## Nursing Intervention Guide to Functional Abilities and Range of Motion for Clients with Work-Related Shoulder Impingement Syndrome

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## Abstract

Work-Related shoulder impingement syndrome is categorized by shoulder pain that is exacerbated with arm elevation or overhead activities. Management options for work-related shoulder impingement syndrome include rehabilitation. Therapeutic exercise was the well-investigated form of rehabilitation. The therapeutic exercise programs consisted of stretching and strengthening the rotator cuff and scapular muscles. The aim of this study was to examine the effect of nursing intervention guide to functional abilities and range of motion of clients with work-related shoulder impingement syndrome. Design: A quasi experimental research design was used. The study was conducted in the Physiotherapy Department, Menoufia University Hospital. Sample: A purposive sample of 40 adult clients diagnosed with shoulder impingement syndrome was included and randomly divided into two equal groups; 20 clients for each group. Instruments: Four instruments were utilized for data collection. A structured interview questionnaire, University of California -Los Angeles shoulder scale, Range of motion measurement scale and Oxford scale. Results: the majority of both study and control groups (80.0% and 100.0% respectively) were unable to use there arm pre nursing intervention, while after three months, 75.0% of the study group improved and became able to function normally compared to the control group. There was a significant improvement in the mean range of motions for shoulder among the study group after three months of the exercise program compared to the control group. Conclusion: Implementation of the nursing intervention guide for the study group was effective in improving functional activities and range of motion compared to control group. Recommendation: Nursing intervention guide about the effectiveness of physical activity and exercise should be part of occupational nurses' role for clients with Work-related shoulder impingement syndrome.

**Keywords:** Functional Abilities, Nursing Intervention Guide, Range of Motion, Work-related shoulder impingement syndrome.

## Introduction

Shoulder impingement syndrome (SIS) refers to a combination of shoulder symptoms, examination findings, and radiologic signs attributable to the compression of structures around the glenohumeral joint that occur with shoulder elevation. Such compression causes persistent pain and dysfunction. Shoulder pain is a common presenting complaint in primary care clinics, and SIS is likely the most common cause of shoulder pain in this setting. Shoulder impingement syndrome (SIS) accounting for approximately 44-65% of all shoulder complaints (Borich et al., 2017).

The cumulative incidence of shoulder problems in general medical practice is estimated to be 11.2/1000 clients per year and

rotator cuff tears are a common cause of pain and disability among adults by about 23% to 33% of the population. In 2008, close to 2 million people in the United States went to their doctors because of a rotator cuff problem (Hamada et al., 2016). Shoulder disorders in Egypt represent approximately one-fifth of disability of shoulder disorders (Alhosini, 2015).

Work-related impingement syndrome is more likely to occur in people who engage in physical activates that require repeated overhead arm movements, such as tennis, golf, swimming, weightlifting, or throwing a ball. Occupations that require repeated overhead lifting or work at or above shoulder height are also at risk of rotator cuff impingement (Bennett, 2018). Repetitive or sustained shoulder elevation during occupational tasks has been identified as a significant risk factor for shoulder tendonitis or non-specific shoulder pain. The evidence of occupational risk is strongest for combined exposure to multiple physical factors, such as holding an instrument while working overhead. Construction workers have substantial experience to awkward postures, repetitive and forceful muscular contractions, and overhead work with prevalence rates ranging from 25% to 71% (Angst et al., 2017).

Pain can be the result of inflammation or damaged in the rotator cuff. Also, bursitis can occur by the bursa can become inflamed and swell with more fluid causing pain and impingement syndrome which occurs when raise the arms to shoulder height, the space between the acromion and rotator cuff narrows. The acromion can run against or "impinge" on the tendon and the bursa, causing irritation and pain (Meister, 2018).

Impingement syndrome is usually treated conservatively, but sometimes it is treated with arthroscopic surgery or open surgery. Traditional treatment includes rest, cessation of painful activity, and physical therapy. Physical therapy treatments would typically focus at reduce pain and inflammation by maintaining range of movement (ROM), improving posture, stretching and strengthening shoulder muscles, and reducing of pain (Bang and Devele, 2016). Different studies have found different rates of success, about 50% of people who try nonsurgical treatments find relief of symptoms. Some of the variables that can affect the likelihood of successful treatment include the size of the rotator cuff tear, the length of time has been experiencing symptoms and age (Kaya et al., 2016).

The role of the nurse in teaching and directing clients who are experiencing SIS towards adherence behavior is a significant one. The responsibility of the nurse is to work with a physiotherapist to assess all variables that may have an effect on clients' clinical outcomes and to use this information when developing and implementing the nursing intervention and clients teaching plan (Penning et al., 2015). Stretching and strengthening exercise program are often used in conservative treatment of shoulder pain, attempting to reduce symptoms and alter identified motion and muscle activity abnormalities. Stretching exercises are very important for individual intervention with shoulder impingement syndrome by improve circulation and relax the muscles of the shoulder that help in relieving pain. Strengthening the rotator cuff muscles is the key to strengthening exercises. It should start with gentle stretching exercises and progressed gradually throughout the program (Dohan et al., 2015).

The duration and success the nursing intervention depends upon many factors, including underlying pathology, compliance with treatment and the appropriateness of the intervention prescribed. If function and symptoms improve over several weeks of exercise, client continues therapy and begins a gradual, stepwise resumption of activities, including sports (Michener, 2014). Clients may induce muscle fatigue but should not cause increased shoulder pain (Zaki, 2017).

## Significance of the study: -

there are many patients who attended the outpatient clinics of physiotherapy complaining from shoulder impingement syndrome. Hence nursing researches in this area is very limited according to previous studies, the researchers found that the implementation of a nursing intervention incorporating the use of exercises program for these patients may relieve pain, improves muscle strength, motion and function among patients with work related shoulder impingement syndrome

## Aim of the study:

The current study aimed to examine the effect of nursing intervention guide to functional abilities and range of motion of clients with work-related shoulder impingement syndrome.

## **Research Hypothesis:**

- 1- Clients who will use the nursing intervention guide will have less pain than control group
- 2- Clients who will use the nursing intervention guide will show normal range of motion and improved functional abilities than control group

#### **Clients and method:**

**Design:** A quasi-experimental research design was used to achieve the aim of the study.

**Setting:** The study was carried out at physiotherapy department at Menoufia University Hospital.

**Sample:** A purposive sample of forty adult clients diagnosed with shoulder impingement syndrome were selected and divided randomly into two equal groups, twenty clients for each. Sample size calculation for this case control study rendered forty clients (twenty clients in each group) with 95% significance level and ration of cases and control was 1/1.

- **Study group (I):** Twenty clients received nursing intervention guide in addition to the routine hospital care.
- **Control group (II):** was exposed to routine hospital care only.

## The clients were selected according to the following criteria: -

- a. Conscious clients of both sexes.
- b. Age range between 18 to 45 years old.
- c. Diagnosed with shoulder impingement syndrome
- d. Free from any other associated disorders as trauma or dislocation of the shoulder.
- e. Free from any other associated chronic diseases such as kidney, liver diseases, diabetes, and any immune disorders.

#### Instruments of the study

Based on review of the related literature four instruments were utilized by the researcher for collecting the necessary data. These instruments were

- **1- Instrument I:** Structured interview questionnaire. It was developed by the researchers to assess:
- **Part one: Sociodemographic characteristic:** It contains six questions related to client's age, sex, marital status, level of education, occupation, number of family members.

#### Part two: Medical history

It was included of four questions related to medical data such as medication history related to the disease, previous shoulder disorders, previous, radiologic investigations for shoulder and date of discovering disease; and past and present medical history, it contains twenty-six questions.

#### Part Three: Clinical manifestation

It was comprised of sixteen questions divided into six questions about physiological manifestations, five questions about behavioral manifestations and five questions about characteristics of pain.

2- Instrument II: - University of California Los Angeles shoulder scale (UCLA). This instrument was developed by Ellman et al., (2003) and was translated and used by the researcher to assess functional activities of daily living and pain. UCLA shoulder scale comprised of 2 subscales, with five questions.

#### Part One: UCLA pain scale

It was used by the researcher to assess the quality of pain experienced. Clients asked to give the response which best described his/her sense of pain over the last four weeks. The scale ranges from zero to ten that provides a simple way to record a subjective estimate of client's pain intensity. The client selects the point in the Liker scale which reflect his/her intensity of pain relating to five categorize.

- a) 0 indicated no pain
- b) 1-2 indicated mild pain
- c) 3-6 indicated moderate pain
- d) 7-8 indicated sever pain
- e) 9-10 indicated Intolerable

#### Part two: UCLA Functional activities scale

It was used by the researchers to assess the functional activities of daily living. It has four questions relating to activities above and below shoulder level, light and heavy activities also. There were five possible responses for each question which are (0) means complete disability, (1) means with severe strain, (2) means with moderate strain, (3) means with mild strain and (4) means with no strain

The scale ranges from zero to ten that provides a simple way to record a subjective estimate of client's functional activities, where 0 means unable to use arm with complete disability and 10 means able to do normal daily activities with no strain. All responses were summed with high score indicated good ability as 0-5 indicated unable to use arm,6-7 indicated slight restriction and 8-10 indicated able to do normally

## **3-** Instrument III: Range of motion measurement scale.

This scale was designed by the British Medical Research Commission in (2005). Goniometer to measure shoulder joint range of motion indegrees. Shoulder flexion normally ranged from  $150^{\circ}$  to  $180^{\circ}$ , shoulder extension from  $45^{\circ}$  to  $60^{\circ}$ , internal rotation  $70^{\circ}$  to  $90^{\circ}$ , external rotation  $70^{\circ}$  to  $90^{\circ}$ , abduction  $150^{\circ}$  to  $180^{\circ}$  and adduction average  $45^{\circ}$ .

4- Instrument IV: Oxford scale for measuring muscle strength it was developed by Smyth, (2009) to determine the assessment and recording of muscle strength of the shoulder. Oxford scale comprised of five questions relating to activities of daily living. There were five possible responses for each question which are: -0 means impossible to do,1 means extreme strain.,2 means moderate strain ,3 means little strain and 4 means no strain

The scale ranges from zero to five that provides a simple way to record a subjective estimate of client's muscle strength of shoulder. While zero means no action discernible in the muscle at all and five is the heights grade that means that the muscle has full strength to move the shoulder through the full movement both against gravity and against resistance.

#### Follow up application:

The researchers gave a follow up application for each client with singular number, for both study and control groups to facilitate their contact; this application was in Arabic and included the following: the client's name, code, telephone number, and researchers' telephone numbers and date of meeting.

Validity and Reliability: All instruments were tested for its content validity by three experts, two in the field of Medical Surgical Nursing and one Community health Nursing, Faculty of Nursing, Menoufia University,

• Test retest was used to ascertain reliability of the applied instruments, the period between each test was two weeks and these clients were excluded from the sample. The reliability of instrument one was 0.89, instrument two was 0.85 and was considered suitable according to Ainsworth, and Lewis (2013). While instrument three was 0.90 and instrument four were 0.92 according to Yamaguchi et al., (2008).

#### Methods

#### Written approval:

Before data collection, all approvals letters were obtained to conduct the study after explaining purpose of the study.

#### Pilot study:

A pilot study was conducted preceding to data collection on 10% of the sample. This was performed in order to test the clarity and the applicability of the instruments and estimated the time needed to collect data. Necessary modifications were done. Data obtained from those clients were not included in the existing study.

#### **Protection of human rights:**

Client's verbal agreement to contribute in this study was obtained after clarification of the purpose of the study. The researchers initially introduced themselves to all clients then they were reassured that any information obtained would be confidential and only would be used for the study purpose. There searcher emphasized that participation in the study is completely voluntary and anonymity of the clients was assured through coding data. Clients were also informed that rejection to participate would not affect their care

## Procedure:

- Data collection procedure was extended over a period of 6 months from June 2019 to the end of December 2019.
- The clients who fulfilled the inclusion criteria were selected randomly and were divided into two equal groups, a study group and a control group. The study was conducted in four consecutive phase. These phases were:-
- **A. Assessment phase**: The first interview before starting the intervention was done to collect base line data using instruments (I, II, III, IV).
- B. Planning phase: Based on the findings of the assessment phase and extensive literature review. the researcher developed for each client of the study group the nursing intervention which contained information about the antiinflammatory diet and the needed exercise recommended by program the physiotherapist. Also, a picture nursing guide with simple explanations was prepared. This guide contains information about shoulder impingement syndrome

and exercises program for clients with shoulder impingement syndrome such as:

- Exercise program for muscle stretching and strengthening as scapular adduction exercise and range of motion exercises with resistance to reduce pain and improve functional abilities of the shoulder and range of motion.
- In addition, the researchers prepared a dietary modification instruction about anti- inflammatory food high with Omega-3.
- **C. Implementation phase**: The researchers conducted 3 teaching sessions every week for 3 months about anti – inflammatory diet and exercises program as stretching exercise for improve muscle power and strengthening exercises for improving muscle strength and distributed a copy of the booklet that was designed to each client in the study group at the beginning of the first session.
- The exercise program was conducted for each client individually using explanation of the exercise and its effect, demonstration and re-demonstration till each client was able to perform the required exercise competently. The researchers took about 45 minutes for each session. After two weeks of starting the stretching exercises, the client starts the strengthening exercises. Each client was asked to repeat the exercises for 15 to 20 times.
- Each week the researchers interviewed each client individually to assess his or her adherence to the plan of care.
- Immediately after the last session: the researchers conducted a closing session for revision for all information's given during all the sessions and reinforcement was done.
- **D. Evaluation phase:** Evaluation of client of both groups were done three times during the study period, the first time on admission by using instrument (I, II, III, IV), the second one after one month of exercise and the third follow up was done after three months of implementing the nursing intervention using instruments II, III and IV.
- A comparison between both groups (study group I and control group II) was done to determine the effect of implementing the

exercise program on clients with shoulder impingement syndrome.

## Statistical analysis

The data collected were tabulated and analyzed by SPSS (statistical package for the social science software) statistical package versing 22 on IBM compatible computer: Quantitative data were expressed as mean and standard deviation and analyzed by applying t test for comparison of two groups. Qualitative data were expressed as number and percentage (No and %) and analyzed by applying Chisquare test ( $X_2$ ).

P-Value at 0.05 was used to determine significance.

## Results

Table (1): Reveals the percentage distribution of the studied groups to sociodemographic characteristics. (N=40). The age of both groups ranges from 18 and 25 years old. In relation to occupation, less than half of study group (45.0%) is manual workers, while half of control group (50.0%) was clerks. There is no statistically significant difference between both study and control groups in almost all sociodemographic characteristics.

Table (2): Describe Comparison between both study and control groups regarding pain intensity before, the nursing intervention guide, and one and three months after. (N=40)

The findings reveal that, 45.0% and 55.0% respectively of the study and control groups reported having Intolerable pain in the affected shoulder at the pre nursing intervention guide. While there is statistically significant improvement among the study group after one month and three months of the nursing intervention guide than the control group relating to pain intensity by p-value  $\leq 0.05$ .

Table (3): Comparison between both study and control groups regarding functional activities pre, one month and three months after the nursing intervention guide. (N=40). The table shows high statistically significant improvement among the study group after 3 months compared to the control group (p-value  $\leq 0.00$ ) in all items of functional activities.

Table (4): Concerning Range of motions among the study and control groups pre, one month and three months after the nursing intervention guide. (N=40). There is highly statistically significant improvement among the study group than the control group related to range of motions of the affected shoulder post three months of the nursing intervention guide (p-value  $\leq 0.001$ ).

**Figure (1)** reveals mean and standard deviations of range of motion exercise among study and control groups, pre, one month, and three months after the nursing intervention. From the figure, it is noticed that, there is significant improvement in the mean of range of motion among the study group for abduction movement from 79.0 before the nursing intervention to become 123.3 after on month and 169.8 after three months, compared to control group 96.3. while for shoulder flexion

there is significant improvement in the mean among the study group from 73.3 before the nursing intervention to become 168.3 after three months compared to control group where the mean is changed from 52.8 to become 84.3 after three months.

Table (5): Reveals comparison between both study and control groups regarding muscle strength of client's pre, one month and three months after the nursing intervention.

The findings reveal a statistically significant improvement among the study group than that for the control group regarding the ability to dress themselves, comb hair, wash and dry themselves, shop, hang up cloth. Also, there is significant improvement among the study group than that for the control group regarding the total score of muscle strength (p-value  $\leq 0.001$ ).

Table (1): Percentage distribution of the studied groups to sociodemographic characteristics. (N=40)

Sociodemographic	Study gr N=20	oup )	Control g N=2	group )	To N=	otal =40	Person Chi-	<i>p</i> - Value
characteristics	Ν	%	N	%	Ν	%	Square	1
Age							_	
• 18-	11	55.0	13	65.0	24	60.0		
• 25- 35	8	40.0	7	35.0	15	37.5	2.64	0.161
• ≤ 45	1	5.0	0	0.0	1	2.5		
Sex								
• Male	12	60.0	8	40.0	20	100.0	1.6	0.20
• Female	8	40.0	12	60.0	20	100.0		
Marital status								
Single	7	35.0	12	60.0	19	47.5	3.78	0.15
Married	11	55.0	8	40.0	19	47.5		
<ul> <li>Widow and divorced</li> </ul>	2	10.0	0	00.0	2	5.0		
Levels of education								
• Illiterate	1	5.0	0	0.0	1	2.5		
<ul> <li>Primary education</li> </ul>	3	15.0	0	0.0	3	7.5	5.60	0.13
<ul> <li>Secondary level</li> </ul>	13	65.0	13	65.0	26	65.0		
• University	3	15.0	7	35.0	10	25.0		
Occupation								
<ul> <li>Manual work</li> </ul>	9	45.0	7	35.0	16	40.0		
• Farmer	2	10.0	2	10.0	4	10.0	3.779	0.437
Employee	2	10.0	0	0.0	2	5.0		
• Clerk	7	35.0	10	50.0	17	42.5		
Number of family								
members								
• two	2	10.0	1	5.0	3	7.5		
• Four	8	40.0	5	25.0	13	32.5	4.168	0.525
• Three	5	25.0	9	45.0	14	35.0		
• Five	4	20.0	4	20.0	8	20.0		
Six or mor	0	0.0	1	5.0	1	2.5		

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 Table (2): Comparison between both study and control groups regarding pain intensity before, the nursing intervention guide, and one and three months after. (N=40)

		Pre exerci	ise progra	ım		After on	e month		After three months				
Items	Study g	roup (20)	Contr (	col group (20)	Stud	y group (20)	Co gr (	ntrol oup 20)	Si gi (	tudy roup (20)	Control group (20)		
	No	%	No	%	No	%	No	%	No	%	No	%	
Pain intensity :													
• No pain	0	0.0	0	0.0	4	20.0	0	0.0	12	60.0	4	20.0	
• Mild	1	5.0	0	0.0	4	20.0	1	5.0	5	25.0	1	5.0	
	1	5.0	1	5.0	8	40.0	7	35.0	3	15.0	7	35.0	
• Moderate	9	45.0	8	40.0	4	20.0	9	45.0	0	0.0	5	25.0	
• Severe	9	45.0	11	55.0	0	0.0	3	15.0	0	0.0	3	15.0	
• Intolerable													
Person Chi-Square	7.748					10	.79		16.267				
p-Value	0.053 *					0.02	29 *		0.003 *				

\*significant

 Table (3): Comparison between both study and control groups regarding functional activities pre, one month and three months after the nursing intervention guide. (N=40)

	,	Pre exerc	ise progra	m		After or	e month		After three months					
Items		Study		Control		Study	(	Control		Study		Control		
	gr	oup (20)	g	roup (20)	gr	oup (20)	gr	oup (20)	gr	oup (20)	Gr	oup (20)		
	No	%	No	%	No	%	No	%	No	%	No	%		
Able to do light activities	0	0.0	<u>^</u>	0.0		15.0	0	0.0	10	50.0				
• No strain	0	0.0	0	0.0	3	15.0	0	0.0	10	50.0	3	15.0		
• Mild strain	1	5.0	0	0.0	4	20.5	1	5.0	5	25.0	2	10.0		
• Moderate strain	1	5.0	2	10.0	7	35.0	4	20.0	5	25.0	1	5.0		
Severe strain	7	35.0	4	20.0	5	25.0	12	60.0	0	0.0	12	60.0		
•Complete disability	11	55.0	14	70.0	1	5.0	3	15.0	0	0.0	2	10.0		
Person Chi-Square		2.	.512 473			9.5	501 5 S							
Able to do heavy activities						0.0	2.5				Î I			
No strain	3	15.0	0	0.0	0	0.0	0	0.0	12	60.0	3	15.0		
Moderate strain	5	25.0	ĩ	5.0	1	5.0	ŏ	0.0	7	35.0	2	10.0		
• Mild strain	7	35.0	4	20.0	1	5.0	2	10.0	1	5.0	$\frac{1}{2}$	10.0		
Severe strain	5	25.0	11	55.0	7	35.0	4	20.0	Ô	0.0	11	55.0		
•Complete disability	ő	0.0	4	20.0	11	55.0	14	70.0	Ő	0.0	2	10.0		
Person Chi-Square	0	12	.735	20.0		2.5	512	70.0	21.511					
p-Value	0.013 *					0.4	73		0.00 *					
Able to do activities below	3	15.0	0	0.0	3	15.0	0	0.0	13	65.0	4	20.0		
shoulder level	4	20.0	1	5.0	4	20.0	1	5.0	4	20.0	1	5.0		
No strain	6	30.0	6	30.0	6	30.0	6	30.0	3	15.0	3	15.0		
<ul> <li>Mild strain</li> </ul>	6	30.0	11	55.0	6	30.0	11	55.0	0	0.0	9	45.0		
<ul> <li>Moderate strain</li> </ul>	1	5.0	2	10.0	1	5.0	2	10.0	0	0.0	3	15.0		
Severe strain	3	15.0	0	0.0	3	15.0	0	0.0	13	65.0	4	20.0		
<ul> <li>Complete disability</li> </ul>														
Person Chi-Square		12	.735			2.5	512		21.511					
p-Value		0.0	013 *			0.4	73	1	0.00 *					
Able to do activities above		20.0	<u>^</u>	0.0		20.0	0	0.0	10	<b>60.0</b>		20.0		
shoulder level	4	20.0	0	0.0	4	20.0	0	0.0	12	60.0	4	20.0		
• No strain	4	20.0	1	5.0	4	20.0	1	5.0	6	30.0	1	5.0		
• Mild strain	8	40.0	8	40.0	8	40.0	8	40.0	2	10.0	1	35.0		
• Moderate strain	4	20.0	9	45.0	4	20.0	9	45.0	0	0.0	5	25.0		
Severe strain	0	0.0	2	10.0	0	0.0	2	10.0	0	0.0	3	15.0		
Complete disability										10				
<i>p-Value</i>		9. 0.(	723 )45 S			9.7 0.04	/23 45 S			18. 0.0	349 01 *			
Total functional activities														
score														
Able to do normally	16	80.0%	20	100.0%	13	65.0%	19	95.0%	2	10.0%	15	75.0%		
• Unable to use arm	1	5.0%	0	0.0%	4	20.0%	1	5.0%	3	15.0%	0	0.0%		
<ul> <li>Slight restriction</li> </ul>	3	15.0%	0	0.0%	3	15.0%	0	0.0%	15	75.0%	5	25.0%		
Person Chi-Square		4.	444	-		5.9	25	-		17.	941			
p-Value	.108					.05	28		.000 *					

S = statistical significant \* = highly statistical significant difference

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	0		on Admission				1 month					Study		Control				
		N	Mean	Std. Deviation	t-test for	<i>p-</i> value	Mean	Std. Deviation	t-test for	<i>p-</i> value	Mean	Std. Deviation	t-test for	<i>p</i> -value	F	<i>p</i> -value	F	<i>p</i> - value
					Equality of Means				Equality of Means				Equality of Means					
Shoulder flexion	Study	2 0	73.25	13.89	3 355	0.002	126.75	37.25	3.83	0.00	168.25	18.08	7 50	0	71 35	0	0	0.007
	Control	2 0	52.75	23.53	5.555	0.002	84.50	32.40	5.05	0.00	84.25	46.09	1.59	0	71.55	0	5.37	0.007
Shoulder Extension	Study	2 0	37.00	5.48	1 276	0.21	50.25	7.34	1 51	0.14	58.00	3.77	4 4 3	0	68 98	0	25.67	0
	Control	2 0	33.75	9.98	1.270	0.21	46.75	7.30	1.51	0.14	51.00	5.98	-1-1-5					-
Internal Rotation	Study	2 0	43.75	8.09	0.697	0.49	69.25	11.15	2 20	0.03	83.25	7.48	4.17	0	97.88	0	21.67	0
	Control	2 0	41.25	13.85	0.077	0.49	60.00	14.23	2.27	0.05	69.25	13.01	,	0	77.00	0	21107	5
External Rotation	Study	2 0	51.25	12.13	1 979	0.055	66.00	13.92	1.00	0.22	83.25	8.47	4.01	0	37 31	0	18/13	0
	Control	2 0	43.25	13.40	1.575	0.055	61.50	14.52	1.00	0.32	69.00	13.44		0	57.51	0	16.45	
Abduction	Study	2 0	79.00	19.37	3 643	0.001	123.25	31.84	3 44	0.00	169.75	11.64	671	0	81.04	0	5 53	0.006
	Control	2 0	55.25	21.79	5.045	0.001	81.50	44.04	3.44	0.00	96.25	47.60	0.71	U	01.04	0	5.55	0.000
Adduction	Study	2 0	18.75	2.75	0.567	0.574	25.00	4.59	- 195-	0.85	29.00	2.05	1.83	0.075	48 78	0	30 58	0
	Control	2	18.00	5.23	0.507	0.574	25.25	3.43	195-	0.05	27.50	3.03		0.075	48.78	U	30.58	U

Table (4): Range of motions among the study and control groups pre, one month and three months after the nursing intervention guide. (N=40)

## **Original Article**

Table (5): Comparison between both study and control groups regarding muscle strength of client's pre, one month and three months after the nursing
intervention guide. (N=40)

		Pre exercis	e progr	am		After or	e month	L	A	After three months				
Items	S	tudy	Co	ontrol		Study		Control	Study gro	oup (20)	Contro	ol group		
	grou	1p (20) %	gro No	up (20) %	l gi No	oup (20)	l gi No	oup (20)	No	0/0	(. No	20)		
Could ha/she able to Dress	110	/0	110	/0	110	/0	110	/0	110	70	110	/0		
No distress	0	0.0	0	0.0	4	20.0	0	0.0	12	60.0	4	20.0		
• Little distress	1	5.0	0	10.0	3	15.0	1	5.0	12	20.0	1	5.0		
Moderate distress	1	5.0	2	10.0	0	13.0	6	20.0	4	20.0	5	25.0		
• Moderate distress.		5.0		10.0	0	40.0	0	50.0	4	20.0	3	25.0		
• Extreme strain	/	35.0	2	10.0	5	25.0	10	5.0	0	0.0	/	35.0		
Impossible to do	11	55.0	16	80.0	0	0.0	3	15.0	0	0.0	3	15.0		
Person Chi-Square		5.037				9.9	952		15.911					
p-Value		0.169				0.04	41 S		0.003 S					
Comb his/ her hair														
• No distress	0	0.0	0	0.0	3	15.0	0	0.0	11	55.0	3	15.0		
• Little distress	1	5.0	0	0.0	3	15.0	1	5.0	5	25.0	2	10.0		
Moderate distress	2	10.0	2	10.0	7	35.0	4	20.0	3	15.0	1	5.0		
• Extreme strain	5	25.0	3	15.0	7	35.0	13	65.0	1	5.0	11	55.0		
• Impossible to do	12	60.0	15	75.0	0	0.0	2	10.0	0	0.0	3	15.0		
Person Chi-Square		1.8	33			8.6	518		18.19					
p-Value		0.6	608			0.0	71 S		0.001 *					
Could he/she able to Wash and dry his/herself.														
• No distress	3	15.0	0	0.0	0	0.0	0	0.0	12	60.0	3	15.0		
• Little distress	4	20.0	1	5.0	1	5.0	0	0.0	3	15.0	2	10.0		
Moderate distress	6	30.0	4	20.0	1	5.0	2	10.0	5	25.0	2	10.0		
Fytreme strain	6	30.0	10	50.0	6	30.0	3	15.0	0	0.0	11	55.0		
• Impossible to de	1	5.0	5	25.0	12	60.0	15	75.0	0	0.0	2	10.0		
• impossible to do												1		

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		Pre exercis	e progr	am		After or		After three months					
Items	S grou	tudy up (20)	Control group (20)		Study group (20)		Control group (20)		Study group (20)		Control group (20)		
Person Chi-Square		8.8	867		2.667			19.886					
p-Value		0.0	)65			0.4	446			0.001	*		
Do household shopping													
• No distress	3	15.0	0	0.0	3	15.0	0	0.0	11	55.0	4	20.0	
• Little distress	3	15.0	1	5.0	3	15.0	1	5.0	6	30.0	1	5.0	
Moderate distress	7	35.0	6	30.0	7	35.0	6	30.0	3	15.0	3	15.0	
• Extreme strain	6	30.0	11	55.0	6	30.0	11	55.0	0	0.0	9	45.0	
• Impossible to do	1	5.0	2	10.0	1	5.0	2	10.0	0	0.0	3	15.0	
Person Chi-Square		5.8	881			5.	881			18.83	8		
p-Value		0.2	208			0.		0.001 *					
Could he/she able to Hang up													
clothes	0	0.0	3	15.0	0	0.0	0	0.0	3	15.0	12	60.0	
• No distress	1	5.0	5	25.0	0	0.0	1	5.0	2	10.0	7	35.0	
• Little distress	4	20.0	7	35.0	2	10.0	1	5.0	2	10.0	, 1	5.0	
Moderate distress	11	55.0	5	25.0	2 1	20.0	7	35.0		55.0	0	0.0	
Extreme strain	4	20.0	0	23.0	+ 14	20.0	11	55.0	2	10.0	0	0.0	
Impossible to do	4	20.0	0	0.0	14	70.0	11	55.0	2	10.0	0	0.0	
Person Chi-Square		10.	643			2.4	451		21.011				
p-Value		0.0	1 *			0	.47		0.0 *				
Total score of muscle strength													
• No action	15	75.0%	17	85.0%	14	70.0%	18	90.0%	3	15.0%	12	60.0%	
• Full strength	5	25.0%	3	15.0%	6	30.0%	2	10.0%	17	85.0%	8	40.0%	



Figure (1): Mean of range of motion exercise among study and control groups, pre, one month and three months after the exercise program. (N=40)

## Discussion

The most frequent cause of shoulder pain is sub acromial impingement syndrome. Shoulder impingement syndrome (SIS) is characterized by shoulder pain that is exacerbated with arm elevation or overhead activities. Treatment options for those with SIS include rehabilitation. Therapeutic exercise was the well-investigated form of rehabilitation. The therapeutic exercise programs consisted of stretching and strengthening the rotator cuff and scapular muscles (Galvin, 2015).

## Sociodemographic characteristics:

The present study clarified that the age of groups ranged between 18 to 35 years old. This result was settled with **Aszman**, (2015) who stated that shoulder impingement syndrome affect youth at a younger age especially between 18 to 25 years. On the contrary Harstad and Haugen (2016) reported that the mean age of the prevalent shoulder impingement syndrome among grownups increased from 35 to 65 years old.

**Concerning sex**, the current study found that the incidence rate of shoulder impingement syndrome in both study and control groups were 1: 1. The finding was in line with Brox et al., (2013). However, Cavalo and Speer, (2018) definite that the highest incidence of shoulder impingement syndrome was in females than males relating to activities of daily living above the shoulder level.

**Regarding occupation**, the present study presented that less than half of the clients do manual work, and less than half were clerks. This finding was in line with Cools et al., (2015) who described that high-risk groups for shoulder impingement syndrome are individuals who work with jobs requiring repetitive overhead activity and women's participating in activities of daily living with overhead activities and men with manual work.

## Clinical manifestations:-

The results of this study showed that the majority of both study and control groups reported physiological manifestations such as, numbness in the affected arm and pain in the affected shoulder when sleeping in one side, tie clothes easily from the back, elevate hands easily at the shoulder level, elevate any objects above level of the shoulder and put hands easily behind the head. These findings were in line with Ingber, (2013) who reported that clients with shoulder impingement syndrome commonly had all physiological and behavioral manifestations of disease.

## Pain intensity

The present study determined that most of both study group and control groups had Intolerable pain before the nursing intervention, while after one and three months the study group was improved significantly to report no pain compared to control group. This finding was in line with Frost, (2014) whore ported that rehabilitation program for clients with shoulder impingement syndrome concerned with stretching and strengthening exercises achieved high level of relieving pain by decreasing severity of shoulder pain for clients with shoulder impingement syndrome after three months. Also, O'Brien et al., (2016) showed a significant improvement in pain level over a period of 12 weeks after using physical therapy. Likewise, Lyons, (2017) reported that the majority of clients who suffered from shoulder impingement syndrome had continues and Intolerable pain with most activities above the shoulder level which was improved slightly after implementation of an exercise program for one month such as stretching, strengthening exercises and range of motion exercises. Also, these results were different with Hebert et al., (2015) who studied the impact of implementation of a stretching and strengthening exercises for six months were highly effective in decreasing severity of shoulder pain for clients with shoulder impingement syndrome.

## Regarding to functional activities:

The present study revealed that the majority of both studied and control groups were unable to do any activities of daily living before implementation of the nursing intervention. While after three months of implementation of the stretching and strengthening exercises most of the study group was able to do all activities of daily living with no strain. This finding was in line with Soliman, (2017) and Rahme, (2014) who found improvements in functional activities within the first 6 weeks, with slow but continued improvement at selected intervals post discharge from three to six months. Also, evidence from a study by Aziz and Basuoni, (2018) showed that therapeutic exercise was more effective in improving functional loss of the shoulder for clients with rotator cuff injury than other therapeutic modality in both short term follow up for six weeks and long-term follow-up for three months. Moreover, Dawason, (2014) examined the effect of therapeutic exercise in a group of clients with degeneration and inflammation of the rotator cuff and found significant improvement in a composite score of pain and functional activities of the shoulder.

## Range of motion of the shoulder:

The resent study reported that there was highly statistical significant improvement among the study group than that of the control group relating to range of motion of the affected shoulder after three months of implementation of the nursing intervention. This result was supported by Nicholas, (2013) who indicated that therapeutic exercise is generally effective in improving shoulder range of motion.

## Muscle strength of the shoulder:

The present study clarified highly statistically significant improvement among the study group than the control group in muscle strength of the affected shoulder after three months of implementation of the nursing intervention. Furthermore, Micheli, (2016) and Cambier, (2014) reported that the therapeutic exercise is generally effective in improving muscle strength from pre intervention to post intervention. These findings could be because stretching exercises increase elastic resistance as strength improved. Moreover, Ahmed, (2018) declared that the positive effect of the specific exercise strategy for three months significantly reduced need for surgery in clients with sub acromial pain in waiting list.

## Conclusion and recommendations:

# Based on the results of this study, it can be concluded that:

- 1. Pain intensity significantly reduced among the study group than control group after the nursing intervention guide application.
- 2. Developed the nursing intervention guide was effective in refining functional abilities among the study group than control group after implementation.
- **3.** Range of motion of the shoulder was enhanced among the study group than the control group post implementation of the nursing intervention guide.

### **Recommendations:**

Based on the findings of the present study the following recommendations are derived and suggested:

#### A- Recommendation for the clients:

- 1. Body building activities should be ongoing process especially for clients with shoulder impingement syndrome and continued throughout their lives to improve their functional activities of daily living and range of motion of the shoulder.
- 2. Allocating nursing intervention guide brochure at workplaces to promote clients' alertness about shoulder impingement syndrome avoiding exercises.

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