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Effect of Skin Rehabilitation Massage Therapy on Burned Patient' Outcomes

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Abstract:
As confirmed by over a decade of research, massage therapy's ability to support emotional and physical health offers great therapeutic benefits to burn survivors. The aim of the study was to assess the effect of skin rehabilitation massage therapy on burned patient; pruritis, pain and scar formation. The study was carried out in burn unit, Tanta Emergency Hospital affiliated to Tanta University. The sample consists of sixty partial or full thickness burn patients on arm, forearm, and hand, the study sample divided into two equal groups. Control group was treated according to the routine management of the hospital for burned patient and experimental group who is treated with skin rehabilitation massage therapy. Four tools were used for the purpose of the study. Tool one: Burned patient assessment questionnaire which consists of two parts: part one includes socio-demographic characteristics; part two includes burn assessment of the patient, Tool II Visual Analogue Pain Assessment Scale to assess the pain level of burned patient. Tool III: The 5-D Itch Assessment Scale to assess itching level of burned patient. Too lV: Manchester Scar Assessment Scale to assess the bun scar. Data were collected from end of September 2016 to the end of April 2017. The results revealed that level of pain, pruritis and scar formation has been improved significantly after application of skin massage rehabilitation therapy for the study group and there is a correlation between total burn scar level and level of pruritis of the control group in the first and third week of study period. Conclusion and recommendation explained that; skin rehabilitation massages therapy is an important component in burn recovery. In-service training programs should be conducted periodically for the nurses in burn unit to assess, improve and update their knowledge regarding skin rehabilitation massage therapy.
Key words: Skin rehabilitation massage therapy, patient' outcomes.

Introduction:

Unlike second degree burn, first degree burns, such as sunburn, usually heal within a few days, while second degree burn, which involves complete destruction of the outermost layer of the skin, the epidermis, and the upper layers of the dermis can take much longer to heal and often result in fibrous tissues formation and contractures, as well as hypertrophic scars [(1)].

Hand and arm involvement as a part of an overall burn injury is common worldwide. It is an indication for referral to a burn unit for care. The hand and arm ranks as one of the three most frequent sites of burn scar and consequently contracture deformity [(2)].Because of the anatomic and functional complexity of the hand and arm, topics concerning its burns can be broad and varied ranging from edema and pain control to outcome assessment which include; wound management, splints, massage, range of motion exercise, positioning, and scar control. Although the recognition that hand and arm burns are of great concern, this area of burn rehabilitation is no more advanced than any other anatomical area in terms of definitively improving patient outcomes. Overall, much clinical research is needed in the area of burn rehabilitation but this is especially true for hand and arm burns because they characterized by complex anatomy, functional importance, and frequency of being involved in a burn injury [(3)].

Even after minor burns and due to lack of daily physical activity and range of motion exercise, burn patients complain from pain, itching, decreased muscle strength reduced joint mobility, and formation of hypertrophic scars, as a common complication which usually develops after re-epithelialization. In addition, developed burn scars have a red to deep purple color and become more elevated, firm, hypersensitive, itchy, tender, tend to contract and affect range of motion[(4)].

Individuals with burn scars frequently experience moderate to severe itching. The incidence of pruritis is up to 87 % in adult burn patients. This itching may be caused by a number of factors which include; dryness of the burned area caused by damaged of the sweat glands, stiffness of the tissue, and scar formation which is a common symptom of the wound healing process[(5)].

On the other hand, pain is also associated with burn injury. It is potentially exacerbated by many factors as painful nature of the treatments and immobility caused by scar tissue, splints or pressure garment. As such, treatment and management of pain is often a very important component of a treatment plan. There is a wide range of research supporting the effectiveness of massage therapy in pain reduction and management [(6,7)].The

burn patient experiences a variety of pain syndromes due to the trauma sustained by the tissue and compensatory changes to surrounding structures [8, 9].

In addition, hypertrophic scar are a sequence of burn injury, it is a raised, thick red scars that are often painful and itchy. These types of scars can impair range of motion and elasticity of the surrounding tissues and it is a great concern for patients and a challenging problem for clinicians. Hypertrophic scars may cause significant functional and cosmetic impairment, pain, and pruritis that compromise the patients' quality of life. Post-burn hypertrophic scars typically appear on the trunk and extremities. In addition, scarring from burn injuries leads to many adverse consequences, including limitation of normal function and mobility, restriction of growth, altered appearance and adverse psychological effects. Scar management and burn therapy are broad terms that cover the aspects of therapy and include; exercise, splinting and positioning, range of motion exercise for the affected limb, skin rehabilitation massage therapy, compression garments, and scar softening lubricants [10-13].

Skin rehabilitation massage therapy of burned patient is an essential component of successful patient care. It is essential in burn recovery, and there is a great need to apply and research these strategies in more clinically relevant and cost-effective approach. Standards for administration of burn centers have largely centered on medical and nursing aspects of care. Despite the recognition of the importance of burn rehabilitation and massage therapy, a little information is published regarding the administration of these strategies [14].The contributions of occupational and physical therapists to burn research are underdeveloped. The majority of studies related to rehabilitation overall focus on pain management and psychological issues with a small percentage discussing physical rehabilitation and outcome. Subsequently, physiotherapy takes a crucial role in the treatment of burn patients and includes a variety of treatment methods such as; exercise therapy, cardiopulmonary training, joint mobilization, positioning, splinting and applying of topical scar softening cream [15].

Burn rehabilitation should be initiated within the first 24 hours of admission of a burn patient to; decrease patient's post-traumatic effects, improve functional independence, prevent or minimize burn complication and improve burn outcomes. Many of the complications previously described can be controlled with early and ongoing burn rehabilitation therapy[16].Moreover, recent research has concluded that burn rehabilitation massage therapy is a valuable therapeutic strategy and is very effective in improving pain, itching, and scar characteristics in hypertrophic scars after burninjury. In congruence with traditional medical treatment, burn rehabilitation massage therapy is an effective means of controlling the development of scar tissue and helping burned patientsto heal more quickly with full range of motion and less pain and itching. In addition, several studies have suggested that massage therapy can reduce burn-related pain, itching and anxiety both from the burn itself and during the healing of wounds [17].In burn units, the nurses play a vital and crucial role in; burn assessment, dressing change, health teaching, splinting, range of motion exercise, pain management, applying of moisturizing skin product, applying of pressure garment and skin massage therapy for the burned patient. Thus the present study aimed to assess the effect of skin rehabilitation message therapy on; pain, itching and scar formation of burned patients.

Material and Method

Design:

The study was a quasi-experimental research study.

Setting:

The study was conducted at Burn Unit, Tanta Emergency Hospital, affiliated to Tanta University, Gharbiya governorate, Arab Republic of Egypt.

Subjects:

Sample: A purposive sample of 60 adult patients with Partial or full thickness burns of arm, forearm and or hands was selected based on Epi. Info and the sample was divided randomly and alternatively into two equal groups; 30 patients each as follow. **Group I (Study group):** Received skin rehabilitation message therapy.

Group II (Control group): Received hospital routine of care for patients with partial or full thickness burns of arm, forearm and or hands.

Inclusion and exclusion criteria: Age between 18 – 60 years old**,** partial and or full thickness burns of arm, forearm and or hands of the one or two upper limb**,** no renal or liver disease, no skin allergies or urticaria, no vascular or hematologic abnormality, and no neurological impairment.

Tools: Four tools were used to collect data related to the study purpose as follow

Tool I: Burned patient assessment tool: It comprises two parts

Part I:Biosociodemographicwhich include; patient code, age, sex, marital status, educational level, occupation, residence, date of admission, past medical and surgical history.

Part II: Burn assessment to assess; degree, percentage, cause and site of burn.

Tool II: Visual Analogue Pain Assessment Scale [18]**:**
This tool used to assess the pain level of burned patient. It consists of a 10cm straight line and rating from 0-10. The line has verbal anchors at opposite ends where the number 0 indicates "no pain" and 10 "worst pain", while1-3 indicates "mild pain", 4-6 indicates "moderate pain", and 7-9 indicates "severe pain".
Tool III: The 5-D Itch Assessment Scale [19]:
This scale is a reliable, multidimensional measure scale of itching, it comprise 5 domains: duration, degree, direction, disability and distribution of itching.
The scores of each of the five domains are achieved separately and then summed together to obtain a total 5-D score. 5-D scores can potentially range between 5 (no pruritis) and 25 (most severe pruritis).Single-item domain scores (duration, degree and direction) are equal to the value indicated below the response choice (range 1–5). The disability domain includes four items that assess the impact of itching on daily activities: sleep, leisure/social activities, housework/errands and work/school. The score for the disability domain is achieved by taking the highest score on any of the four items. For the distribution domain, the number of affected body parts is tallied (potential sum 0–5) and the sum is sorted into five scoring bins: sum of 0–2 = score of 1, sum of 3–5 = score of 2, sum of 6–10 = score of 3, sum of 11–13 = score of 4, and sum of 14–16 = score of 5. Some modification has been done in the distribution domain to fit with the burn of arm, forearm and hand.
Tool IV: Manchester Scar Assessment Scale [20]:
The Manchester Scar Scale was introduced by Beau et. al, in 1998. The scale has five parameters for the evaluation of the scar: color, skin texture, contour, distortion, and texture giving a score of 1 to 4 for all the parameters except for skin texture that is represented by score 1 or 2 and a Visual Analogue Scale (VAS) for scar assessment that describes the overall cosmetic appearance of the scars from excellent to poor, giving a score from 0 to 10. Scores from the 2 evaluations (five parameters plus VAS) are added together to give an overall score for the scar; the score range is from a minimum value of 5 for the best clinical scar to 28 representing clinically worse scar.

Method

1. An official Permission to carry out the study was obtained from the responsible authorities.
2. Patient's written consent to participate in the study was obtained.
3. Patient's confidentiality was ascertained.
4. Tool I was developed after review of literature. Tool II, III, and IV were adapted with some modification after reviewing of expertise and related literatures.
5. Content validity: All tools were tested for content validity by 6 experts in the field of medical-surgical and critical care nursing, Faculty of Nursing, and accordingly some modifications were done
6. Reliability: All tools were tested for reliability and Cronbach alpha was used based on standardized items and it was 0.761, 0.837, and 0.824 respectively for tool II, III&IV.
7. A pilot study was carried out on 5 burned patients in order to test the clarity, feasibility and applicability of the different items of the determinant tools and accordingly; some modifications were done and those patients were excluded from the study.
8. Data was collected from the end of September 2016 to the end of April 2017.
9. Phases of the actual study: The present study was conducted on four phases.

I. Assessment phase: In the first day of admission; initial assessment was carried out by the researchers for all study subjects in both control and study groups to assess the patients who met the inclusive criteria of the study. Assessment was carried out using tool I, II, III&IV to collect baseline data.
II. Planning Phase: This phase was formulated based on assessment phase and literature review. Priorities and expected outcome criteria were put when planning of patient care which included: decrease level of pain, improve itching and scar formation.
III. Implementation phase: Group I (Study group): In this phase skin rehabilitation message therapy was implemented by the researchers to all participants involved in the study group, the duration of massage session was 15 minutes daily for three weeks and include: Applying of soothing refresher to cleanse the skin, using of cleansing oil to the affected skin, skin rehabilitation massage therapy using light stroking and message followed by acupressure on unscarred part of the arm, forearm and hand using a fingers and a soothing skin cream, Using of closed dressing method with soothing lotion or cream, and using of pressure garment on the affected part. Patient who was discharged before three weeks was instructed to perform rehabilitation message therapy by his/her family member, demonstration of rehabilitation massage therapy was done by the researcher and re-demonstration by family member to ensure the correct way of the implementation. **Group II (Control group):** received routine hospital care for patients with burn injury which include; application of Dermazeine cream and closed dressing method for hand, arm and forearm, application of Helerium cream to enhance slough is case of

escar formation and Betadine antiseptic solution and open dressing method to enhance dryness once healing process starts.

IV. Evaluation phase: Evaluation was done for both groups four times; first day upon admission as baseline data, at the end of first, second and third week using tool II, III, and IV Comparison was done between both groups to determine effect of skin message rehabilitation therapy on pain, itching and scar formation of burned area.

Statistical analysis: The collected data were organized, tabulated and statistically analyzed using SPSS software statistical computer package version 13. For qualitative data, comparison between two groups was done using Chi-square test (X^2). For comparison between means of two groups of parametric data; Student t-test was used and paired t-test was used for comparing means of one group before and after intervention. Correlation between variables was evaluated using Pearson's correlation coefficient. Significance was adopted at $p<0.05$ for interpretation of results of tests of significance [21, 22].

Result

Table 1 revealed that third of control and study group (33.3%) were in age group of 18 to<30 years and 30-<40 with a range of (19-53) and (19-55) for control and study group respectively. In relation to sex; it was found that equal proportion (40.0%) of control and study group were female and the highest proportion of both control and study group 60% and 66.7% respectively were married. Concerned to occupation and residence; equal proportion (40.0%) and (60.0%) of control and study group have manual work and lives in rural areas respectively.

Table 2presentedthatless than two third and equal proportions (60%) of control and study group have partial and full thickness burn respectively, while about three fourth of control group (73.3%) and less than half (46.7%) of study group have 20-<30%of burn of total body surface area with a range of (18-35) and (15-34)for control and study group respectively, as regards to the cause of burn; hot fluid was the main cause of control and study group with an equal proportion 53.3% followed by fire 46.7% and 33.3% for study and control group respectively. Site of burn was recorded by burned patient in the right hand and right forearm by majority of both control and study group (80%), while left forearm and right fingers was recorded by all (100%) of control group and same percent (73.3%) in the right and left fingers in the study group.

Table 3 presented distribution of pain Visual Analogue Scale of the studied groups throughout periods of study. It is illustrated that one third of control group 33.3% had moderate level of pain in the 1st day and 1st week, while two third of them 66.7% had worse pain in the same period of time and more than half 53.3 and more than fourth 26.7 of them experienced worth pain in the 2nd and 3rd week respectively.

For study group, majority of them 93.3% had worse pain in the first day and only small percent 13.3 and 6.7% and none of them had worse pain in the 1st, 2nd and 3rd week respectively after application of the skin rehabilitation massage therapy and majority of them 80% and 86.7% have no pain at all on the 2nd and 3rd week respectively, there was significant difference in the control and study group regarding pain experience throughout periods of study where P = 0.002 and 0.00 respectively where pain level has been decreased dramatically for the study group after application the skin rehabilitation message therapy.

Table 4 demonstrated mean scores of the 5D itch assessment scale items of the studied groups throughout periods of study. It showed that the mean score of itching duration ranged from (1-5) in the first day to (2-5) in the 3rd week for the control group compared to (2-5) in the first day which has been decreased to (1-4) in the 3rdweekfor the study group after application of the skin rehabilitation massage therapy and there was a highly statistically significant difference in the study group regarding itching duration throughout periods of study where P = 0.00

For degree of itching; mean score ranged from (2-4) to (1-4) in the 1st day and 3rd week respectively for control group compared to (1-5) to (1-4) in the first day and 3rd week respectively for the study group after application of the skin rehabilitation massage therapy and there was a highly statistically significant difference in the study group regarding degree of itching throughout periods of study where P = 0.00.

Regarding to direction of itching it was noticed that the mean score ranged from (2-5),(2-5),(2-4) and (1-4) in the 1st day, 1st, 2nd, and 3rd week respectively for the control group compared to (2-4),(2-4),(1-4) and (1-4)) in the same period of time for the study group after application of the skin rehabilitation massage therapy and there was significant difference in the control and study group regarding direction of itching throughout periods of study where P = 0.046 and 0.00 respectively.

Related to disability as an impact of itching on daily activities, the mean score ranged from (2-6) in the 1st day to (1-6) in the 3rd week for the control group compared to (3-5) in the first day to (2-5) in the 3rd week for the study group after application of the skin rehabilitation massage therapy and there was a highly statistically significant difference seen among the study group regarding itching disability throughout periods of study where P = 0.00.

As for distribution of itching; the mean score ranged from(2-5),(3-5),(2-5) and (2-5) in the 1st day, 1st, 2nd, and 3rd week respectively for the control group compared to (4-5),(3-4),(1-4) and (1-4)) for the study group in the same

period of time and after application of the skin rehabilitation massage therapy and there was significant difference in the study group regarding distribution of itching throughout periods of study where P = 0.00.

Table 5 showed distribution of the total 5D itch level of the studied groups throughout periods of study. It showed that sever pruritis was reported by more than one third 40% and more than fourth 26.7% with a mean of 11-25 and 12-22 for control group in the 1st day and first week respectively compared to more than fourth 26.7 and small percent 6.7% with a mean of 17-21 and 15-21 for study group in the same period of time. On the other hand; mild pruritis was reported by less than half 46.7% and two third 66.7% of the study group with a mean of 11-17 and 9-16 in the 2nd and 3rd week respectively after application of the skin rehabilitation massage therapy compared to small and equal percent 13.3. % with a mean of 11-21 and 9-19 of control group in the same period of time, also there was an intergroup significant difference in both control and study group regarding distribution of the total 5D itch level throughout periods of study where P = 0.02 and 0.00 respectively.

Table 6 illustrated mean scores of Manchester scar assessment scale of the studied groups throughout periods of study; it can be noticed that; the mean score for Visual Analogue Scale for scar assessment of the control group ranged from (5-8) and (4-7) in the 1st and 3rd week respectively compared to(4-8) and (0-3) in the same period of time after application of the skin rehabilitation massage therapy and there an intergroup significant difference in both control and study group regarding Visual Analogue Scale for scar assessment throughout periods of study where P = 0.026 and 0.00 respectively.

For Manchester scar assessment scale items; the mean score for skin color ranged from (2-4) in the 1st day, 1st, and 2nd week of control group compared to (1-4), (2-4) and (2-3) in the same period of time with no significant difference in both groups.

Regarding skin texture; mean score for both groups ranged from (1-2) throughout periods of study with intergroup significant difference in both groups where P = 0.025 and 0.00 for control and study group respectively.

As regard skin contour; mean score of control group ranged from (1-2) which increased to (2-4)in the 1st day and 1st week respectively compared to equal value (1-4) in the same period of time for study group with significant difference in control group where P = 0.00

For skin distortion, mean score of control group ranged from (1-3)in the 1st day which increased to (2-4) in the 1st, 2nd, and 3rd week compared to (1-3),(2-3),(2-3), and (1-4) in the same period of time for study group with significant difference in control group where P = 0.00.

Related to skin texture; mean score of control group ranged from (2-3)in the 1st day which increased to equal value of (2-4)in the 1st, 2nd, and 3rd week compared to (2-4),(2-4),(2-4) and (1-4) throughout periods of study for study group with significant difference in study group where P = 0.024.

Table 7 presented total scar level of the studied groups throughout periods of the study. It showed that all study group 100% hade mild scar level on the third week while; majority of control group86.7% had moderate scar level in the period of time. On the other hand; same percent 93.3% of control and study group had moderate and mild scar respectively in the 2nd week of the study period and after application of the skin rehabilitation massage therapy for the study group and there was an intergroup significant difference in both control and study group regarding total scar level throughout periods of study where P = 0.009 and 0.00 respectively.

Table 8 proved that; in the first day of burn injury one third (33.3%) of control group comparing to near half (46.7%) of study group with moderate pruritis have moderate burn scar level, in addition during the third week, majority of patient in control group (80%) compared to third (33.3%) of study group who have moderate pruritis have moderate and mild burn scar level respectively. There was significant difference between total 5 D itch and total burn scar score level of control group in the first day where P = 0.03.

Table 9 presents that; there was a correlation between total 5 D itch level and total burn scar level in the 1st day and 3rd week for the control group with a significant difference where P= 0.031and0.001whereas there was no significant difference between total 5 D itch level and total burn scar level in the 1st day and 3rd week for the study group where P= 0.094and0.698 respectively.

Table (1): Distribution of the studied patients according to their Socio-demographic data

Characteristics	The studied patients (n=60)			
	Control group (n=30)		Study group (n=30)	
	N	%	N	%
Age (in years)				
▪ 18< 30 years	10	33.3	14	46.7
▪ 30-< 40 years	14	46.7	10	33.3
▪ 40-< 50 years	2	6.7	2	6.7
▪ ≥ 50 years	4	13.3	4	13.3
Range	(19-53)		(19-55)	
Mean ± SD	32.27±10.41		32.13±11.12	
Sex				
▪ Female	12	40.0	12	40.0
▪ Male	18	60.0	18	60.0
Marital status				
▪ Married	18	60.0	20	66.7
▪ Divorced	6	20.0	0	0.0
▪ Single	6	20.0	10	33.3
Occupation				
▪ Not working	12	40.0	10	33.3
▪ Manual work	12	40.0	12	40.0
▪ Employee	6	20.0	8	26.7
Residence				
▪ Rural	18	60.0	18	60.0
▪ Urban	12	40.0	12	40.0

Table (2): Distribution of the studied groups regarding burn history

Burn history	The studied patients (n=60)			
	Control group (n=30)		Study group (n=30)	
	N	%	N	%
1-Type of burn				
▪ Partial sickness	18	60.0	12	40.0
▪ Full sickness	12	40.0	18	60.0
2-Percentage of burn (%)				
▪ < 20 %	6	20.0	8	26.7
▪ 20-< 30 %	22	73.3	14	46.7
▪ ≥ 30 %	2	6.7	8	26.7
Range	(18-35)		(15-34)	
Mean ± SD	23.00±4.52		23.80±6.08	
3-Cause of burn				
▪ Fire	10	33.3	14	46.7
▪ Hot fluid	16	53.3	16	53.3
▪ Electricity	2	6.7	0	0.0
▪ Chemicals	2	6.7	0	0.0
Site of burn:				
▪ Right hand	24	80.0	24	80.0
▪ Left hand	22	73.3	26	86.7
▪ Right arm Present	24	80.0	26	86.7
▪ Left arm	22	73.3	26	86.7
▪ Right forearm	24	80.0	24	80.0
▪ Left forearm	30	100.0	26	86.7
▪ Right fingers	30	100.0	22	73.3
▪ Left fingers	24	80.0	22	73.3

Table (3): Distribution of the pain Visual Analogue Scale (VAS) of the studied groups throughout periods of study

Pain level	Control group (n=30)								χ^2 P	Study group (n=30)								χ^2 P
	1st day		1st week		2nd week		3rd week			1st day		1st week		2nd week		3rd week		
	N	%	N	%	N	%	N	%		N	%	N	%	N	%	N	%	
▪ No pain (0-3)	0	0.0	0	0.0	0	0.0	4	13.3	**21.39 0.002 ***	0	0.0	1	33.3	2	80.0	2	86.7	**109.65 0.00***
▪ Moderate (4-6)	1	33.3	1	33.3	1	46.7	1	60.0		2	6.7	0	53.3	4	13.3	6	13.3	
▪ Worse (7-10)	2	66.7	2	66.7	4	53.3	8	26.7		8	93.3	4	13.3	2	6.7	0	0.0	

* Significant at level P < 0.05.

Table (4): Mean scores of the 5D itch assessment scale items of the studied groups throughout periods of study

5D itch scale sub items	Range / Mean ± SD									
	Control group (n=30)				F P	Study group (n=30)				F P
	1st day	1st week	2nd week	3rd week		1st day	1st week	2nd week	3rd week	
1. Duration	(1-5) 3.40±1.04	(2-5) 3.53±0.73	(2-4) 3.40±0.72	(2-5) 3.33±0.96	0.277 0.842	(2-5) 3.53±0.97	(2-4) 3.07±0.94	(1-4) 2.40±1.10	(1-4) 2.13±1.17	**10.99 0.00***
2. Degree	(2-4) 3.40±0.72	(2-4) 3.20±0.76	(2-4) 3.13±0.73	(1-4) 3.00±0.83	1.433 0.237	(1-5) 3.20±0.85	(1-5) 2.73±1.08	(1-4) 2.13±0.73	(1-4) 1.80±0.76	**15.54 0.00***
3. Direction	(2-5) 3.53±1.11	(2-5) 3.27±0.94	(2-4) 3.07±0.79	(1-4) 2.87±0.90	**2.749 0.046***	(2-4) 3.33±0.71	(2-4) 3.40±0.72	(1-4) 2.47±0.73	(1-4) 2.40±0.81	**15.74 0.00***
4. Disability	(2-6) 3.93±1.55	(2-5) 3.60±0.97	(2-5) 3.47±0.97	(1-6) 3.33±1.32	1.317 0.272	(3-5) 4.40±0.62	(4-5) 4.13±0.35	(3-5) 3.53±0.63	(2-5) 3.27±0.87	**19.87 0.00***
5. Distribution	(2-5) 4.07±0.94	(3-5) 3.87±0.73	(2-5) 3.87±0.90	(2-5) 3.53±0.82	2.019 0.115	(4-5) 4.53±0.51	(3-5) 3.93±0.79	(1-4) 2.93±0.79	(1-4) 2.40±1.04	**43.29 0.00***

Table (5): Distribution of the total 5D itch level of the studied groups throughout periods of study

Total 5D itch level	The studied patients (n=60)																
	Control group (n=30)								χ^2 P	Study group (n=30)								χ^2 P
	1st day		1st week		2nd week		3rd week			1st day		1st week		2nd week		3rd week		
	N	%	N	%	N	%	N	%		N	%	N	%	N	%	N	%	
▪ Mild pruritis (6-12)	4	13.3	2	6.7	4	13.3	4	13.3	**21.40 0.002***	0	0.0	0	0.0	14	46.7	20	66.7	**62.79 0.00***
▪ Moderate pruritis (13-19)	14	46.7	20	66.7	24	80.0	26	86.7		22	73.3	28	93.3	16	53.3	10	33.3	
▪ Severe pruritis (20-26)	12	40.0	8	26.7	2	6.7	0	0.0		8	26.7	2	6.7	0	0.0	0	0.0	
Range Mean ± SD	(11-25) 18.33±3.82		(12-22) 17.47±2.57		(11-21) 16.93±2.59		(9-19) 16.07±3.10		**F=2.90 P=0.04***	(17-21) 19.00±1.17		(15-21) 17.27±1.60		(11-17) 13.47±1.89		(9-16) 12.00±2.29		**99.68 0.00***

* Significant at level P < 0.05.

Table (6): Mean scores of Manchester scar assessment scale of the studied groups throughout periods of study.

Burn scar assessment	The studied patients (n=60)									
	Range Mean ± SD									
	Control group (n=30)				F P	Study group (n=30)				F P
	1st day	1st week	2nd week	3rd week		1st day	1st week	2nd week	3rd week	
1. VAS assessment	(5-8) 6.53±1.38	(5-8) 6.53±1.38	(4-8) 6.27±1.36	(4-7) 5.60±1.28	**3.186 0.026***	(4-8) 6.20±1.58	(3-6) 4.13±1.11	(2-4) 3.07±0.79	(0-3) 1.80±0.85	**82.18 0.00***
2. Manchester scale										
▪ Color	(2-4) 3.07±0.69	(2-4) 3.20±0.66	(2-4) 3.27±0.79	(1-4) 2.93±1.08	0.97 0.409	(1-4) 2.80±1.06	(2-4) 2.53±0.73	(2-3) 2.47±0.51	(2-3) 2.33±0.48	2.15 0.098
▪ Skin texture	(1-2) 1.40±0.50	(1-2) 1.47±0.51	(1-2) 1.67±0.48	(1-2) 1.73±0.45	**3.222 0.025***	(1-2) 1.60±0.50	(1-2) 1.93±0.25	(1-2) 1.33±0.48	(1-2) 1.20±0.41	**17.76 0.00***
▪ Contour	(1-2) 1.47±0.51	(2-3) 2.13±0.35	(2-3) 2.60±0.50	(2-4) 3.27±0.94	**45.58 0.00***	(1-4) 2.27±0.79	(1-4) 2.53±0.90	(1-4) 2.33±0.88	(1-4) 2.27±1.08	0.57 0.638
▪ Distortion	(1-3) 2.00±0.37	(2-4) 2.27±0.58	(2-4) 2.73±0.58	(2-4) 3.07±0.87	**17.27 0.00***	(1-3) 2.13±0.51	(2-3) 2.40±0.50	(2-3) 2.47±0.51	(1-4) 2.27±0.94	1.58 0.197
▪ Texture	(2-3) 2.40±0.50	(2-4) 2.53±0.63	(2-4) 2.80±0.85	(2-4) 2.73±0.87	1.912 0.131	(2-4) 2.87±0.63	(2-4) 2.47±0.63	(2-4) 2.47±0.73	(1-4) 2.33±0.80	**3.25 0.024***

* Significant at level P

Table (7): Distribution of the total burn scar level of the studied groups throughout periods of study

Total burn scar level	The studied patients (n=60)																	
	Control group (n=30)								χ^2 P	Study group (n=30)								χ^2 P
	1st day		1st week		2nd week		3rd week			1st day		1st week		2nd week		3rd week		
	N	%	N	%	N	%	N	%		N	%	N	%	N	%	N	%	
▪ Mild scar (6-16) ▪ Moderate scar (17-27)	12 18	40.0 60.0	6 24	20.0 80.0	2 28	6.7 93.3	4 26	13.3 86.7	**11.667 0.009***	8 22	26.7 73.3	18 12	60.0 40.0	28 2	93.3 6.7	30 0	100.0 0.0	**48.89 0.00***
Range Mean ± SD	(13-20) 16.87±2.10		(15-22) 18.13±1.99		(15-23) 19.33±1.95		(15-22) 19.33±2.12		**F=9.97 P=0.00***	(15-22) 17.87±1.89		(14-19) 16.00±1.49		(11-17) 14.13±1.81		(9-15) 12.20±2.04		**F=53.81 P=0.00***

* Significant at level P < 0.05.

Table (8): Comparison between total burn scar level and total 5D itch level among the studied groups on the 1st day and 3rd week of study period

Total 5D itch level	Total burn scar level									
	Control group (n=30)				χ^2 P	Study group (n=30)				χ^2 P
	Mild scar		Moderate scar			Mild scar		Moderate scar		
	N	%	N	%		N	%	N	%	
1st day										
Mild pruritis	4	13.3	0	0.0	**6.98 0.03***	0	0.0	0	0.0	FE 0.055
Moderate pruritis	4	13.3	10	33.3		8	26.7	14	46.7	
Severe pruritis	4	13.3	8	26.7		0	0.0	8	26.7	
3rd week										-
Mild pruritis	2	6.7	2	6.7	FE 0.075	20	66.7	0	0.0	
Moderate pruritis	2	6.7	24	80.0		10	33.3	0	0.0	

* Significant at level P < 0.05.

Table (9):Correlation between total burn scar level and total 5D itch level among the studied groups on 1st dayand 3rd week of study.

Total 5D itch level	Total burn scar level			
	Control group		Study group	
	r	P	r	P
1st day	**0.393**	**0.031***	**0.311**	**0.094**
3rd week	**0.584**	**0.001***	**-0.074**	**0.698**

* Significant at level P < 0.05.

Discussion:

In addition to routine medical treatment of burn, skin rehabilitation massage therapy is an effective means to control the development of scar tissue and heal more quickly with full range of motion and less itching and pain level.

The age of studied groups ranged from 19-55 years old which is contradicted with **Cho Y et.al, 2014**[23] who stated that the mean age of the studied group ranged from 33 - 51 years old and **Richard R** [24] who reported participants averaged 17.7 years and **Yoon S et.al, (2014)** [25] who state that the mean age of the studied group was 46.06 years.

Regarding pain; the present study proved that there was a high significant difference of the study group after application of skin message rehabilitation therapy whereas the pain level has been decreased throughout the study period; more over the study revealed that there was a significant difference of all sub items of 5 D itch scale sores and the total level pruritis of the study group after application of the skin message rehabilitation therapy throughout the study period, this result is congruent with **Field et.al, 2000**[26] who found immediate

significant reduction of itching, pain, anxiety, and mood after massage therapy which is confirmed after 5 weeks compared to standard medical care and reported greater immediate and long-term improvements in pruritis and pain in the 10 subjects who received massage therapy for 5 weeks than the 10 subjects who only received standard therapy.

Also the result was supported by **Roh YS et.al, 2007**[27] who compared 18 subjects of study group who received massage therapy and 17 subjects of control group who receive standard therapy for 3 months and reported that the massage-therapy group showed greater improvements in pruritis, visual scar scale score, and depression and added that there was a significant reduction of pruritis and improvement of visual analog scale after the massage therapy, and furthermore; **Choet.al, 2014**[23]showed significant improvements in pain and itching in the massage group compared to the standard therapy group. The reduction of pain and pruritis could be supported by the gate control theory of **Melzack et.al, 1967**[28].

In relation to scar formation; the result of the present study illustrated that the scores of both VAS of scar assessment and the parameter of scar evaluation was decreased significantly in the study group after application of the skin message rehabilitation therapy which is confirmed with **Shin T et.al, 2012**[29] who reported that there was a potential positive results of massage therapy on burn scars as the improvement of pliability due to the mechanical disruption of fibrotic scar tissue, The meta-analysis by **Anzarut A et.al, 2009**[30]reported a decrease in scar thickness in the pressure therapy group compared to the control group, **Anthonissen M et.al, 2016**[31]stated that pressure using garment or compression therapy improves scar thickness and probably decreases scar redness and massage therapy could have a positive effect on scar pliability, pain and pruritis also, and added that the use of moisturizers creams and lotions are effective treatments of scar tissue and could have an effect on itching.

In addition, **Anna Ket.al, (2004)** [32]supports the present finding and emphasizes the effectiveness of massage intervention on scar tissue characteristics, the treatment of burn related itching and pain, and prevention of soft tissue dysfunction of compensatory structures and recommended the importance of integration of massage therapy into burn rehabilitation. Also; the results of the present study were agreed by **Yoon S et.al, (2014)** [25]who found in a randomized, controlled study comprised 146 patients with burn injury that burn rehabilitation massage therapy is effective in improving pain, itching and scar formation and added that; among patients who receive massage therapy a significant decrease in scar thickness and improvements in skin elasticity, each session lasts 30-minutes after applying moisturizing cream to improved pain, pruritis, and scar formation.

These results may be explained by the fact that the reflex therapy triggers the stimulation of the afferent peripheral nerves to the central nervous system which induce muscle relaxation, a decrease in pain level, and an overall sense of well-being. In addition, the mechanical effects of the massage therapy cause an improvement in venous return and lymphatic drainage and subsequently decrease edema formation. Further, massage therapy stimulates movement between muscle fibers, subsequently more fluid muscle movement[33].On contrast of the result of the present study, **Patino O et.al, (1999)** [34]didn't prove effects of massage therapy on the vascularity, pliability, and height of the hypertrophic scar, although there were a decrease in pruritis in some patients of the study group patients.

Skin rehabilitation massage therapy takes a crucial role in acute treatment and rehabilitation process of burn patients and it has a positive result on scar formation, pain level, itching and pruritis. In three studies using combined pressure and silicone therapy, all showed improvements in different items of scar surface over time [35-37].

Conclusion

Burn rehabilitation massage therapy can be one of the modality for controlling post-burn pain, pruritis and scar characteristics. Based on the findings of the present study, it can be concluded that; Skin rehabilitation massages therapy is an important component in burn recovery, early application of skin massages therapy to burned patient is an effective nursing strategy in improving patient's outcomes, it is easy, cost effective and non-invasive procedure which helped in; decrease level of pain, itching and improve scar formation and characteristics.

Recommendations

The present study recommended:

- Skin rehabilitation massage therapy for burned patients as it proves its effect on pain, pruritis, and scar formation of burn injury.
- In-service training programs should be conducted periodically for the nurses in burn unit to improve and update their knowledge regarding skin rehabilitation massage therapy which should be used as a routine nursing intervention for all burned patients.

Further study is recommended in the following aspects:

- Optimal timing of noninvasive methods of scar management is needed to determine impact on burn scarring.
- Comparative studies of different therapeutic modalities in well-designed protocols.
- Use of both subjective scar assessment scales and objective scar assessment tools to evaluate scar characteristics.
- The effects of physical activity and range of motion exercise on burn outcomes
- Establish a standard protocol for burn scar massage therapy on the basis of the long-term therapeutic effects and evolution of hypertrophic scars.

References:

1. Dobbs E, Curreri P. Burns: analysis of results of physical therapy in 681 patients. J Trauma 1992; 12:242–8.
2. Kraemer M, Jones T, Deitch E. Burn contractures: incidence, predisposing factors, and results of surgical therapy. J Burn Care Rehabil 1988; 9:261–5.
3. Schneider J, Holavanahalli R, Helm P, O'Neil C, Goldstein R, Kowalske K. Contractures in burn injury part 2: investigating joints of the hand. J Burn Care Res 2008; 29:606–13.
4. Van den E, Stappaerts K, Fieuws S, Laperre J, Massage P, Flour M, et al.The assessment of erythema and thickness on burn related scars during pressure garment therapy as a preventive measure for hypertrophic scarring. Burns 2005; 31: 696–702.
5. Field, T., Peck, M., Hernandez-Reif, M., Krugman, S., Burman, I., Ozment-Schenck, L. "Post burn Itching, Pain and Psychological Symptoms Are Reduced With Massage Therapy." Journal of Burn Care and Rehabilitation. May/June 2000; 21(3); 189-193.
6. Keith, J., "Pain management in burned patients." Pain Reviews Oct 1998 5(3).
7. Moyer, C. "Massage Therapy: Meta-Analytic Evidence for a Contextual Model" Pscyhological Bulletin. 2004. 130:3-18.
8. Bock O, Schmid G, Malewski P, Mrowietz U. Quality of life of patients with keloid and hypertrophic scarring. Arch Dermatol Res 2006; 297(10):433–8.
9. Atkinson J, McKenna K, Barnett A, McGrath D, Rudd M. A randomized, controlled trial to determine the efficacy of paper tape in preventing hypertrophic scar formation in surgical incisions that traverse Langer's skin tension lines. Plast Reconstr Surg 2005; 116(6):1648–56 [discussion 1657–8].
10. Allchin J, Baldwin J, Ball S et al. Physiotherapy and Occupational Therapy Clinical Practice Guidelines, Agency for Clinical Innovation July 2014 E info@aci.nsw.gov.auwww.aci.health.nsw.gov.au
11. Van N, Bremer M, Faber A, Middel koop E, Nieuwenhuis M. Itching following burns: epidemiology and predictors. Br J Dermatol 2008; 158(1):95–100.
12. Emad T. Role of Massage on the Management of Hypertrophic Scar: Review. International Journal of Multidisciplinary and Current Research. ISSN: 2321-3124.March/April 2017 issue.
13. Richard M, William S, Forbes L, Tanja H et al. Burn Rehabilitation and Research: Proceedings of a Consensus Summit. Journal of Burn Care & Research July/August 2009-PP 543-573
14. Richard R, Hedman T, Quick C, et al. A clarion to recommit and reaffirm burn rehabilitation. J Burn Care Res 2008; 29:425 -32.
15. Mieke b, Daniel c, Thaı J, Eric K. The effects of conservative treatments on burn scars: A systematic review. Science Direct, 2015JBUR-4818; No. of Pages 11
16. Merilyn L. Moore, PT, William S, et al. Rehabilitation of the Burned Hand. HandClin 25 (2009) 529–541doi:10.1016/j.hcl.2009.
17. Kwan M, Kennis W. Splinting Programme for patients with Burnt Hand. Hand Surg. 2002; 7:231–41. [PubMed]
18. Gelinas C, Fillion L, Puntillo K, Viens C and Fortier M. Validation of the critical care pain observation tool in adult patients, American journal of Critical Care, 2006; 15(4): 420-27.
19. Elman S, Hynan L, Gabriel V, Mayo M. The 5-D itch scale: a new measure of pruritis. Br J Dermatol. March 2010; 162(3) : 587-593.
20. Beau H, Floyd K, Dunn K, Orton C, Ferguso M, "new quantitative scale for clinical scar assessment," Plastic and Reconstructive Surgery, vol. 102, no. 6, pp. 1954–1961, 1998.
21. Dawson B and Trapp R G. Basic and Clinical Biostatistics. Lange Medical Book/ McGraw-Hill, Medical Publishing Division. 3rd ed, USA.2001. 161,218.
22. Petrie A and Sabin C. Medical Statistics at a Glance. 2nd ed., Blackwell Publishing, 2005.

23. Cho YS, Jeon H, Hong A, Yang T, Yim H, et. al, The effect of burn rehabilitation massages therapy on hypertrophic scar after burn: a randomized controlled trial. Burns 2014;1–8.
24. Richard R, Baryza M. Burn Rehabilitation and Research: Proceedings of a Consensus Summit. J Burn Care Res 2009; 30:543–573.
25. Yoon S, Jong J,Aram H ,Hyeong T The effect of burn rehabilitation massage therapy on hypertrophic scar after burn: A randomized controlled trial Burns 2014 DOI: http://dx.doi.org/10.1016/j.burns.2014.02.005.
26. Field T, Peck M, Hernandez-Reif M, Krugman S, Burman I, Ozment L. Post burn itching, pain, and psychological symptoms are reduced with massage therapy. J Burn Care Rehabil 2000; 21:189–93.
27. Roh Y, Cho H, Oh J, Yoon C. Effects of skin rehabilitation massage therapy on pruritis, skin status, and depression in burn survivors. J Korean Acad Nurs 2007; 37:221–6.
28. Melzack R, Wall P. Pain mechanism: a new theory. Surv Anesthesiol 1967; 11:89–90.
29. Shin T, Bordeaux JS. The role of massage in scar management. Dermatol Surg 2012; 38:414–23. [27]. Melzack R, Wall P. Pain mechanism: a new theory. Surv Anesthesiol 1967; 11:89–90.
30. Anzarut A, Olson J, Singh P, Rowe H, Tredget E. The effectiveness of pressure garment therapy for the prevention of abnormal scarring after burn injury: a meta analysis. J Plast Recontr Surg 2009;62:77–84.
31. Anthonissen M, et al. The effects of conservative treatments on burn scars: A systematic review. Burns (2016), http://dx.doi.org/10.1016/j.burns.2015.12.006.
32. Anna K, Kimberly B, Gladman B. Burn Rehabilitation November 30, 2004. https://www.massagetherapycanada.com/technique/burn rehabilitation-1411.
33. Br J Dermatol. Author manuscript; available in PMC 2011 Mar 1. Published in final edited form as: Br J Dermatol. 2010 Mar; 162(3): 587–593. Published online 2009 Dec 1. doi: 10.1111/j.1365-2133.2009.09586.x
34. Patino O., Novick C., Merlo A. & Benaim F. Massage in hypertrophic scars. The Journal of burn care & rehabilitation 20, 268–71; discussion 267 (1999).
35. Steinstraesser L, Flak E, Witte B, Ring A, Tilkorn D, Hauser J, et al. Pressure garment therapy alone and in combination with silicone for the prevention of hypertrophic scarring: randomized controlled trial with intra individual comparison. Plast Reconstr Surg 2011; 128:306–13.
36. Li-Tsang C, Zheng Y, Lau J. A randomized clinical trial to study the effect of silicone gel dressing and pressure therapy on posttraumatic hypertrophic scars. J Burn Care Res 2010; 31:448–57.
37. Harte D, Gordon J, Shaw M, Stinson M, Porter A. The use of pressure and silicone in hypertrophic scar management in burns patients: a pilot randomized controlled trial. J Burn Care Res 2009; 30:632–42.