



EFFECTIVENESS OF ACTIVE RANGE OF MOTION IN COMBINATION WITH STRETCHING IN TREATMENT OF BURN PATIENT

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ABSTRACT

Background: Serious burn prompts to a condition of hyper catabolism, bringing about fast muscle damage and long term disability. As life expectancy from severe burn are enhancing, early restoration is vital to boost functional recovery. The prevalence of burn in 2004 was 11 million worldwide.

Objective of Study: To assess the effects of active range of motion exercises in combination with stretching exercises on burn patients.

Methodology: It was aquasi-experimental study. The study was conducted in Burn and Plastic Surgery Department, Mayo Hospital, Lahore. The study was completed in five months from September 2015 to February 2016 after the approval of synopsis. There was two groups and each group was allocated with 20 patients. Non-probability convenient sampling technique was used. Group 1 received active range of motion and stretching exercises while group 2 received active range of motion exercises alone for three sessions a week for 4 weeks. Demographics data, pain intensity on visual analogue scale (VAS), functional status of affected region on burn functional assessment scale (BFAS) and range of motion through Goniometer were recorded before and after the treatment. Data were entered and analyzed through Statistical Package of Social Sciences (SPSS) version 16.0.

Results: Baseline measurements for pain intensity on VAS for group 1 was 7.04 ± 1.46 that changed to 1.71 ± 0.56 and for group 2 it was changed from 6.684 ± 1.25 to 2.63 ± 0.76 . Burn Functional Assessment Score for group 1 and 2 were 29.23 ± 5.03 and 29.94 ± 4.65 and that were changed to 8.86 ± 2.69 and 12.42 ± 2.06 respectively.

Conclusion: Active range of motion along with stretching exercises was more effective than the active range of motion alone in reducing pain intensity, functional activities and range of motion of involved limb for treatment of burn patients.

Key words: Burn patients, stretching, active range of motion

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INTRODUCTION

Serious burn prompts to a condition of hyper catabolism, bringing about fast muscle damage and long term disability⁽¹⁾. As life expectancy from severe burn are enhancing, early restoration is vital to boost functional recovery⁽²⁾. The prevalence of burn in 2004 was 11 million worldwide⁽³⁾. Burns are caused by exposure of skin to increased temperature, electric current, warm liquids and ultraviolet radiations that occur with warm metals boiling liquids, flames or steam contacting with the skin. Burns are divided into four main categories on the basis of severity: first degree burn limit to superficial skin layer, second degree burn involves the deep layers of skin and results in redness and blister, deep second degree burn is serious form that may progress to third degree over the period of some days⁽⁴⁾. Physiotherapy treatment is a key component to gain range of motion and successful contracture

release after burn. Physiotherapy should be started as soon as possible after the operation. The main goal of physiotherapy is to maintain the length gained by surgery. The secondary goal is to achieve normal ambulation and prevent contractures of the lower extremities. For the upper extremities, the secondary goal is to improve the patient's ability to perform activities of daily living. There are numerous ways a physiotherapist can help a burn contracture patient: they can provide scar massage to decrease hypertrophic scarring and stretch muscles that have contracted to prevent recontracture provide appropriate pressure garments and splints or even provide serial casting to help heal the wound and stretch tissue⁽⁵⁾.

Other than posttraumatic wound and skin care, a huge number of rehabilitative measures are utilized keeping in mind the end goal to



reintegrate a burn victim into social furthermore, proficient life, e.g. physiotherapy, psychotherapy, manual therapy, massages, splints, prostheses and epentheses^(6,7).

Stretching and active range of motion also have a great effect on burn patients to improve muscles active movement and tissue performance that the patient also performs themselves with only the antagonistic muscles of their affected limb or digits movement is not forced or. If the graft is healthy and has a good condition this can be done as soon as a week after surgery. Early mobility programs are appropriate for patients who have the ability to understand both the exercises and the precautions associated with them⁽⁸⁾. The rationale of this study was to compare the effect of active range of motion along with stretching and active range of motion alone for the management of burn patients in reducing pain and improving functional status of involved region.

METHODOLOGY

The study design was a Quasi-experimental. It was conducted in Burn and Plastic Surgery Department and Physiotherapy Department, Mayo Hospital, Lahore. The study was completed within six months from September 2015 to February 2016. The study included forty patients through non-probability convenience sampling technique. The inclusion criteria of the study was: age of the patients from 10 to 50 years, 1st degree burn, 2nd degree burn, 3rd degree burn and burn including areas of body like hand, arm, shoulder, foot and leg. And the exclusion criteria were: age below 10 and above 50 years, 4th degree burn, and burn of face, head or buttock, history of malignancy, osteoporotic patients, pregnant women and spinal fracture.

The patient came to physiotherapy department either referred from senior physiotherapist or burn and plastic surgeon from Burn and Plastic Surgery Department. An Informed consent was obtained from each patient or attendant. All the participants were assessed through physical examination by the Physiotherapist. The data

included demographic information including age, gender, socioeconomic status, marital status, educational status, duration of onset, nature and mode of pain, pain intensity of the limb on Visual Analogue Scale, functional limitation of affected limb on Burn Functional Assessment Scale and range of motion of involved limb through Goniometer.

The patients were divided into two groups. Group 1 received active range of motion and stretching exercises while group 2 received active range of motion exercises alone. Type of treatment for subjects was according to medical ethics, beneficial and harmless effects. In group 1: active exercises of involved and uninvolved limb was carried out for three times a week for 60 minutes⁽⁹⁾ and three sets of 15 second stretching⁽¹⁰⁾ and in group 2: only active range of motion was employed. The patients were provided 4 week treatment and then followed for another 2 weeks for pain intensity, functional status and ROM of the involved limb. Data were entered and analyzed through SPSS version 16.0. All qualitative variables were presented in the form of frequency tables and percentages. All quantitative variables were presented in the form of mean \pm SD along its range (max-min). T-test was applied to compare the mean differences of quantitative variables. P-value < 0.05 was taken as significant.

RESULTS

The patients included in this study with age range of 10 to 45 years. Out of which 26 were male and 14 females. Results showed baseline measurements for pain intensity on VAS for group 1 was 7.04+1.46 that changed to 1.71+0.56 and for group 2 it was changed from 6.684+1.25 to 2.63+0.76. Burn Functional Assessment Score for group 1 and 2 were 29.23+5.03 and 29.94+4.65 and that were changed to 8.86+2.69 and 12.42+2.06 respectively (Table.No.1).

The table.no.2 illustrates that in group 1 mean active shoulder flexion before treatment was 60.00+0.00 and after treatment it was 110.00+14.14. Mean active shoulder extension before treatment was 17.50+3.53 and after



treatment 30.00+0.00. Mean active shoulder abduction, external rotation and internal rotation before treatment were 60.00+0.00, 25.00+7.07 and 25.00+7.07 that changed to 120.00+14.14, 55.00+0.00 and 37.50+3.5 after 4 week treatment respectively. The table also illustrates that mean active elbow flexion and extension before treatment were 53.83+5.77 and 51.66+16.07 that changed to 96.66+5.77 and 16.66+2.88 after treatment. Active wrist flexion, extension, radial deviation and ulnar deviation before treatment were 23.33+6.05, 15.00+3.16, 6.33+2.16, 10.83+2.04 and after 4 week treatment changed to 48.33+9.30, 35.00+11.40, 11.16+2.04 and 20.16+2.56 respectively.

The table.no.2 also illustrates that in group 2 mean active shoulder flexion before treatment was 60.00+8.16 and after treatment it was 158.75+6.29. Mean active shoulder extension before treatment was 18.75+2.50 and after treatment 50.00+4.08. Mean active shoulder abduction, external rotation and internal rotation before treatment were 57.50+5.00, 26.25+7.50 and 25.00+5.77 that changed to 152.50+22.17, 61.25+11.81 and 65.00+10.00 after 4 week treatment respectively. The table illustrates that mean active elbow flexion and extension before treatment were 35.00+7.07 and 40.00+14.14 that changed to 120.00+60.00 and 10.00+0.00 after treatment. Active wrist flexion, extension, radial deviation and ulnar deviation before treatment were 25.00+7.07, 16.87+3.72, 6.75+2.25, 10.87+2.74 and after 4 week treatment changed to 65.62+4.95, 51.62+5.44, 14.62+2.25 and 26.12+2.90 respectively.

Table.No.1: Descriptive Analysis of VAS

	Group 1 (n=20)		Group 2 (n=20)	
	Baseline mean(SD)	After 4 weeks mean(SD)	Baseline mean(SD)	After 4 weeks mean(SD)
Pain Intensity (VAS)	7.04±1.46	1.71±0.56	6.68±1.25	2.63±0.76
Functional Status of Extremities (BFAS)	29.23±5.04	8.86±2.69	29.95±4.65	12.42±2.06

Table.2: Summary result for Range of motion for each study group

Range of Motion	Group 1 (n=20)		Group 2 (n=20)	
	Baseline Mean±SD	After 4 week Mean ±SD	Baseline Mean ±SD	After 4 week Mean ±SD
Shoulder flexion	60.00±0.00	110.00±14.14	60.00±8.16	158.75±6.29
Shoulder extension	17.50±3.53	30.00±0.00	18.75±2.50	50.00±4.08
Shoulder abduction	60.00±0.00	120.00±14.14	57.50±5.00	152.50±22.17
Shoulder external rotation	25.00±7.07	55.00±0.00	26.25±7.50	61.25±11.81
Shoulder internal rotation	25.00±7.07	37.50±3.54	25.00±5.77	65.00±10.00
Elbow flexion	53.83±5.77	96.66±5.77	35.00±7.07	120.00±60.00
Elbow extension	51.66±16.07	16.66±2.88	40.00±14.14	10.00±0.00
Wrist flexion	23.33±6.05	48.33±9.30	25.00±7.07	65.62±4.95
Wrist extension	15.00±3.16	35.00±11.40	16.87±3.72	51.62±5.44
Wrist radial deviation	6.33±2.16	11.16±2.04	6.75±2.25	14.62±2.25
Wrist ulnar deviation	10.83±2.04	20.16±2.56	10.87±2.74	26.12±2.90

DISCUSSION

The rationale of this study was to compare the effect of active range of motion along with stretching and active range of motion alone for the management of burn patients in reducing pain and improving functional status of involved region. This study included 40 patients with patient's age range from 10 year to 45 years. The study had 26 male and 14 females. 20 patients were included in group 1 who received active range of motion and stretching exercises and 20 patients were in group 2 who received only active range of motion exercises. Pre and Post pain intensity difference for group 1 and 2 were 5.33 and 4.05 which showed a significant decrease in patient reported pain scores in group 1 received both active range of motion and stretching as compared to group 2 that received active range of motion alone. The reduction in pain following stretching can be explained in terms of inhibitory effects of GTO (Golgi tendon organ) which causes a dampening effect on the motor neuronal discharges, thereby causing relaxation of musculotendinous unit by resetting its resting length. Combination of active range of motion and stretches might be more effective for producing viscoelastic change than active range of motion alone, because the greater forces could produce increased viscoelastic change and passive extensibility⁽¹¹⁾.

Burn functional assessment scale score for group 1 was 29.23±5.04 that changed to 8.86±2.69 and for group 2 was 29.95± 4.65 that changed to 12.42± 2.06. The mean difference of pre-post scores was 20.37 and 17.53 respectively which showed more improvement was occurred in group 1 than group 2. The mobility training cohort showed significantly



better performance in terms of shoulder range of motion and activities of daily living than the passive training cohort ⁽¹²⁾. The rehabilitative management of burns starts at the same day of injury and necessitate the multidisciplinary approach. So, a precise rehabilitation program is necessary to reduce after injury effects and enhance quality of life ⁽¹³⁾. As far as physiotherapy is concerned, the aim is to improve range of motion of surrounding joints and muscle strength. Pain is the basic complaint during physiotherapy, for this consideration of pain threshold and medication is used before the start of exercise ⁽¹⁴⁾.

AROM flexion, extension, abduction, external rotation, internal rotation of shoulder and elbow flexion, wrist flexion, wrist extension, wrist radial deviation and ulnar deviation were more increased for group 2 than group 1. But the difference in mean for both group ROMs We're very close. However, marked improvement occurred in both groups from baseline values. Stretching exercises with active range of motion exercises decreased the pain intensity, improved functional status and increased range of motion of affected limb as compared to active range of motion exercises alone for the treatment of burn patients. Difficulties were faced on receiving active participation under the age of 13 due to their non-co-ordination during follow up receiving muscular stretching exercises plus active range of motion exercises.

CONCLUSION

The results showed that active range of motion along with stretching exercises was more effective than the active range of motion exercises alone in reducing pain intensity, improving functional status and range of motion of involved limb for treatment of burn patients.

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