancer control, response for nursing intervention, and rehabilitation. The literature suggests that exercise in breast cancer survivors or in patients receiving therapy improves cardiorespiratory fitness, physical function, and muscular strength.[65,66] Thus, there is increasing evidence that regular exercise after the diagnosis of breast cancer might have a substantial positive impact in mortality, morbidity, prognosis, and quality of life. In line of study, Eyigor et al.,[67] shown that exercises have significant effects in females with breast cancer in terms of functional capacity, fatigue, flexibility, and quality of life compared to the control group.

This result was further supported by Macvicar et al., [68] stated the effects of breast cancer have been

described previously as affecting women physically, mentally, emotionally and socially. exercise, as an integrated system, deals with all these aspects. On the same line, Vadiraja, Raghavendra, et al., [69] stated that the participants reported improvement in their QOL after exercise program. Mock et al.[70] studied the effect of home-based exercise at least 90 min per week for three or more days in women with breast cancer who reported significantly less fatigue and emotional distress as well as higher functional ability and QOL than the women who were less active during treatment.

The study suggests that there is strong evidence for reduced risk of some cancers with increasing physical activity. The strongest evidence exists for breast cancer's patients to increase physical activity in a consistent way during treatment, because regular practice of exercise, as soon as possible after surgery and during treatment, may reduce secondary effects and improvements in physical functioning, , muscle strength and endurance.[71] The findings agreement with Oliveira,[72] shows the physical function, emotional function, role function, cognitive function and global quality-of-life scales, a higher score indicates better level of functioning. Finally, it was obvious that the findings revealed significant improvements in pain level and functional of shoulders and functional status findings throughout study phases, with almost all patients being controlled by the end of the intervention. Thus the main study hypothesis was achieved.

**Conclusion and recommendations**

The study findings concluded that individualized custom tailored exercise intervention can be effective in the management of breast cancer symptoms through improving level of pain and shoulder movements. In addition, results indicate exercise intervention benefits and a trend toward improvement in physical and psychological functioning and overall quality of life.

Based on these findings it is recommended to apply this intervention as a routine care in the study setting and similar ones. All the nurses in the outpatient clinics should be trained in delivering the intervention to their patients. The illustrative booklet should be distributed to breast cancer patients.

**Conflicting Interest**

The author declared that there was no conflict of interest.

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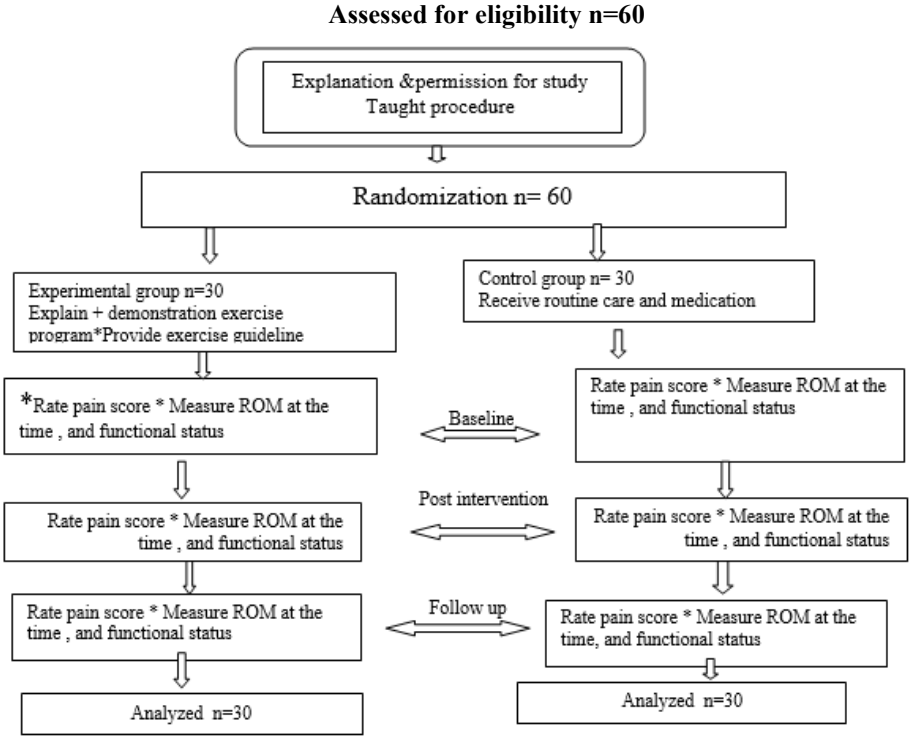


**Figure 1:** Flow of participants through study

 

**Result:**

**Table 1: Socio demographic and medical characteristics of women with breast cancer surgery (N=102)**

| Variables | Intervention G. | Control G. | p- value |
|---|---|---|---|
| **Age: Mean ± SD** | 43.1±2.5 | 45.5±3.6 | 0.230 |
| **Marital status** | | | |
| Married | 35(58.33) | 36(60) | |
| Divorced/widow | 11(18.33) | 14(23.33) | 0.254 |
| Single | 14(23.33) | 10(16.67) | |
| **Employment status:** | | | 0.412 |
| Do not work or | 12(20) | 11(18.38) | |
| Students | 20(33.33) | 19(31.66) | |
| Worker | 28(46.67) | 30(50) | |
| Housewife | | | |
| **Education** | | | |
| Illiterate | 20(41.66) | 16(36.66) | 0.154 |
| Read and write | 12(20) | 15(25) | |
| Secondary | 15(25) | 14(23.33) | |
| University | 8(13.33) | 9(15) | |
| **Residence:** | | | |
| Rural | 37(61.66) | 35(58.33) | .1070 |
| Urban | 23(38.33) | 25(41.66) | |
| **Side of surgery** | | | |
| Left | 34 (56.66) | 35 (58.33) | 0.978 |
| Right | 26(43.33) | 25 (41.66) | |
| **Breast cancer Surgery** | | | |
| Lumpectomy | 23(38.33) | 25 (41.66) | 0.398 |
| Mastectomy | 37(61.66) | 35 (58.33) | |

*Statistically significant at P 0.05

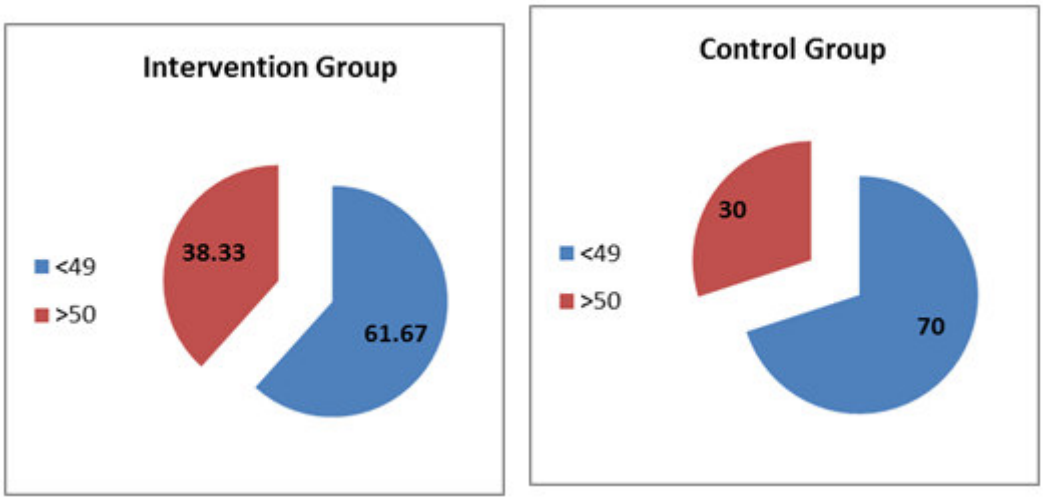


**Figure2. Age of both groups**

**Table (2) Mean and standard deviation of pain severity before and after exercise program in the experimental and control groups (N =60)**

| Items | Intervention Group (n=30) | Control Group (n=30) | t-test | P value |
|---|---|---|---|---|
| **Pain** | Mean SD | Mean SD | | |
| - Before | 3.85(.366) | 3.68(.598) | 1.594 | .1190 |
| - After | 2.43(.605) | 2.99(.224) | 3.568 | 0.001* |
| - Follow up | 2.95( .587) | 3.55( .639) | 2.062 | 0.046* |

*Statistically significant at P < 0.05

 

**Table (3) Measurement of central tendency and distribution of ROM among patients over three times of treatment (N =60)**

| Items | Intervention Group | | | Control Group | | | P- value |
|---|---|---|---|---|---|---|---|
| | Baseline | Post | Follow up | Baseline | Post | Follow up | |
| **Abduction :** | | | | | | | |
| Affected | 91.8±19.46 | 93.6±17.72 | 105.0±14.01 | 88.17±16.45 | 88.50±12.2 | 95.92±15.7 | <0.001 |
| Non – affected | 101.6±17.75 | 96.3±11.47 | 97.58±16.19 | 00.0±18.4 | 101.50±10.6 | 110.7±14.3 | |
| **Flexion :** | | | | | | | |
| Affected | 103.7±12.4 | 09.2±13.5 | 115.6±12. 49 | 01.82±17.3 | 12.8±14.7 | 121.2±16.8 | <0.001 |
| Non – affected | 101.6±17.75 | 96.3±11.47 | 97.58±16.19 | 06.10±13.8 | 116.90±14.4 | 126.6±13.37 | |
| **Internal rotation** | | | | | | | |
| Affected | 45.83.75±14.5 | 53.75±7.81 | 58.33±11.5 | 47.18±20.13 | 48.09±17.7 | 52.82±18.7 | 0.002 |
| Non – affected | 47.40±10.43 | 54.90±14.72 | 58.75±14.73 | 53.10±17.4 | 52.83±9.81 | 59.30±13.12 | |
| **Extension :** | | | | | | | |
| Affected | 35.42±11.4 | 38.33±11.1 | 44.92±11.65 | 38.36±9.29 | 42.45±8.93 | 48.27±8.92 | .0950 |
| Non – affected | 37.42±12.1 | 41.17±9.9 | 49.25±11.6 | 39.50±9.25 | 45.10±6.15 | 48.30±4.45 | |
| **External rotation :** | | | | | | | |
| Affected | 63.33±20.2 | 62.17±12.4 | 68.25±9.9 | 65.54±11.89 | 69.09±5.75 | 71.00±6.29 | 0.010 |
| Non – affected | 69.08±12.3 | 68.25±9.9 | 67.83±12.1 | 70.50±14.3 | 70.50±11.97 | 71.60±14.2 | |

**Table (4) Measurement of central tendency and distribution of functional status among patients over three times of treatment**

| Items | Intervention | | | Control | | | p-value |
|---|---|---|---|---|---|---|---|
| | Pre M±SD | Post M±SD | Follow up M±SD | Pre M±SD | Post M±SD | Follow up M±SD | |
| ***Personal care*** Mean ± SD Range | 23.62±2.36 19-28 | 25.92±2.04 23-29 | 26.44±2.19 19-31 | 22.04±3.24 21–30 | 24.62±2.36 19-28 | 23.62±2.36 20-28 | <0.001 |
| ***Household activities*** Mean ± SD Range | 17.18±3.72 15-30 | 21.35±5.36 15-34 | 25.55±6.18 15-33 | 20.86±10.17 15-48 | 21.35±5.36 15-36 | 19.18±3.72 15-34 | <0.001 |
| ***Social activities*** Mean±SD Range | 10.80±1.39 8-14 | 11.10±1.43 8-15 | 12.22±1.49 9–15 | 11.50±1.66 8-14 | 11.89±1.39 8-16 | 10.77±1.39 8-15 | 0.002 |
| ***Occupation activities*** Mean ± SD Range \| | 10.33±4.62 8-21 | 14.67±5.98 8-24 | 14.33±5.84 8-24 | 10.47±7.01 8-21 | 11.88±3.62 8-23 | 11.33±3.67 8-22 | 0.095 |
| ***TIFSCA*** Mean±SD Range | 63.19±9.86 54-85 | 72.67±10.05 57-91 | 73.87±10.21 53-93 | 63.93±15.54 54–85 | 64.19±9.86 54-87 | 63.99±9.86 54-86 | 0.010 |

 

**Table (5). Correlation between patients exercise program and outcome variables preprogram, post program, and follow up after three month for the intervention group.**

| **Research variables** | ***Exercise program*** | |
|---|---|---|
| **Preprogram** | ***R*** | ***p*** |
| - Pain intensity | 0.237 | 0.140 |
| - Shoulder movement | -0.234 | 0.147 |
| - Functional status | -0.108 | 0.509 |
| **Post program:** | | |
| - Pain intensity | -0.491 | 0.005* |
| - Shoulder movement | -0.628 | <0.01* |
| - Functional status | -0.568 | 0.004* |
| **Follow up program :** | | |
| - Pain intensity | 0.372 | 0.014* |
| - Shoulder movement | -0.323 | 0.035* |
| - Functional status | -0.477 | <0.01* |