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Original Article

Effect of Range of Motion Exercise Program on Pain Level among Patients with Second Degree Burn at Mansoura University Hospitals

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1.ABSTRACT

Background: The burn injuries can result in devastating functional impairments and hamper quality of life. One of the rehabilitation program components is Range of motion exercise. The range of motion exercise can reduce pain level and prevent contracture. **Aim:** The present study **aimed** to evaluate the effect of range of Motion exercise on pain level with burnt patient with second degree burn. **Methods**: A quasi-experimental design one group pretest posttest was utilized. **Subject:** A purposive sample (47) of adult patients diagnosed with second degree of burn. **Setting**: Plastic, Reconstructive and Burn Surgery Center at Mansoura University Hospitals. **Study tools:** The data were collected by using a Structured Interview Questionnaire and Pain Visual Analogue scale assessment. Continuous data were normally distributed and were expressed in mean ±standard deviation and Chi-square test (or fisher's exact test when applicable) was used for comparison of variables with categorical data in SPSS 23. **Results:** The study revealed that, there were high statistically significant differences regarding Range of motion and pain level were found in the the post-test, where P values <0.001**. **Conclusions:** A significant improvement of pain level was found after implementation of the ROM program which supported the study hypotheses. **Recommendations:** Simple instruction handouts have to be available for burnt patients about range of motion exercise, in addition to the usual rehabilitation activities at burn center and repeat the study on a full thickness burn degree wound

Keywords*: Burn, Range of Motion exercise, Pain*

2.Introduction

After falls, violent acts, and traffic accidents, burns are the fourth most common cause of injuries worldwide (Murray et al., 2020). Burns are one of the most harmful injuries and a serious health issue around the world, particularly in underdeveloped nations. Burns are thought to be responsible for approximately 265,000 deaths worldwide each year. Over 300,000 people per year died from burns related to fires alone, with scalds, chemical burns, and other types of burns accounting for more fatalities. (Mohammadhossini,Ahmadi,Gheibizadeh, Malehi, & Zarea, 2019).

Burn injury is widely regarded as one of the most distressing injuries a person can experience. In addition to physical and psychological pain, the correct management of a burn injury necessitates painful procedures such as debridement, daily wound management, and surgical intervention, followed by intensive physical and occupational rehabilitation. Burn pain is particularly complex; it is multi-faceted and often changes as the patient progresses through a series of procedures and treatments that involve the manipulation of painful burn areas. (Romanowski et al., 2020). When treating second-degree burns (both partial thickness and full partial thickness), the ROM exercise can help reduce pain, reduce dressing changes period, help control infection, speed up healing, help with long-term recovery, and reduce treatment expenses. (Blome-Eberwein et al., 2021).

Initially, burn wounds are usually painful. The intensity of the pain is dependent on the extent of the burn. Burns are characterized by hyperalgesic symptoms and mild to moderate pain, and are the most severe type of burn immediately after injury. These types of burns only involve the

superficial layer of the skin, and are associated with severe hyperalgesic reactions and moderate to severe pain. (Wiechman, & Sharar, 2019). Nurses must be proficient in assessing pain and utilizing techniques to reduce the patient's pain due to the fact that certain patients may experience both physical and/or psychological discomfort associated with dressing changes and wound treatment. (Abo El Ata, Shaheen, Abdelgilil Khalil & Yousef Saleh, 2021)

Aim of the study

Evaluate effect of Range of Motion Exercise program on Pain Level among Patient with Second Degree Burn

3.2Method

Research Design: A Quasi-experimental pre / post research design, one group was utilize in this study.

3.2Research Setting:

This study was conducted at Plastic, Reconstructive and Burn Surgery Center at Mansoura University Hospitals, Egypt, 2nd floor, The Burn Unit consists of one dressing room, hydrotherapy room, four patient's rooms (12 beds), ICU room (3 beds), storage room, and nursing room, funny room for children and doctor room.

3.3Research Subjects: A purposive sample of 47 adult patients diagnosed with second degree of burn, aged from 20 to 60 year. Both gender, and burn percentage from 10 - 50% (TBSA).

Inclusion Criteria: Patients with second-degree burns who meet the following criteria was chosen: hemodynamically stable; able to communicate; and contact mean age of 20–60 years.

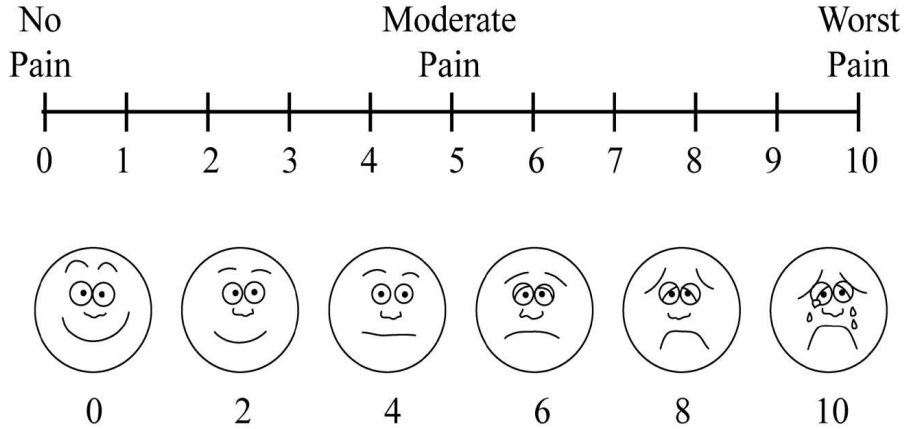
Exclusion Criteria: Patients with severe consequences such severe infections, traumatic brain injuries, spinal cord injuries, significant fractures, or amputation. Psychological illnesses in the past.

3.4Tools of data collection:

Two tools were used to collect data pertinent to the study:

Tool 1: Structured Interview Questionnaire: Assessment of demographic characteristics & medical data form: This part was developed by the researcher after reviewing related literature (WHO, 2018) and included data such as age, sex, occupation, marital status, residence… etc. Medical data: This included series of questions to elicit patient's information related to burn past and present medical history such as site of burn, causative factors, burn degree, and percent of burn, previous hospitalization, date of admission and health relevant data sheet.

***Tool 2: Pain Visual Analogue scale (VAS) assessment*:** this tool was adopted from (Hawker et al., 2011) for assessing pain regarding its severity. A "10 points scale" is just a straight line. The line starts at zero and ends at ten. Zero means no pain, and ten means the worst pain possible. 0 means no pain, 1-3 means a little bit of pain, 4-6 means a decent amount of pain, 7-9 means a lot of pain, and 10 means the worst possible pain



3.5Tool Validity:

Study tools were designed by the researcher and was submitted to a panel of five reviewers and experts in medical surgical nursing and Plastic surgery staff members. Every participant was asked to review the instrument for topic coverage, clarity, phrasing, length, structure, and overall appearance. Modifications of tools were done according to panel judgment

3.6Tool Reliability:

Reliability of the Cronbach's alpha value of the Visual analog scale was (0.902).

3.7Pilot Study:

It was conducted on 10 % (6 patients) in the selected setting for test clarity, arrangement, applicability of tool, and time needed. The required modifications was made. Patients involved in the pilot study was excluded from the study sample.

3.8Data collection process:

Phase 1: Preparatory phase:

The Faculty of Nursing at Mansoura University's Research Scientific Ethical Committee gave its ethical approval. The Mansoura University Hospital' responsible authority, the Plastic and Burn Surgery Center, gave permission. The aim and the nature of the study was explained to all burn nurses to gain their cooperation in data collection. Preparing the educational material in the form of a PowerPoint presentation and educational videos and posters.

Phase II: Implementation phase

- The educational intervention consist of one theoretical session and two practical sessions.
- These educational sessions was done either individually or in groups (1-3) patients based on the number of patients in each room, and tell to you relevant to make this exercise.
- Before starting each session, the researcher was reminded of the previous instructions before beginning the new one.

1st Session include providing verbal burn teaching on the definition, causes, severity, consequences, and treatments.

2nd Session include (Lower Extremity Passive ROM Exercises) exercises help and keeping the muscles and joints of the burnt limbs flexible. ROM exercises were needed to prevent joint stiffness and contractures over the affected joints. Include Hip and Knee Flexion, Hip Rotation, Hip Abduction, Ankle Rotation, Toe Flexion and Extension, Heel-Cord Stretching, Lumbar Rotation and Hamstring Stretch.

3rd Session include (Upper Extremity Passive ROM Exercises) include Elbow Flexion and Extension, Shoulder Flexion and Extension, Shoulder Internal and External Rotation, Horizontal Shoulder Abduction, Neck Rotation, Finger and Wrist Flexion and Extension and Thumb Flexion and Extension

- The program was implemented in period of 2-3 months including pretest, program implementation, and post-test for patients.
- For the pre-test; the time consumed to fill the demographic, history, pain level from 20-30 minute.
- The researcher was called of patient or relative by contact mean three time a week to follow up and remember him/her to make program according what is learned
- The researcher was attended the hospital on Saturday to Monday and clinical on Saturday and Wednesday both morning and afternoon and demonstrated the ROM exercise program that included a one theoretical session and two practical training session (45-60 minute) to each session.

Phase III: Evaluation phase

Evaluate of pain level post implementation ROM exercise program by use VAS tool.

3.9Statistical Analysis

All statistical analyses were carried out using SPSS for Windows version 20.0 (SPSS, Chicago, IL). Continuous data were normally distributed and reported as mean ±standard deviation (SD). Categorical data were reported as a number and a percentage. We used a statistical test called the Chi-square test (or Fisher's exact test if it was more suitable) to compare different categories of data. The correlation co-efficient test was developed to look for correlations between two variables with continuous data. The reliability (internal consistency) test for the questionnaires used in the study was computed. Statistical significance was defined at $p<0.05$.

3.10Ethical Considerations and Human Rights

Research proposal was accepted by Ethical Committee within the College of Nursing. There is no hazard for study subject during application of the research. The study was complying with ethical principles in clinical research. Informed consent acquired from patients or guidance that who are willing to participate in the study, after explaining the aim of the study. Study subject has the right to refuse to participate or withdraw from the study with no rational any time and privacy have been taken into consideration for the collection of data.

4.Results

Table 1 shows the number and distribution of the demographic characteristics and medical data of the burnt patients. The age of the studied burnt patients ranged from 20 to 40 years and more, with a mean age of 32.2 ±6.2 years. Study subjects aged from 20 to less than 30 years constituted the majority (48.9 %) of the studied burnt patients. Regarding gender; more than two third (66.0%) were male. While toward occupation; free work and student were both equal constitute 29.8%. Regarding the studied burnt patient's marital status, married patients were constituting about 44.7%. While regarding medical history; 14.9% of the studied burnt patients were had diabetes and only 10.6% of the studied burnt patients were had hypertension.

Table 2 shows the comparison of Visual analog scale at pre and post scale. The table showed that Wound Status in a Pre – Scale was mostly had a severe pain, in post – Scale it was mostly had no pain, with a statistically significance differences pre – scale and post – scale as p= <0.001**

Table 3 shows association between demographic characteristics, medical data and visual analog scale at post – scale. The table presented that there was a statistically significant relationship between demographic characteristics, medical data like diabetes with a visual analog scale at post – scale, as p- value .>05. But there was no statistically significant relationship between demographic characteristics, medical data like age in years, gender, occupation, marital status, educational level, residence, hypertension, causes of burn, and percentage of TBSA with a visual analog scale at post – scale as p- value <.05

Table 1. **Number and distribution of the demographic characteristics and medical data of the burnt patients**

	N(47)	%
Age (Years)		
20 – 29	23	48.9
30 – 39	11	23.4
40 or More	13	27.7
Mean ±SD	32.2 ±6.2	
Gender		
Male	31	66.0
Female	16	34.0
Occupation		
Employee	7	14.9
Housewife	7	14.9
Free work	14	29.8
Student	14	29.8
Not work	5	10.6
Marital Status		
Married	21	44.7
Single	26	55.3
Medical History		
Hypertension	5	10.6
Diabetes	7	14.9

SD (Standard deviation)

Table 2. **Comparison of Visual analog scale at pre and post scale**

	Pre – Scale		Post – Scale		Fisher's exact test	
	N (47)	%	N (47)	%	N (47)	%
Wound Status						
No pain	0	0.0	27	57.4		
Mild pain	0	0.0	14	29.8		
Moderate pain	12	25.5	4	8.5		
Severe pain	35	74.5	2	4.3	74.432	<0.001**

highly statistically significant p ≤ 0.001

Table 3. Association between demographic characteristics, medical data and Visual analog scale at post – scale

	No Pain (n=27)		Mild Pain (n=14)		Moderate Pain (n=4)		Severe Pain (n=2)		Chi – Square / Fisher's exact test	
	n	%	n	%	n	%	n	%	X^2	P
Age (Years)										
20 – 29	12	44.4	9	64.3	1	25.0	1	50.0		
30 – 39	9	33.3	2	14.3	0	0.0	0	0.0		
40 – 49	6	22.2	3	21.4	3	75.0	1	50.0	8.380	0.212
Gender										
Male	21	77.8	8	57.1	2	50.0	0	0.0		
Female	6	22.2	6	42.9	2	50.0	2	100.0	6.493	0.090
Occupation										
Employee	5	18.5	1	7.1	1	25.0	0	0.0		
Housewife	2	7.4	3	21.4	1	25.0	1	50.0		
Free work	9	33.3	4	28.6	1	25.0	0	0.0		
Student	7	25.9	6	42.9	0	0.0	1	50.0		
Not work	4	14.8	0	0.0	1	25.0	0	0.0	10.793	0.547
Marital Status										
Married	12	44.4	6	42.9	2	50.0	1	50.0		
Single	15	55.6	8	57.1	2	50.0	1	50.0	0.088	0.993
Medical History										
Hypertension	2	7.4	1	7.1	1	25.0	1	50.0	4.604	0.203
Diabetes	0	0.0	3	21.4	4	100.0	0	0.0	28.404	<0.001**

highly statistically significant $p \leq 0.001$

5.Discussion

Part I: Demographic data characteristics of the studied patients

Regarding the study patient's demographic characteristics, the results of the present study revealed that the age of the studied burnt patients was within the average of thirty two. The same result agreed with study done by **Mahamoud, Hassan, El-Mageed, Sayed and Desouky (2021)** who reported that the average age of group study was thirty six. These current study findings disagree with **AbdElaal et al., (2022)** who showed the average of age of age was forty one.

Regarding gender; more than two third were male, this finding at a same line with study done **by Mahamoud, Hassan El-Mageed, Sayed and Desouky (2021)** who reported that two third of studied sample were males in a study titled "Effect of Nutritional Factor on Burn Wound Healing for burnt patients". These current study findings disagreed with **Walash, Elhana, Abo and El-sol (2019)** who reported more than two third were female in study titled "Efficacy of Dressing by Aloe Vera Gel on Healing and Pain among Burnt Patients"

The present study revealed that, most studied burnt patient were read and write by about more than half. This finding at same line with **Seliman, Fouad and Mohamed (2022)** who reported that more than half is read and write of burnt patient, but disagreed with **Magbool Ali and Hussein (2021)** who reported that, majority of study is secondary level of education. The lowest level of education does not have sufficient information about burn prevention and the use of

flammable tools carefully due to lack of education, knowledge and reliance on life experience

The present study revealed that more than half were single. This finding agree with **Seliman ,Fouad and Maarouf (2022)** who reported single is approximately of half. The findings disagree with study done **Elsherbiny, Fahar, Weheida, Shebl and Shrief (2018)** who reported that, the married patient is more than half of study sample. Also disagree by **Walash, Elhana, Abo and El-sol (2019)** who clarified more than two third is married.

Most of researchers demonstrated that majority of burnt patient were married within female, housewife because that had a high responsibilities toward life because of cooking appliance that it's the most common of cause but my opinion the male also had a high responsibilities toward life because the burn is trauma accident can occurred anywhere and anytime to female and male.

Part II: Effect of range of motion exercise on pain level

The results of the study demonstrate that interventions (Range of motion exercise program) showed significantly reduce pain intensity in the patients with the second-degree burn wound, this finding at a same line **with Aly Yakout and Khlosy (2020)** who showed good effect of ROM on burnt patient after intervention, in a similar study done by **Delfani, Zakerimoghadam and Mohammadaliha (2016)** who reported muscle relaxation technique was effective in relieving pain, pruritus and vital signs in the patients with burn injury, especially second-degree burn. The researcher view in this point that, the complementary methods should be used in reducing pain in the patients with second degree burn.

The results of the study revealed that patients in a pre-intervention was mostly had a severe pain and moderate to mild pain, in a post-intervention which come at same line with improvement of pain, this finding agree with **Walash, Elhana, Abo and El-sol (2019)** who showed mostly had a severe pain and moderate pain before intervention. But in post intervention the current study relaved that the low patient had with moderate and sever pain still feeling a pain, this finding disagree with **Walash, Elhana, Abo and El-sol (2019)** who reported that no moderate pain and sever pain. Patient who still with moderate and sever pain had a chronic disease effected the immune system, that's reasons delayed wound healing which results increase feeling of pain.

The findings of the present study revealed that Wound Status in a Pre – Scale was mostly had a severe pain, in post – Scale it was mostly had no pain, with a statistically significance differences pre – scale and post – scale as p= <0.001**, this finding is consistent with study done by **Keshavarzi et al., (2022)** who showed significantly reduce pain intensity in the patients with the second-degree burn wound. This finding disagree with **Hosseinzadeh, Firouzkouhi, Masinaeinea and Abdollahimohammad (2021)** who reported that no significant difference between the scores of pain based on Mann-Whitney U test before the intervention.

Since some studies emphasized the significance of gender and age on the perception of pain, we have analyzed whether these variables had an impact on pain perception in our study. When observing gender differences, the results we obtained showed that during ROM exercise, female had a higher visual analogue scale score than males, but the difference was not statistically significant. This finding supported by **Komarčević , Jokić, Pajić, Jovanović and Milenković (2023); Mengistu, Obsa and Gemeda (2018)** who reported the female had more VAS score than male and the difference wasn't statistically significant. My opinion gender and age wasn't playing a significant role in pain perception

6.Conclusions

This study revealed that, the benefit of the ROM exercise technique for hospitalized burnt patients. It found out that the majority of patients reported a significant decrease in the pain intensity, which confirmed our hypothesis that proposed " Burnt patient who receives ROM exercise based program was reduced pain level"

The research results showed that the two hypotheses of the study were correct. They found evidence that the pain level improved both during and after doing the exercises that involved moving the joints.

7.Recommendations

On the light of the findings the following recommendations are suggested

1. Simple instruction handouts have to be available for burnt patients about range of motion exercise, burn complication and treatment, in addition to the usual rehabilitation activities at burn center.

2. Importance of apply positioning of patients burnt parts as being an important wound care steps to avoid stiffness, discomfort and contracture.

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