ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

Effect of A nursing Rehabilitation Program on Shoulder Joint range of motion and Functional Abilities for Patients Post Rotator Cuff Surgery

Soheir Mohamed Weheida(1), Kwather Gaber Tolba(2), Essam Mohamed El Abbassy(3), Hend Abdelfatah Mohamed Hagag(4), Gehan Mohamed Desoky(5).

(1) Professor of Medical-Surgical Nursing, Faculty of Nursing, Alexandria University, Egypt.
(2) Professor of Medical-Surgical Nursing, Faculty of Nursing, Alexandria University, Egypt.
(3)Professor of Orthopedic and Traumatology Orthopedic and Traumatology Department, Faculty of Medicine, Alexandria University, Egypt.
(4) Assistant Lecturer of Medical-Surgical Nursing, Faculty of Nursing, Damanhur University, Egypt
(5) Assistant Professor of Medical-Surgical Nursing, Faculty of Nursing, Alexandria University, Egypt.

Abstract

Background: The rehabilitation program is usually the cornerstone post-rotator cuff surgery. The role of the nurses post-surgery includes physical assessment, pain management, and education to the patient on the safe compensatory strategies to optimize functional abilities. **Aim:** evaluate effect of a nursing rehabilitation program on shoulder joint range of motion and functional abilities for patients post rotator cuff surgery. **Design:** A quasi-experimental research design with pre, immediate post, and follow up after two months. **Setting:** This study was carried out at the Hadara Orthopedic and Traumatology University Hospital, Alexandria. **Subjects:** A convenience sample of sixty adult patients were scheduled for rotator cuff surgery. **Tools**: Tool I: Rotator cuff surgery patient's assessment: structured interview schedule. Tool II: Modified visual analog scale. Tool III: Range of motion for the affected shoulder. Tool IV: Muscle strength scale of the affected shoulder. Tool V: Functional abilities of the upper limb. **Results:** The results showed that the control group had unsatisfactory knowledge pre, immediately and two months post-rehabilitation program compared to patients in the study group, with the statistically significant difference with p value was 0.001. Moreover, there was a statistically significant difference between patients of both studied groups regarding the range of motion, muscle strength, and overall functional abilities of the affected shoulder two months post-rehabilitation program. **Conclusion:** A nursing rehabilitation program has been proven to give a positive result to patients in relation to shoulder joint range of motion and functional abilities post rotator cuff surgery. **Recommendation**: Replication of the study on large probability sampling.

Keywords: *Rehabilitation program, Range of motion, Functional abilities, Rotator cuff surgery, and shoulder joint.*

Introduction:

Rotator cuff disorders are one of the most common causes of disability related to the shoulder, in which a tendon is squeezed and rubbed against bones, and partial or complete tears of the rotator cuff tendons occur (Pander, Sierevelt, Pecasse, Van Noort, 2018).

The prevalence of rotator cuff tears between 25% of people over 50 and over 50% of the elderly, are common in Egypt. In 2016, the prevalence of rotator cuff tears in the general population in Egypt were 50% with the frequency rising with age (Edwards et al, 2016). While 70% of rotator cuff repairs performed in Italy over the age of 25 and about 65 % among patients under the age of 50 every year. The rate of rotator cuff repairs in Italy climbed significantly between 2017 and 2019. (Longo et al. people, 2019).

Rotator cuff strains or tears are caused by overuse or acute injury. The rotator cuff can also strain or tear after a fall, a car accident, or another sudden injury. These injuries typically cause intense and immediate pain. Shoulder pain is the primary symptom of rotator cuff injury. The patient also suffered from weakness of the shoulder, restricted shoulder movement, numbness and tingling in the affected arm or hand, limitations to daily activities, and joint stiffness (Codding & Keener, 2018).

Treatment of rotator cuff tears depends on the severity of the injury, as well as the age and activity level of the patient. It may be conservative or surgical treatment. For conservative treatment, it is focused on maintaining the range of motion and preventing the shoulder from becoming stiff. For surgical treatment of rotator cuff tear, the main indication is a full thickness tear, or partial tear that has not responded to the conservative treatment, and

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

produces symptoms that interfere with the patient's normal functioning (Dang, Davies, 2018).

Postoperative rehabilitation goals for patients aimed to decrease pain, increase range of motion (ROM), return to normal functional activities at the earliest time, and prevent re-rupturing of the repaired tissues. In addition, increased loading of movements and exercises are prerequisites for optimal tendon healing. A nursing rehabilitation program involves a group of exercises that should begin after two weeks from surgery, such as shoulder shrugs, pendulum exercises, passive assisted exercises, and other exercises (Terrance, Cilenti, 2018).

The role of the nurse as an educator is now becoming more central to their scope of practice than ever before. Rehabilitation nurses must be able to teach patients activities and exercises to perform in the clinical setting and at home, and also to facilitate health promotion and prevention measures. Nurses also should instruct patients about general precautions that should be followed, such as avoiding lifting the operative arm without assistance or how to use the muscles of the operative shoulder as in lifting, carrying, pushing, pulling, driving, and moving in bed during the first three months. So, This helps the nurse to provide optimal care for patients undergoing rotator cuff surgery and give attention to the patient's limitations and problems, and help patients to be adapted to them (Petrillo, Longo, Papalia, Denaro, 2017).

Significance of the study:

The rotator cuff tears are age-related and commonly degenerative pathologies, that can impact an individual's quality of life, and lead to surgical intervention. The statistical records of Hadara Orthopedic and Traumatology University Hospital; Alexandria, The statistical records of Hadara Orthopedic and Traumatology University Hospital; Alexandria, revealed that 70% of total patients admitted to the hospital in the year 2020 were diagnosed with rotator cuff tear.

The rehabilitation program is usually the cornerstone post-surgery, and it includes exercises, to improve range of motion and strengthen the shoulder muscles. The nurses are responsible to help patients to get professional nursing care. (Lin, Wang, Liu, Chen, 2016). Moreover, the role of the nurses post-rotator cuff surgery includes physical assessment, activity, range of motion restrictions, pain management, and education to the patient on the safe compensatory strategies to optimize function for activities.Hence this problem was not investigated in Egypt so, the researcher evaluate the effect of a nursing rehabilitation program on shoulder joint range of motion and functional abilities for patients post rotator cuff surgery.

Aim of the Study:

The present study aimed to evaluate the effect of a nursing rehabilitation program on shoulder joint range of motion and functional abilities for patients post rotator cuff surgery.

Hypotheses of study:

1- Patients who follow the rehabilitation program exhibit a normal shoulder range of motion than the patients who don't follow the rehabilitation program.

2- Patients who follow the rehabilitation program have strong muscle strength than the patients who don't follow the rehabilitation program.

3- Patients who follow the rehabilitation program exhibit improved mean score of functional abilities with no pain than the patients who don't follow the rehabilitation program.

Subjects and Method:

Research design:

A quasi-experimental research with pre, immediate, and post two months follow up was utilized.

Setting:

The study was carried out at the inpatient unit G and outpatient clinic of Hadara Orthopedic and Traumatology University Hospital, Alexandria. The hospital serves Alexandria, Matrouh, and El Beheira governorates.

Subjects:

A convenience sample of sixty adult patients (40-60 years old) were scheduled for rotator cuff surgery, and assigned randomly and alternatively into two equal groups (control & study groups), which included 30 patients in each group. Epi info 7 program was used to estimate the sample size using a population size of 180, a Confidence coefficient of 95%, and an acceptable error of 10%. The minimum sample size required were 60 patients.

- **Inclusion criteria:**
  - Adult patients, conscious, able to communicate.
  - Patients diagnosed with rotator cuff tear and scheduled for surgery.
- **Exclusion criteria:**
  - No trauma on any other parts of the body.
  - No joint disorders whether in the upper or lower limb.

Tools for data collection:

Tool I: Rotator cuff surgery patient's assessment: structured interview schedule:

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

This tool was developed by the researcher after reviewing the related literature (Craven & Hirnle, 2009), to collect baseline data. It was divided into three parts as the following:

Part I: Patients demographic characteristics: as age, sex, educational level, marital status, occupation, and residence area.

Part II: Patient's clinical data; as mechanism of injury, diagnosis, name of the operation, date of admission, date of surgery, date of discharge, chief complaints, medical history, surgical history, and prescribed medications.

Part III: Patient's knowledge; regarding post-rotator cuff surgery definition, indications, benefits, signs and symptoms, risk factors, complications, and types of exercises that were performed post-surgery.

In relation to, patients' knowledge answers were scored correct, incomplete, and wrong :

- The correct and complete answer was given a scored = Three
- The correct and incomplete answer was given a scored= Two
- A wrong answer or don't know was given a scored = one

Scoring system:

A total score for every patient was summed up and converted into a percent score. The percent score was classified as the following:

- Scoring of 60% and above was considered satisfactory.
- A score less than 60% was considered unsatisfactory.

Tool II: Modified visual analog scale:

This tool was adopted from Dones, Messina, Nazzi, & Franzini, (2011), and was used by the researcher for a subjective estimate site of pain, characteristics of pain, aggrevating factors, reliving factors of pain and the patient's severity of pain using a visual analog scale. The score ranged from 0-10. A score of zero means no pain & a score of ten means worst pain, and the highest score is the worst level of pain.

1 up to 3	Mild pain
4 up to 6	Moderate pain
7 up to 9	Severe pain
10	Worst pain

Tool III: Range of motion of the affected shoulder:

This tool was developed by the researcher based on a literature review (Gates, Walters, Cowley, Wilken, & Resnik, 2016), for the accurate recording of the joint range of motion of the affected shoulder, using the goniometer, to determine the flexibility in performing the range of motion of the affected shoulder as flexion, extension, hyperextension, adduction, abduction, internal, and external rotations of the shoulder. The reading of the joint range of motion was compared against the normal value for each range.

Flexion	170-180 degrees
Extention	50-60 degrees
Abduction	0-90 degrees
Adduction	90- 0 degrees
Internal rotation	80 – 90 degrees
External rotation	90 -100 degrees

Tool IV: Muscle strength scale of the affected shoulder:

Muscle strength scale of the affected shoulder was adopted from Szyluk, Jasinski, Widuchowski, Mielnik, &Koczy, (2015), and was used by the researcher to assess muscle strength of the shoulder using manual muscle testing. This included assessment of the following muscles; (Supraspinatus, Infraspinatus, Teres minor, and Subscapularis), A five-point Likert scale was used ranging from 0 to 5 as follows:

- No contraction=0
- Flicker or trace of contraction=1
- Complete range of motion with gravity eliminated=2
- Complete range of motion against gravity with no resistance=3
- Complete range of motion against gravity with some resistance=4
- Complete range of motion against gravity with full resistance=5

Tool V: Functional abilities of the upper limb:

This tool was adopted from Nicholas, Hefford, & Tumilty, (2012), and was used by the researcher, to assess and provide information about patient abilities to perform specific activities of the upper limb such as wash hair, dressing and undressing, laundering clothes (washing, ironing, & folding), and bathing. Each activity was scored separately, according to the following rating scale that ranged from 0 to 4.

- Extreme difficulty or unable to perform self-care= 0
- Quite a Bit of difficulty=1
- Moderate difficulty=2
- A little bit of difficulty=3
- No difficulty or ability to perform full self-care=4

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

Scoring system:

The total score was summed up and converted into a percentage. The percent score ranged from 0 to 75%;

0 < 25%	The patient is dependent.
25% < 50%	The patient has moderate difficulty.
50%<75%	The patient has a little difficulty.
75% and more	The patient is more independent.

Method:

- Approval from the Research Ethical Committee, Faculty of Nursing, Alexandria University was obtained.
- An official permission was obtained from the Faculty of Nursing, Alexandria University, to the study setting to obtain their permission to collect necessary data.
- An official permission was obtained from the hospital director and head of the departments of the selected hospital setting after an explanation of the aim of the study.
- Tool I & tool III was developed by the researcher after reviewing the related literature, and tool II, tool IV, and tool V was adopted by the researcher.
- Validity testing: All tools were submitted to 3 experts in the Medical-Surgical Nursing, Faculty of Nursing, Alexandria university, and two experts in the orthopedic field, Faculty of medicine, Alexandria university for content validity, and the necessary modifications were carried out accordingly.
- The reliability of tools I&IV was tested through Cronbach's alpha. The reliability coefficient for tool I patient's knowledge was 0.846 and 0.949 for tool IV.
- A pilot study was conducted before the actual study and was carried out on 6 patients to assess the feasibility and applicability of the tools and the necessary modifications were carried out accordingly. Those patients were excluded from the actual study.
- After administrative approval, the data collection was started, and continued from April 2020 to September 2020.

The study was carried out in four phases:

1. Assessment phase:

The initial assessment was carried out for both groups (control & study) on the 2nd-day post rotator cuff surgery at the inpatient units of Hadara Orthopedic and Traumatology University Hospital, Alexandria, to assess knowledge, pain, range of motion of the affected shoulder, muscle strength, and functional abilities of the upper limb before application of a nursing rehabilitation program using all tools.

2. Planning phase :

- Based on the data obtained from the initial assessment phase and review of the related literature (Craven & Hirnle, 2009), the planning rehabilitation program was developed for each patient by the researcher. Powerpoint, pictures, and videos were formulated for the patients of the study group (II).
- A colored booklet was developed, to be distributed to each patient of the study group (II). it included the following topics:
  - Simple anatomy of the shoulder and definition of rotator cuff surgery.
  - Risks and precautions needed post rotator cuff surgery.
  - Types of exercises that were carried out.
  - Activities of daily living that must be carried.

Expected outcomes from the rehabilitation program include:

- The patient regained full ROM.
- The patient regained full strength in all rotator cuff muscles.
- Functional abilities of the patient were carried out with no pain.

3. Implementation phase :

- A nursing rehabilitation program was implemented individually for each patient in the study group in 3 sessions. The first session was done on the 2nd day postoperative at the inpatient units of Hadara Orthopedic and Traumatology University Hospital, Alexandria, and the second two sessions were done post two weeks in the outpatient clinic of the previous setting, and each session took 30-60 minutes. A colored booklet was distributed to each patient of study group II.
- The purpose of the study was explained to patients of study group II.
- A colored booklet was distributed to each patient of study group II.
- Method of teaching:
  - The face-to-face discussion was used for the theoretical session .
  - Demonstration and re-demonstration were used for the practical session .
  - Media used: PowerPoint slides, videos, posters, and a colored booklet were used to support the given information.
  - For the control group, they receive only routine hospital care (roator cuff surgery) and perform follow up in rehabilitation center.

1. The first session: was done post-operatively and included the patient's knowledge about post-rotator cuff surgery as:

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

- Definition, benefits, and indications of rotator cuff surgery.
- Exercises were carried out, different types of it, and duration.
- Functional abilities of the shoulder.

2. The second session: included teaching about exercises that were carried out as:

- **Active exercises for non-affected joint of the upper limb:**

o Wrist active range of motion (flexion and extension): The patient was instructed to bend the wrist forward and backward. This exercise was repeated three times/per day.

o Wrist extensor stretch: The patient was instructed to extend the affected arm and make a fist with the palm facing down. Bend the wrist so that the fist points toward the floor and with the other hand, gently bends his/her wrist farther until the patient felt a mild to moderate stretch in the forearm. Hold for at least 15 to 30 seconds. This exercise was repeated three times/ per day.

o Wrist curls: The patient was instructed to place the forearm on a table with his/her hand hanging over the edge of the table, palm up. Place a filled water bottle weight on the hand, slowly raise and lower the weight while keeping the forearm on the table and the palm facing up. This exercise was repeated three times/per day.

o Forearm pronation and supination: The patient was instructed to bend the elbow 90°, turn the palm upward and hold for 5 seconds. Slowly turn the palm downward and hold for 5 seconds.

o Resisted elbow flexion and extension: The patient was instructed to sit or lie on the back with the elbow flexed to 90 and slowly bend the elbow so that the hand nears the shoulder. The examiner resisted the patient until the elbow was completely straight. This exercise was repeated three times/per day.

- ***Exercises to strengthen upper extremities:***

o Hand muscle isometric exercises; the patient was instructed to obtain a sponge rubber ball. Grip the ball 5 to 10 times. This exercise was repeated three times/per day.

o Biceps isometric exercises; the patient was instructed to raise arms to shoulder height and interlock fingertips of both hands. Try to pull hands apart using arm muscles. Hold for 5 to 15 seconds then relax muscles. This exercise was repeated three times/per day.

o Triceps muscles isometric exercises; the patient was instructed to raise arms to shoulder height. Make a fist with one hand and place it against the palm of the other hand. Push hands together as hard as possible for 5 to 15 seconds then relax. This exercise was repeated three times/per day.

3. The third session included :

- ***Active assisted ROM exercises & isometric exercises of the rotator cuff which included:***

o Shoulder forward elevation: It was done either lying down or sitting position. Clasp hands together and lift arms above head. Keep the elbows as straight as possible. Maintain the elevation for 10-20 seconds, then slowly lower the arms. This exercise was repeated three times/per session.

o Pendulum exercises: The patient was instructed to lean forward and place one hand on a table for support, and let the other arm hang freely at the side. Gently swing the arm forward and back in a circular motion. This exercise was repeated 5 times, 3 sessions a day.

o Supported shoulder rotation: The patient was instructed to keep the elbow in place and shoulder blades down and together. Slide forearm back and forth. This exercise was repeated 5 times, 3 sessions a day.

o Internal rotation: The patient was instructed to touch the hip and progress to touch mid-back. This exercise was repeated 5 times, 3 sessions a day.

- ***Active ROM and isometric exercises of the rotator cuff*** *(Edwards et al., 2016)* ***as:***

o Active horizontal abduction exercise:

The patient was instructed to lie on one side with the shoulder to be exercised on the top. Keep the elbow straight, and the shoulder flexed so that the arm is out and parallel to the floor, slowly lift the arm so that the hand is pointing towards the ceiling. Hold this position for one to two seconds, and then slowly lower to the starting position. Move through a pain-free ROM.

o Side lying shoulder external rotation exercise: The patient was instructed to lie on one side with the shoulder to be exercised on top, keep the elbow bent to 90 degrees and tucked into the side and the elbow remained at the side the entire time.

o Side lying shoulder internal rotation exercise: The patient was instructed to lie on one side, but the shoulder to be exercised on the bottom, move the arm forward an inch or two to prevent lying directly on the arm or elbow, keep the elbow bent to 90 degrees, and keep the palm facing up.

o Isometric shoulder extension: The patient was instructed to stand with the back against the wall and arms straight at the sides. Keeping the elbows straight, push the arms back into the wall. Hold for 5 seconds, and then relax. This exercise was repeated 5 times, 3 sessions a day.

o Isometric shoulder external rotation: The patient was instructed to stand with the affected arm at the side of the body with the hand against a wall. Bend the elbow

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

90 degrees. Push the back of the hand slowly into the wall. Hold for 5 seconds, and then relax. This exercise was repeated 5 times, 3 sessions a day.

o Isometric shoulder internal rotation: The patient was instructed to stand at a corner of a wall. Place the affected arm against the wall around the corner, bending the elbow 90 degrees. Push the palm into the wall. Hold for 5 seconds, and then relax. This exercise was repeated 5 times, 3 sessions a day.

4. Evaluation phase:

- All patients in both groups were evaluated three times, pre the rehabilitation program implementation, immediately, and two months post rehabilitation program implementation in the inpatient unit and outpatient clinic using tools I, II, III, IV & V.
- The first-time assessment was conducted pre the rehabilitation program implementation in the inpatient unit using the five tools I, II, III, IV, and V to collect baseline data.
- The second-time evaluation was done immediately post rehabilitation program implementation for both groups in the outpatient clinic using tools II, III, IV, and V.
- The third time was done two months post-rehabilitation program implementation in the outpatient clinic using tools II, III, IV, and V.
- The difference between both groups was evaluated using appropriate statistical analysis to evaluate the effect of a nursing rehabilitation program on shoulder joint range of motion and functional abilities for patients post rotator cuff surgery.

Statistical analysis of the data:

❖ After data collection, they were coded and transferred into a specially designed format, to be suitable for computer feeding.

The following statistical analysis measures were used:

- Qualitative data were described using numbers and percentages.
- Quantitative data were described using range (minimum and maximum), mean, standard deviation, and median. The significance of the obtained results was judged at the 5% level.
- **Statistical analysis tests** included: Chi-square, Fisher's Exact or Monte Carlo correction, student T-test, ANOVA test and correlation, Mann-Whitney test, Friedman test, and Cronbach's Alpha (Kirkpatrick, Feeney, 2013).
- **Tables** of different characteristics were presented.

Ethical considerations:

- Written informed patients' consent was obtained before data collection and after an explanation of the study's aim.
- The patient was informed that his or her participation in the study is voluntary and he/she can withdraw at any time and his or her withdrawal did not affect the care he/she receives at the hospital.
- Privacy and anonymity of the study participants were asserted and maintained.
- Confidentiality of the collected data was assured.

Results:

Table (1): shows the percentage distribution of patients of both studied groups according to socio-demographic characteristics. The results showed that more than three-quarters 76.7% of patients in the control group and less than two-thirds 63.3% of patients in the study group were in the age group 40 to less than 50 years old. While for gender, it was found that, more than two-thirds 66.7% of patients in the control group and 73.3% of patients in the study group were females. Concerning occupation, it can be noticed that more than two thirds 66.7% of patients in the control group and half 50% of patients in the study group were housewives.

Table (2): Shows the percentage distribution of patients of both studied groups according to clinical data pre-program implementation. Regarding the mechanism of injury, findings showed that more than two-thirds 66.7% of patients in the control group and 70% of patients in the study group had an acute injury as weightlifting and falling. Moreover, there was a significant difference among both control and study group patients' pre-program implementation with p value was 0.045.

Table (3): shows the overall levels and scores of patients' knowledge assessment at three different intervals pre, immediately, and two months post-rehabilitation program. The findings showed that the mean scores for patient's knowledge of the control group were (21.67 ± 17.84, 23.81 ± 21.33, & 32.62 ± 30.46 respectively) pre, immediately post-program & two months post-rehabilitation program, with statistically significant differences within the control group patients (t=14.296*,p <0.001) compared to (24.76 ± 24.37, 45.95 ± 37.83, & 63.57 ± 36.44 respectively) of patients of the study group, with statistically significant difference within the study group (t=17.081*,p<0.001). Moreover, there was a significant difference among both control and study group patients immediately after post-program (p2=0.008*), and two months post-rehabilitation program with p value was 0.001.

Table (4): shows the comparison between patients of both studied groups according to pain

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

characteristics and severity pre, immediately, & two months post-rehabilitation program. It can be noticed that All both studied groups 100% felt pain, the highest percentage of pain was in the right shoulder and represented more than half 56.7% in the control group compared to 66.7% in the study group patients. Also, pain character was tingling and represented 73.3% of patients of the control group compared to 70% of patients of the study group. Concerning severity of pain, (66.7%, 53.3%, 56.7% respectively) of patients of the control group had mild pain pre the rehabilitation program, immediately, and two months post rehabilitation program compared to (66.7%, 66.7%, 86.7% respectively) of patients of the study group. In addition, (33.3%,46.7%,43.3% respectively) of patients of the control group suffered from moderate pain compared to (33.3%,33.3%,13.3% respectively) of patients of the study group pre rehabilitation program, immediately, and two months post rehabilitation program, with Statistical significance difference between patients of both studied groups two months post rehabilitation program with p value was 0.010.

Table (5): show the comparison between patients of both studied groups in relation to range of motion of the affected shoulder immediately, and two months post-rehabilitation program. Statistical significance difference of both studied groups in relation to flexion of the affected shoulder immediately and two months post rehabilitation program, where (t= 100.279*, p=0.000*, t=713.111*, p=0.000* respectively). Statistical significance difference of both studied groups in relation to extension of the affected shoulder immediately and two months post rehabilitation program, where(t = 408.74*, p=0.000*, t=373.103*,p =0.000* respectively). Statistical significance difference of both studied groups in relation to abduction of the affected shoulder immediately and two months post rehabilitation program, where (t=430.749*, p=0.000*, t=29.804*,p =0.000* respectively).

Table (6): **shows the comparison between patients of both studied groups according to muscle strength of the affected shoulder immediately and two months post-rehabilitation program.**

Statistical significance difference between patients of both studied groups in relation to supraspinatus muscle strength immediately post rehabilitation program and two months post rehabilitation program (p<0.001*), and statistical significance difference within the study group immediately and two months post rehabilitation program(t=114.56* p=0.000).

Statistical significance difference between patients of both studied groups in relation to infraspinatus muscle strength immediately and two months post rehabilitation program (p<0.001), and statistical significance difference within the study group immediately and two months post rehabilitation program (t=123.692*, p=0.000.

Statistical significance difference between patients of both studied groups in relation to teres minor muscle strength immediately and two months post rehabilitation program (p=0.000*), and statistical significance difference within the study group immediately and two months post rehabilitation program (t=122.325*, p=0.000).

Statistical significance difference between patients of both studied groups in relation to subscapularis muscle strength immediately and two months post rehabilitation program (p=0.000*), and statistical significance difference within the study group immediately and two months post rehabilitation program (t=114.529*, p=0.000).

Table (7): shows the comparison between patients of the two studied groups according to levels of a score of functional abilities of the affected shoulder pre, immediately, and two months post-rehabilitation program.

As for overall functional abilities of the upper limb, there was a significant difference within the control group patients pre-rehabilitation, immediately post-program & two months post-rehabilitation program, and also within the study group patients (t=50.282*, p<0.001*, t=55.869*, p<0.001* respectively), and the mean scores of patients of the control group were (0.92 ± 2.06, 14.06 ± 8.89, & 37.61±7.97respectively), compared to their study group patients (5.64 ± 4.94, 25.78 ± 9.99, & 62.31±10.20 respectively). In addition, there was a significant difference between patients of both control and study group patients pre, immediately, and two months post-rehabilitation

Program (p_1<0.001*,p2<0.001*, & p3<0.001* respectively).

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

Table (1): Percentage distribution of patients in both studied groups according to demographic characteristics (n=60).

Patient's socio-demographic characteristics	Control (n =30)		Study (n =30)		P
	No.	%	No.	%	
Age (years):					
• 20-					
• 30-	0	0.0	1	3.3	$^{MC}p=$ 0.402
• 40-	23	76.7	19	63.3	
• 50 ≤ 60	7	23.3	10	33.3	
Sex:					
• Male.	10	33.3	8	26.7	0.573
• Female.	20	66.7	22	73.3	
Level of education:					
• Illiterate.	1	3.3	4	13.3	
• Read and write.	1	3.3	3	10.0	
• Primary.	1	3.3	2	6.7	$^{MC}p=$ 0.526
• Preparatory.	1	3.3	2	6.7	
• Secondary.	17	56.7	12	40.0	
• University.	9	30.0	7	23.3	
Marital status:					
• Single.	1	3.3	2	6.7	
• Married.	29	96.7	25	83.3	$^{MC}p=$ 0.224
• Widowed.	0	0.0	3	10.0	
• Divorced.	0	0.0	0	0.0	
Occupation:					
• Manual.	8	26.7	10	33.3	
• Professional.	2	6.7	5	16.7	$^{MC}p=$ 0.391
• Housewife.	20	66.7	15	50	
Place of residence:					
• Urban.	18	60.0	22	73.3	0.273
• Rural.	12	40.0	8	26.7	

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

Table (2): Percentage distribution of patients of both studied groups according to clinical data pre-program implementation.

Patient's clinical data	Control (n=30)		Study (n=30)		P
	No.	%	No.	%	
Mechanism of injury					
• Acute injury as weightlifting and falling.	20	66.7	21	70.0	
• Degenerative injuries due to long-term overuse as overhead throwing.	10	33.3	4	13.3	
• Repetitive mechanical activities such as sports as swimming, tennis, baseball, and kayaking.	0	0.0	2	6.7	χ^2=7.595 p=0.055*
• Repetitive stress	0	0.0	3	10.0	
Name of operation					
• Arthroscopic Rotator Cuff Repair.	30	100.0	30	100.0	_
Chief complaints #					
• Shoulder pain, which is worse with movement.	30	100.0	30	100.0	χ^2=3.2038 p=0.524
• Weakness in the shoulder.	16	53.3	8	26.7	
• Limited range of motion.	29	96.7	28	93.3	
• Crackling sensations (crepitus.	29	96.7	27	90.0	
• Shoulder swelling.	10	33.3	14	46.7	
Medical history#					
• No	9	30.0	17	56.7	
• **Yes**	**21**	**70.0**	**13**	**43.3**	χ^2=4.344 P=0.037*
• Dislocation of the shoulder	1	4.8	0	0.0	
• Sternoclavicular separation.	1	4.8	1	7.7	
• Rotator cuff tear.	4	19.0	2	15.4	
• Shoulder fracture.	5	23.8	4	30.8	χ^2=6.8032 p=0.449
• Arthritis of the shoulder.	4	19.0	1	7.7	
• Diabetes mellitus	8	38.1	4	30.8	
• Hypertension	6	28.6	0	0.0	
• Fracture femeur	0	0.0	1	7.7	
Surgical history					
• No	28	93.3	30	100.0	χ^2=2.069 p=0.150
• Appendectomy	2	6.7	0	0.0	
Prescribed medications#					
• No	18	60.0	14	46.7	χ^2=1.071 p=0.301
• **Yes**	**12**	**40.0**	**16**	**53.3**	
• Insulin	8	66.7	4	25.0	
• Analgesics	7	58.3	9	56.3	χ^2=12.426 p=0.006*
• Antihypertensive	6	50.0	0	0.0	

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

Table (3): Overall levels and scores of patient's knowledge assessment at three different intervals pre, immediately, and two months post-rehabilitation program

Overall levels and scores of patient's knowledge assessment	Control (n =30)						Study (n =30)						Test of Sig. (p_1)	Test of Sig. (p_2)	Test of Sig. (p_3)
	Pre the rehabilitation		Immediately post rehabilitation		Two months post-rehabilitation		Pre the rehabilitation		Immediately post rehabilitation		Two months post-rehabilitation				
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			
Unsatisfactory (<60%)	29	96.7	29	96.7	25	83.3	25	83.3	19	63.3	12	40.0	χ^2=2.963 (^{MC}p=0.195	χ^2= 10.417* (0.001*)	χ^2=11.915* (0.001*)
Satisfactory (≥60%)	1	3.3	1	3.3	5	16.7	5	16.7	11	36.7	18	60.0			
Fr (p_0)	**8.000* (0.018*)**						**14.111* (0.001*)**								
Total Score	**(0–14)**														
Min – Max.	0.0 – 9.0		0.0 – 13.0		0.0 – 14.0		0.0 – 12.0		1.0 – 14.0		1.0 – 14.0				
Mean ± SD.	3.03 ± 2.50		3.33 ± 2.99		4.57 ± 4.26		3.47 ± 3.41		6.43 ± 5.30		8.90 ± 5.10				
% Score													t=0.561 (0.577)	t=2.793* (0.008*)	t=3.570* (0.001*)
Min – Max.	0.0 – 64.29		0.0 – 92.86		0.0 – 100.0		0.0 – 85.71		7.14 – 100.0		7.14 – 100.0				
Mean ± SD.	21.67 ± 17.84		23.81 ± 21.33		32.62 ± 30.46		24.76 ± 24.37		45.95 ± 37.83		63.57 ± 36.44				
F (p_0)	**14.296* (<0.001*)**						**17.081* (<0.001*)**								

Table (4): Comparison between patients of both studied groups according to pain characteristics and severity pre, immediately, & two months post-rehabilitation program.

Q	Pain characteristics	Control (n =30)		Study (n =30)		P
		No.	%	No.	%	
1	**Presence of pain**					
	• Yes	**30**	**100.0**	**30**	**100.0**	–
	• No	0	0.0	0	0.0	
1	**Site of pain**	**(n= 30)**		**(n= 30)**		
	• RT shoulder	17	56.7	20	66.7	χ^2=0.635
	• LT shoulder	13	43.3	10	33.3	P=0.426
3	**Characteristics of pain#**					
	• Heaviness in the shoulder.	16	53.3	7	23.3	χ^2=6.080*
	• Tingling.	22	73.3	21	70.0	p=0.108
	• Aching.	15	50.0	15	50.0	
	• Numbness.	0	0.0	3	10.0	
	Time of pain					
	• At morning	5	16.6	5	16.6	–
	• At night	25	83.4	25	83.4	
4	**Aggravating factors for pain**					
	• Elevation the shoulder.	0	0.0	1	3.3	
	• Heavy work.	0	0.0	8	26.7	χ^2=10.588 p=0.005*
	• Moving & lifting any object.	30	100.0	21	70.0	
5	**Relieving factors for pain**					
	• Rest the shoulder in asling.	20	66.7	19	63.3	
	• Analgesics.	4	13.3	2	6.7	χ^2=1.292
	• Rest & analgesics.	6	20.0	9	30.0	p=0.524
6	**Pain severity**					
	Pre rehabilitation					
	• Mild	20	66.7	20	66.7	
	• Moderate	10	33.3	10	33.3	––

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

	Immediately post rehabilitation • Mild • Moderate	 16 14	 53.3 46.7	 20 10	 66.7 33.3	χ^2=1.111 P=0.292 –
	Two months post rehabilitation • Mild • Moderate	 17 13	 56.7 43.3	 26 4	 86.7 13.3	χ^2=6.648 P=0.010*
	χ^2	**χ^2=1.193 p=(0.551)**		**χ^2=4.091 p=(0.129)**		

Table (5): Comparison between patients of both studied groups in relation to range of motion of the affected shoulder immediately, and two months post-rehabilitation program.

Range of motion of the affected shoulder	Control (n =30)		Study (n =30)		U (p_1)	U (p_2)
	Immediately (two weeks) post rehabilitation	Two months post rehabilitation	Immediately (two weeks) post rehabilitation	Two months post rehabilitation		
Flexion						
Min – Max.	14.00 – 44.00	9.00 – 74.00	60.0 – 100.0	90.0 – 135.0	14.660 (0.000*)	21.440 (0.000*)
Mean ± SD.	30.50 ± 8.22	32.17 ± 15.06	76.0 ± 14.88	112.5 ± 13.94		
Fr (p_0)	**100.279* (0.000*)**		**713.111* (0.000*)**			
Extension						
Min – Max.	20.0 – 30.0	20.0 – 30.0	20.0 – 50.0	30.0 – 60.0	8.969* (0.000*)	13.536* (0.000*)
Mean ± SD.	21.67 ± 3.79	23.33 ± 4.79	37.33 ± 8.78	47.83 ± 8.68		
Fr (p_0)	**408.74* (0.000*)**		**373.103* (0.000*)**			
Adduction						
Min – Max.	0.0 – 0.0	0.0 – 0.0	0.0 – 0.0	0.0 – 0.0	–	–
Mean ± SD.	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0		
Fr (p_0)	–		–			
Abduction						
Min – Max.	30.0 – 60.0	45.0 – 90.0	60.0 – 90.0	75.0 – 90.0	10.366* (0.000*)	7.020* (0.000*)
Mean ± SD.	46.0 ± 6.75	70.17 ± 14.83	75.33 ± 13.95	89.50 ± 2.74		
Fr (p_0)	**430.749* (0.000*)**		**29.804* (0.000*)**			
Internal rotations						
Min – Max.	45.0 – 80.0	45.0 – 90.0	35.0 – 90.0	60.0 – 90.0	4.171* (0.000*)	6.321* (0.000*)
Mean ± SD.	60.17 ± 10.13	69.33 ± 9.35	73.17 ± 13.74	82.83 ± 7.03		
Fr (p_0)	**671.780* (0.000*)**		**775.034* (0.000*)**			
External					5.984*	7.168*

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

rotations					(0.000*)	(0.000*)
Min – Max.	30.0 – 80.0	45.0 – 90.0	45.0 – 90.0	60.0 – 100.0		
Mean ± SD.	56.67 ± 10.93	68.50 ± 9.75	75.0 ± 12.73	85.67 ± 8.78		
Fr (p_0)	**562.424* (0.000*)**		**820.322* (0.000*)**			

Table (6): Comparison between patients of both studied groups according to muscle strength of the affected shoulder immediately, and two months post-rehabilitation program.

Muscle strength of the affected shoulder:	Control (n =30)				Study (n =30)				χ^2 (p_1)	χ^2 (p_2)
	Immediately (two weeks) post rehabilitation		Two months post rehabilitation		Immediately (two weeks) post rehabilitation		Two months post rehabilitation			
	No.	%	No.	%	No.	%	No.	%		
Supraspinatus										
• No contraction	10	33.3	10	33.3	0	0.0	0	0.0		
• Flicker or trace of contraction	20	66.7	20	66.7	0	0.0	0	0.0		
• Complete range of motion with gravity eliminated	0	0.0	0	0.0	1	3.3	0	0.0	70.576* (^{MC}p <0.001*)	69.257* (^{MC}p <0.001*)
• Complete range of motion against gravity with no resistance	0	0.0	0	0.0	22	73.3	8	26.7		
• Complete ROM against gravity with some resistance	0	0.0	0	0.0	7	23.3	18	60.0		
• Complete ROM against gravity with full resistance	0	0.0	0	0.0	0	0.0	4	13.3		
χ^2 (p_0)	0.388 (0.824)				114.56* (0.000*)					
Infraspinatus										
• No contraction	10	33.3	10	33.3	0	0.0	0	0.0		
• Flicker or trace of contraction	16	53.3	15	50.0	0	0.0	0	0.0		
• Complete range of motion with gravity eliminated	4	13.3	5	16.7	2	6.7	0	0.0	64.064* (^{MC}p <0.001*)	69.121* (^{MC}p <0.001*)
• Complete range of motion against gravity with no resistance	0	0.0	0	0.0	24	80.0	8	26.7		
• Complete ROM against gravity with some resistance	0	0.0	0	0.0	4	13.3	22	73.3		
• Complete ROM against gravity with full resistance	0	0.0	0	0.0	0	0.0	0	0.0		
χ^2 (p_0)	5.251 (0.262)				123.692* (0.000*)					
Teres minor										
• No contraction	10	33.3	10	33.3	0	0.0	0	0.0		
• Flicker or trace of contraction	16	53.3	15	50.0	0	0.0	0	0.0		
• Complete range of motion with gravity eliminated	4	13.3	5	16.7	0	0.0	0	0.0	68.751* (^{MC}p= 0.000*)	68.402* (^{MC}p =0.000*)
• Complete range of motion against gravity with no resistance	0	0.0	0	0.0	19	63.3	2	6.7		
• Complete ROM against gravity with some resistance	0	0.0	0	0.0	10	33.3	23	76.7		
• Complete ROM against gravity with full resistance	0	0.0	0	0.0	1	3.3	5	16.7		
χ^2 (p_0)	5.251 (0.262)				122.325* (0.000*)					
Subscapularis										
• No contraction	10	33.3	10	33.3	0	0.0	0	0.0	70.366* (0.000*)	69.573* (0.000*)
• Flicker or trace of contraction	20	66.7	20	66.7	0	0.0	0	0.0		

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

• Complete range of motion with gravity eliminated	0	0.0	0	0.0	0	0.0	0	0.0		
• Complete range of motion against gravity with no resistance	0	0.0	0	0.0	19	63.3	4	13.3		
• Complete ROM against gravity with some resistance	0	0.0	0	0.0	10	33.3	21	70.0		
• Complete ROM against gravity with full resistance	0	0.0	0	0.0	1	3.3	5	16.7		
χ^2 (p_0)	0.388 (0.824)				114.529* (0.000*)					

Table (7): Comparison between patients of the two studied groups according to levels of the score of functional abilities of the affected shoulder pre, immediately, and two months post-rehabilitation program.

Items	Control (n =30)						Study (n =30)						Test of Sig. (p_1)	Test of Sig. (p_2)	Test of Sig. (p_3)
	Pre the rehabilitation		Post rehabilitation				Pre the rehabilitation		Post rehabilitation						
			Immediately		Two months				Immediately		Two months				
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			
1. Personal hygiene															
• Dependent	30	100.0	14	46.7	0	0.0	30	100.0	5	16.7	0	0.0	–	χ^2= 6.239* (0.012*)	χ^2=13.278* (MCp=0.001*)
• Moderate difficulty	0	0.0	16	53.3	12	40.0	0	0.0	25	83.3	1	3.3			
• Little difficulty	0	0.0	0	0.0	18	60.0	0	0.0	0	0.0	27	90.0			
• Independent	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	6.7			
% score	0.42 ± 2.28		15.63 ± 10.98		41.67 ± 11.05		0.63 ± 2.52		23.12 ± 9.45		55.0 ± 9.49				
Fr (p_0)	**55.491* (<0.001*)**						**58.615* (<0.001*)**								
2. Dressing															
• Dependent	30	100.0	11	36.7	0	0.0	26	86.7	10	33.3	0	0.0	χ^2=4.286 (FEp=0.112)	χ^2=1.038 (MCp=0.718)	χ^2=13.790* (0.001*)
• Moderate difficulty	0	0.0	18	60.0	14	46.7	4	13.3	17	56.7	3	10.0			
• Little difficulty	0	0.0	1	3.3	15	50.0	0	0.0	3	10.0	18	60.0			
• Independent	0	0.0	0	0.0	1	3.3	0	0.0	0	0.0	9	30.0			
% score	0.14 ± 0.76		17.78 ± 12.94		44.17 ± 14.38		6.11 ± 9.01		27.64 ± 12.35		61.94 ± 13.12				
Fr (p_0)	**53.226* (<0.001*)**						**58.615* (<0.001*)**								
3. Undressing															
• Dependent	27	90.0	9	30.0	0	0.0	18	60.0	3	10.0	0	0.0	χ^2=7.200* (0.007*)	χ^2=11.573* (MCp=0.002*)	χ^2=31.952* (MCp<0.001*)
• Moderate difficulty	3	10.0	21	70.0	8	26.7	12	40.0	19	63.3	0	0.0			
• Little difficulty	0	0.0	0	0.0	21	70.0	0	0.0	8	26.7	10	33.3			
• Independent	0	0.0	0	0.0	1	3.3	0	0.0	0	0.0	20	66.7			
% score	2.50 ± 7.63		17.50 ± 11.65		46.25 ± 10.80		12.08 ±11.80		32.08 ± 13.36		70.56 ± 11.78				
Fr (p_0)	**52.923* (<0.001*)**						**57.474* (<0.001*)**								
4. Home business															
• Dependent	30	100.0	26	86.7	9	30.0	30	100.0	17	56.7	0	0.0	–	χ^2=6.735* (0.023*)	χ^2=33.450* (MCp <0.001*)
• Moderate difficulty	0	0.0	4	13.3	20	66.7	0	0.0	12	40.0	9	30.0			
• Little difficulty	0	0.0	0	0.0	1	3.3	0	0.0	1	3.3	16	53.3			
• Independent	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	5	16.7			
% score	0.0 ± 0.0		9.44 ± 9.75		25.74 ± 8.15		0.83 ± 2.32		18.89 ± 13.36		56.02 ± 15.66				
Fr (p_0)	**55.615* (<0.001*)**						**57.826* (<0.001*)**								
5. Recreational activities															
• Dependent	30	100.0	27	90.0	2	6.7	29	96.7	9	30.0	0	0.0	χ^2=1.017 (FEp=1.000)	χ^2=23.204* (MCp<0.001*)	χ^2=55.266* (MCp<0.001*)
• Moderate difficulty	0	0.0	3	10.0	26	86.7	1	3.3	16	53.3	1	3.3			
• Little difficulty	0	0.0	0	0.0	2	6.7	0	0.0	5	16.7	16	53.3			
• Independent	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	13	43.3			

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

% score	2.0 ± 4.07		12.50 ± 7.51		37.50 ± 9.26		10.0 ± 8.41		30.50 ± 13.09		70.0 ± 11.67				
Fr (p0)	**52.769* (<0.001*)**						**60.0*(<0.001*)**								
Overall															
• Dependent	30	100.0	26	86.7	2	6.7	30	100.0	13	43.3	0	0.0	–	χ^2=12.381* (<0.001*)	χ^2=54.247* (MCp<0.001*)
• Moderate difficulty	0	0.0	4	13.3	27	90.0	0	0.0	17	56.7	2	6.7			
• Little difficulty	0	0.0	0	0.0	1	3.3	0	0.0	0	0.0	24	80.0			
• Independent	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	4	13.3			
% score	0.92 ± 2.06		14.06 ± 8.89		37.61 ± 7.97		5.64 ± 4.94		25.78 ± 9.99		62.31 ± 10.20				
Fr (p0)	**60.0*(<0.001*)**						**60.0*(<0.001*)**								

Discussion:

Rotator cuff tear is a rip in the group of four muscles and tendons that stabilize the shoulder joint and results in detaches from the humerus, it may be full or partial thickness tears. A full-thickness rotator cuff tear occurs when the entire tendon tears off the bone, while a partial thickness rotator cuff tear occurs when only part of the tendon separates from the bone, and it may be acute or chronic (Pander, Sierevelt, Pecasse, Van Noort, 2018).

Concerning socio-demographic data, the findings of the present study showed that more than three-quarters of patients in the control group and more than two-thirds of patients in the study group were in the age group of 40 to less than 50 years old. This can be attributed to overuse of the shoulder, such as repetitive shoulder movements during performing domestic activities, or on the job like manual work such as construction workers and carpenters, which puts strain on the shoulder, stresses muscles and tendons, and results in tendons wear down and causing a tear. This finding agrees with Hattrup, (2018); Babhulkar, Ravikumar, Patil, Kumar, (2019), who carry out a study entitled "Clinical outcome of arthroscopic rotator cuff repair in patients aged 50 years and older" which reported that tendons lose its strength and flexibility over 40 years old. This makes the ligaments more prone to partial or full thickness tears, and older people are predisposed to complete tears, which can be associated with a higher risk of tendon degeneration and increased difficulty of repair.

Moreover, the results of the present study showed that the highest percentage of patients in both the control and the study groups were females and housewives. This can be attributed to the fact that Egyptian females are responsible for all domestic activities, which may expose them to many sources of high violent activities, and put extra stress on their shoulders as lifting heavy loads. This is in the same line as Salih, (2020), who carry out a study entitled "Detection of the rotator cuff tendons tears by ultrasound in Sudanese housewives with chronic shoulder pain" who reported that women perform heavy domestic work with great effort such as lifting heavy objects. While, Longo et al., (2021) who carry out a study entitled " The role of estrogen and progesterone receptors in the rotator cuff disease: a retrospective cohort study" mentioned that, estrogens and progesterone are known to influence fibroblast proliferation and the production of type one collagen, which is important in tendons and ligaments, these structural alterations could be due to low levels of sex hormones and high levels of pro-inflammatory cytokines. These results are contradicted by Zehetgruber, Noske, Lang, & Wurnig, (2020) who carry out a study entitled "Suprascapular nerve entrapment. A meta-analysis"; also, Razmjou, Holtby, &Myhr, (2021), carry out a study entitled "Gender differences in quality of life and extent of rotator cuff pathology" reported that men are at risk for supraspinatus tears, because they are engaged in heavy work, and they are approximately three to four times more likely to suffer from neuropathy, secondary to suprascapular nerve entrapment syndrome, which results from dynamic microtrauma, as in overhead athletes and laborers such as welder, carpenter, and construction workers.

The present study also showed that more than two-thirds of the control and the study group patients had rotator cuff tears, resulting from an acute injury such as weight lifting and falling. This can be attributed to the that arms are used as a protective measure to soften the impact of the ground during falling, and prevent injuries to the hips and head, and the stresses occurring within the rotator cuff during an attempt to cushion a fall, and lifting heavy load may locally exceed the tensile strength of the tendon fibers and cause a partial or full-thickness tear. This is supported by Mazeas, Traulle, Acco, Solignac, Forelli, (2020), who carry out a study entitled "Role of deltoid muscle in reducing peak forces in forwarding fall simulation" emphasized that an improper overuse of the rotator cuff muscle causes it to become irritated, and the forces occurring during a fall can be so great, that even a tendon of a young and healthy individual without degenerative changes can tear. The damage caused by a fall depends on many factors such as speed, height, weight, defense strategy, the direction of impact, muscle strength, and tissue quality.

Moreover, the results revealed that there has been an improvement in the level of knowledge in

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

the study group patients more than in the control group two months post-rehabilitation program. This can be attributed to the study group patients followed the information provided to them by the researcher, and the distribution of a colored booklet to each patient in the study group illustrated to them. This is supported by Robinson, Lam, Walton, Murrell, (2017), who carry out a study entitled "The effect of rotator cuff repair on early overhead shoulder function: a study in 1600 consecutive rotator cuff repairs" emphasized that young and middle-aged group and higher educational attainment were associated with higher knowledge scores, and using multimedia services improve patient's understanding about rotator cuff repair.

Regarding severity of pain, the results of the current study verified that, one third of the study group patients had moderate pain pre rehabilitation program. This percent decreased in the study group patients two months post rehabilitation program. This can be attributed to the application of the rehabilitation program, as the exercises may alter pain because the body typically releases natural opiates, such as endorphins and other substances, that can slightly alter the body's response to pain on the long term, and improve blood supply to shoulder joint and surrounding area, which increases pain threshold and accordingly decreases pain. This is in the same line with Yang, Robbins, Reilly, Maerz, Anderson, (2017) who carry out a study entitled " The clinical effect of a rotator cuff re-tear: A Meta-analysis of Arthroscopic single-row and double-row repairs"; also, Weekes et al., (2021), carry out a study entitled "Do relaxation exercises decrease pain after arthroscopic rotator cuff repair? A Randomized Controlled Trial" illustrated that the patients receiving physiotherapy exercises had improved pain, compared with their controls who didn't receive physiotherapy, and the pain decreases with exercise after rotator cuff surgery.

As for the range of motion of the affected shoulder, the present study revealed that there was a significant improvement in the study group patients regarding flexion, extension, abduction, and internal and external rotation of the affected shoulder immediately & two months post-rehabilitation program. This result may be due to, the continuous application of exercises by the patients of the study group, where continuous shoulder exercises, improve movement scores of the affected shoulder, improve circulation, increase flexibility, accelerate healing, prevent shoulder joint stiffness, improve the quality of the tissue, which leads to tendon-bone integration, and increase independence in functional abilities. The results of the current study are in agreement with Nikolaidou, Migkou, Karampalis, (2017), who carry out a study entitled " Rehabilitation after rotator cuff repair" which reported that the main aim of exercises following rotator cuff surgery is to reduce pain and postoperative stiffness, increase shoulder joint range of motion, and improve functional abilities, and also, reported that after rotator cuff surgery the patients in the exercise group achieved 150 degrees of shoulder flexion and 50 degrees of shoulder extension.

Moreover, Edwards, McFarland, Jorge, and Rojas, (2017), who carry out a study entitled " Shoulder range of motion exercises" mentioned that appropriate range of motion post-surgery is important to minimize the chances of developing post-operative stiffness and emphasized that, post rotator cuff surgery the patients in the exercise group achieved 80 degrees of shoulder internal rotation and 90 degrees of shoulder external rotation. These results are contradicted with Park et al., (2018), who carry out a study entitled " The effect of dynamic external rotation comparing 2 footprint-restoring rotator cuff repair techniques" emphasized that increased external rotation beyond 60° has the potential to cause increased tension in the anterior portion of the tendon. There is a significant increase in strain associated with internal rotation stretching post rotator cuff repair.

As for muscle strength of the affected shoulder, there was a significant improvement in the study group patients regarding supraspinatus, infraspinatus, teres minor, and subscapularis muscle strength immediately post-program and two months post-rehabilitation program. This may be related to the application of exercises for rotator cuff muscles, where exercises help to restore the normal performance of shoulder motion, enhance muscular strength and endurance to support the shoulder and keep it stable, and improve flexibility by gently stretching the muscles after strengthening exercises to reduce muscle soreness and keep it long and flexible. This is in the same line with Challoumas, Biddle, McLean, Millar, (2020), who carry out a study entitled "Comparison of treatments for frozen shoulder: A Systematic review and meta-analysis" emphasized that isolation of the supraspinatus muscle was best achieved with the test position of elevation at 90 degrees of scapular elevation. Abduction measures the force of the supraspinatus muscle.

Concerning self-care activities, the findings of the present study demonstrated that there was a significant difference between the control and the study group patients immediately and two months post-rehabilitation program, regarding personal hygiene, dressing, undressing, home business, and recreational activities. Whereas the findings revealed that there has been an improvement in overall self-care activities in the study group patients, the highest percentage of patients in the control group had moderate difficulty to perform self-care activities, while more than three-quarters of patients in the study group had little difficulty two months post-rehabilitation program .

These findings are attributed to the study group of patients following the instructions provided for them by the researcher, performing self-care

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

activities, and due to incorporating home exercises regularly into their daily living. Regular exercises may lead to an increase in autonomy for daily and routine activities. These results are in agreement with Rashid et al., (2017), who carry out a study entitled " Increasing age and tear size reduce rotator cuff repair healing rate at one year" who reported that, exercises maximize functional ability and encourage self-care and self-management.

The rotator cuff tears are age-related and commonly degenerative pathologies, that can impact an individual's quality of life, and lead to surgical intervention. The rehabilitation program is usually the cornerstone post-surgery, and it includes exercises, to improve range of motion and strengthen the shoulder muscles. The nurses are responsible to help patients to get professional nursing care. According to the International Council of Nurse, when providing care for patients, nurses should respect the patient's rights, values, and beliefs, and give complete and accurate information to the patients about their disease Lin, Wang, Liu, Chen, (2016) .

Moreover, the role of the nurses' post rotator cuff surgery includes physical assessment, activity, and range of motion restrictions, pain management, and education to the patient on the safe compensatory strategies to optimize function for activities such as washing or combing the hair, that commonly cause strain of the rotator cuff muscles and instruct the patient about how to use the muscles of the operative shoulder as in lifting, carrying, pushing, pulling, driving during the first three months. In addition, The nurses can increase patients' awareness about follow-up care to reduce the functional disability of the patient's shoulder. So, This puts a burden on the nurse to provide optimal care for patients undergoing rotator cuff surgery and give attention to the patient's limitations and problems and help patients to be adapted to them (Boldo, Lawrence, 2018).

Conclusion:

From the results of the study, it can be concluded that: The nursing rehabilitation program has been proven to give a positive result in relation to patients' shoulder joint range of motion and functional abilities post rotator cuff surgery.

Recommendations

Based on the findings of the present study, the following recommendations are derived and should be considered:

1. Replication of the study on large probability sampling.

ACKNOWLEDGEMENT

Words cannot express the feeling of gratitude that I have for the doctors who honored me by supervising this dissertation. I would like to express my deepest appreciation and gratitude to **Prof. Soheir Mohamed Weheida**, Professor of Medical-Surgical Nursing, Faculty of Nursing, Alexandria University for her continuous encouragement, appreciable help, thoughtful supervision, bright ideas, guidance, valuable suggestions and she has exerted unmatched efforts throughout the progression of this work .With gratitude, I wish to express my greatest thanks to **Prof. Essam Mohamed El Abbassy,** Professor of Orthopedic and traumatology, Orthopedic and Traumatology Department, Faculty of Medicine, Alexandria University for their guidance and his exerted efforts throughout the progression of this work. Also, I wish to express my greatest thanks and deep appreciation to **Prof. Kwather Gaber Tolba,** Professor of Medical-Surgical Nursing, Faculty of Nursing, Alexandria University for her kindness, supervision, and encouragement. Also, my thanks to **Dr. Gehan Mohamed Desoky,** Assistant professor of Medical-Surgical Nursing, Faculty of Nursing, Alexandria University for her kindness and generously giving much of her effort to me, valuable cooperation, helpful instructions, and support during the practical work, and for reading and revising this dissertation till the final manuscript.

References

Babhulkar, A. S., Ravikumar, M., Patil, P., & Kumar, V. (2019). Clinical outcome of arthroscopic rotator cuff repair in patients aged 50 years and older. International Journal of Orthopaedics, 6(4), 1141-1145.

Boldo, A.N., Lawrence V. (2018). Expectations following rotator cuff surgery. Current Reviews Musculoskeletal Medicine Journal, 11(1): 162–166.

Challoumas, D., Biddle, M., McLean, M., Millar, N. (2020). Comparison of treatments for frozen shoulder: A Systematic review and meta-analysis. JAMA Network Open, 1;3(12): 2029.

Craven, R., Hirnle, C.(2009). Fundamentals of Nursing : Human Health and Function 6th ed. p.p 291. Philadelphia: Wolters Kluwer Health/Lippincott Williams& Wilkins.

Codding, J. L., & Keener, J. D. (2018). Natural History of Degenerative Rotator Cuff Tears. Current reviews in musculoskeletal medicine, 11(1), 77-85.

Dang, A., & Davies, M. (2018). Rotator cuff disease: Treatment options and considerations. Sports medicine and arthroscopy review, 26(3), 129-133.

Dones, I., Messina, G., Nazzi, V., & Franzini, A. (2011). A modified visual analogue scale for the assessment of chronic pain. Neurological sciences : official journal of the Italian Neurological Society and of the Italian Society of Clinical Neurophysiology, 32(4), 731-733.

Edwards, P., Ebert, J., Joss, B., Bhabra, G., Ackland, T., Wang, A. (2016). Exercise rehabilitation in the non-operative management of rotator cuff tears: A review of the literature. International journal of sports physical therapy, 11(2): 279-301.

Edward, G., McFarland, M.D., Jorge, L., Rojas, M.D. (2017). Shoulder range of motion exercises. Available at: https://encrypted-tbn0. gstatic.com/images?q=tbn: ANd9GcRE7POWc-2KmtQDoT9-mB Vhq fBL7_nDpgYd6FWguEFV 32ef-nJV2FYwLZS8X-LU ibqa KSg &usqp=CAU.

Gates, D.H., Walters, L.S., Cowley, J., Wilken, J.M., & Resnik, L. (2016). Range of Motion Requirements for Upper-Limb Activities of Daily Living. The American journal of occupational therapy : official publication of the American Occupational Therapy Association, 70(1), 1-10.

Hattrup, S. J. (2018). Rotator cuff repair: relevance of patient age. Journal of shoulder and elbow surgery, 4(2), 95-100.

Kirkpatrick LA, Feeney BC. (2013). A simple guide to IBM SPSS statistics for version 20.0. Student ed. Belmont, Calif.: Wadsworth, Cengage Learning.

Lin, P.C., Wang, C.H., Liu,Y.Y., Chen,C.S. (2016).Orthopedic inpatient rehabilitation conducted by nursing staff in acute orthopedic wards in Taiwan. International Journal of Nursing Practice,19:618-626.

ISSN 2786-0183
Helwan International Journal for Nursing Research and Pratctice
Vol. 1, Issue 2, Month: December 2022, Available at: https://hijnrp.journals.ekb.eg/

Longo, U. G., Mazzola, A., Carotti, S., Francesconi, M., Catapano, S., Magrì, F., Perrone, G., Morini, S., De Salvatore, S., & Denaro, V. (2021). The role of estrogen and progesterone receptors in the rotator cuff disease: a retrospective cohort study. BMC musculoskeletal disorders, 22(1), 891.

Longo, U., Salvatore, G., Rizzello, G., Berton, A., Ciuffreda, M., Candela, V., Denaro, V. (2019). The burden of rotator cuff surgery in Italy: a nationwide registry study. Archives of Orthopedic Trauma Surgery, 137(2):217-224.

Mazeas, J., Traulle, M., Acco, M., Solignac, N., & Forelli, F. (2020). Role of deltoid muscle in reducing peak forces in forward fall simulation. International Journal of Orthopaedics Research, 3, 111–115.

Nikolaidou,O., Migkou,S., Karampalis,C. (2017). Rehabilitation after rotator cuff repair. Open Orthopedic Journal, 11: 154–162.

Nicholas, P., Hefford, C., Tumilty, S. (2012) The use of the patient-specific functional scale to measure rehabilitative progress in a physiotherapy setting. J Man Manip Ther; 20(3): 147–152.

Pander, P., Sierevelt, I. N., Pecasse, G., & van Noort, A. (2018). Irreparable rotator cuff tears: long-term follow-up, five to ten years, of arthroscopic debridement and tenotomy of the long head of the biceps. International orthopaedics, 42(11), 2633-2638.

Park, M.C., Mo, J.A., Eiattrache, N.S., Tibone, J.E., Mcgarry, M.H., Lee, T.Q.(2018). The effect of dynamic external rotation comparing 2 footprint-restoring rotator cuff repair techniques. American Journal Sports Medicine, 36(5):893–900.

Petrillo, S., Longo, U. G., Papalia, R., & Denaro, V. (2017). Reverse shoulder arthroplasty for massive irreparable rotator cuff tears and cuff tear arthropathy: a systematic review. Musculoskeletal surgery, 101(2): 105-112.

Rashid, M. S., Cooper, C., Cook, J., Cooper, D., Dakin, S. G., Snelling, S., & Carr, A. J. (2017). Increasing age and tear size reduce rotator cuff repair healing rate at one year. Acta orthopaedica, 88(6): 606-611.

Razmjou, H., Holtby, R., Myhr, T. (2021). Gender differences in quality of life and extent of rotator cuff pathology. Arthroscopy, 22(1):57–62.

Robinson, H. A., Lam, P. H., Walton, J. R., & Murrell, G. A. C. (2017). The effect of rotator cuff repair on early overhead shoulder function: a study in 1600 consecutive rotator cuff repairs. Journal of shoulder and elbow surgery, 26(1): 20-29.

Salih, M. (2020). Detection of the rotator cuff tendons tears by ultrasound in sudanese housewives with chronic shoulder pain. International Journal of Science and Research, 9(1), 283.

Szyluk, K., Jasinski, A., Widuchowski, W., Mielnik, M., Koczy,B. (2015). Results of arthroscopic bankart lesion repair in patients with post-traumatic anterior instability of the shoulder and a non-engaging hill-sachs lesion with a suture anchor after a minimum of 6-year follow-up. J Bone Joint, 21: 2331–2338.

Terrance, A., Cilenti, M. (2018). Rotator cuff repair: post-operative rehabilitation concepts. Current Review Musculoskeletal Medicine, 11(1): 86–91.

Weekes, D. G., Campbell, R. E., Wicks, E. D., Hadley, C. J., Chaudhry, Z. S., Carter, A. H., Pepe, M. D., Tucker, B. S., Freedman, K. B., & Tjoumakaris, F. P. (2021). Do Relaxation Exercises Decrease Pain After Arthroscopic Rotator Cuff Repair? A Randomized Controlled Trial. Clinical orthopaedics and related research, 479(5), 870-884.

Yang, J., Robbins, M., Reilly, J., Maerz, T., & Anderson, K. (2017). The Clinical Effect of a Rotator Cuff Retear: A Meta-analysis of Arthroscopic Single-Row and Double-Row Repairs. The American journal of sports medicine, 45(3): 733-741.

Zehetgruber, H., Noske, H., Lang, T., &Wurnig, C.(2020). Suprascapular nerve entrapment. A meta-analysis. International Orthopedic, 26(6):339–343.