

Effect of Relaxation Breathing Technique among Patients with Moderate Burn on Their Pain and Anxiety at Wound Care

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Abstract: This study aimed to assess the effect of relaxation breathing technique on pain and anxiety level at wound dressing change for patients with moderate burn injuries. It followed a quasi-experimental, pretest-posttest comparison groups design with randomly assignment into two groups' study (20) and control groups (20). The study was conducted in the Burn hospital in Tripoli city at Libya. Tool 1 a structured questionnaire assessment including: Burn injury parameter, subjective expressed pain, self rating scale of pain and self Evaluation Questionnaire (Trait-State Anxiety Inventory). Tool 2 include two parts, part I Physical signs associated with pain record include blood pressure, heart rate and respiratory rate. Part II reflecting Behavioral Pain Assessment Scale (RBPAS). Assessment pain intensity and reflecting pain behavior scale exhibited by study and control groups before relaxation breathing technique and during wound care and lasted during relaxation breathing technique for three consecutive days during wound care. Vital signs was carried out three times before, during and after wound care and prior relaxation breathing technique lasted before, during and after dressing and relaxation breathing technique. Anxiety level scale was utilized once prior the relaxation breathing technique at wound care and lasted post relaxation breathing technique and wound care on three consecutive days of assessment. Result the pain intensity, anxiety level and reflecting pain behavior decreased significantly during wound care post relaxation breathing technique but they still had severe pain with moderately level of anxiety. Also, there was significant difference between study group who received both pharmacological treatment and relaxation breathing technique and those who received pharmacological treatment only as regard respiration and blood pressure, pre, during and post wound care. Recommendation however, this study recommended with evidence base guidelines toward effect of complementary therapy intervention during wound care using visualization, distraction, relaxation, exercises and imagery on pain and stress level among patients with severe burn injury.

Key words: Relaxation breathing technique • Moderate burn • Pain and Anxiety

INTRODUCTION

Pain is defined as a sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage [1]. It is known that patients with wounds can experience nociceptive pain (A persistent ache) as a result of tissue damage and neuroceptive pain (A stinging or stabbing pain) as a result of nerve damage [2]. Burn pain involves several components that cause the patient to experience

severe and prolonged pain. It is known that patients with partial-thickness burns are very painful, with deeper burns causing more damage to nerve endings that cause excruciating pain when in contact with air currents. In full-thickness burns pain is usually not felt on the surface of the skin, but painful edges surround the injury where viable pain receptors at the margins of the wound are hypersensitive to pain which causing deep muscle or ischemic pain [3]. Moderate burn injury is defined as partial thickness burns between 15-25% in ages between

10- 50 years, partial thickness burns between 10-20% in ages below 10 years or above 50 years and full thickness burns between 2-10% [4].

However, burn patient with severe pain has continuous background pain experienced alongside intense pain during wound treatment procedures as well as it made worse by movements e.g. Changing position, turning in bed, breathing or walking. These procedures include dressing changes, wound cleansing and physiotherapy sessions [5]. Often patients with burns must endure or more painful procedures daily, for weeks or months, comprising wound cleansing, debridement, dressing changes, surgical operations and physical and occupational therapies [6, 7]. The pain experienced during wound care procedures has often been reported to be excruciating. Moreover, pain management during wound care procedures is a critical part of treatment in acute burn injuries [7].

Patient-centered assessments are important during the wound care process as they can provide sensitive and effective management of wound pain [8]. Non-verbal cues, such as guarding the wound area, grimacing and restricted movement, should be noted, particularly if the patient is not able to provide a description of the pain [9]. Similarly, patients can also display behavioral signs of stress, which wound care professionals should acknowledge during the wound care process. In some cases, it may be necessary to gather information and a history from other sources, such as the primary caregiver. Wound care professionals should acknowledge individual patient behaviors (Both verbal and non-verbal) as this can indicate signs of pain and stress [10]. It is now recognized that pain is complex and is influenced by many factors including emotions, social background, the meaning of the pain to patients, together with their beliefs, attitudes and expectations [11].

However, stress and anxiety are thought to be interlinked with pain, with anxiety increasing due to the anticipation of pain and the experience of anxiety also intensifying the perception of pain [12, 13]. This is cyclical in that the intense pain often leads to anxiety in anticipation of upcoming pain, such as that experienced with dressing change. Due to the amplification of pain, by anxiety and stress levels, for patients with burns, it is important that treatment methods simultaneously target both the physical and psychological aspects of burn injuries [14]. However, it must be noted that many medical professionals are aware of the psychological impacts of wounds upon patients [15]. Prior experiences of pain will also affect patients, for example, a patient who has

previously experienced pain on dressing change will anticipate the pain each time a dressing is changed and will become anxious and tense, resulting in an increase in pain experienced [15]. So, time invested before dressing removal is time well spent and talking to patients about how much pain they can expect, together with an explanation of measures that are in place to minimize their pain will help to reduce feelings of fear and anxiety.

Patients who feel more pain than expected from a procedure may become less confident about the nurse treating them and be more anxious about future dressing changes [16]. Anxiety is thought to generate an autonomic response such as muscle tension and an increase in heart rate and blood pressure, while focusing on the pain, past experience and the meaning of the pain all contribute to the level of pain a patient experiences [17]. Burn care nurses are confronted daily with the phenomenon of pain. They find themselves in a paradoxical position because they are often the cause of pain during wound care procedures as they remove bandages, clean and debride the wound area, yet at the same time they are also the providers of pain relief [5].

The current state of pain management is not satisfactory to nurses working in burn care and research into pain management is a high priority [18]. In addition, nurses can independently implement many non pharmacological interventions. As pharmacological intervention falls primarily within the realm of medical decision-making. Rather, we examine the use of non-pharmacological interventions because Kiplagat[19] reported that patients experience pain in spite of the use of medication.

When non-pharmacological methods are used in combination with pharmacological interventions, a positive effect on pain relief can be seen [20, 21]. In important considerations when selecting a non-pharmacological intervention for patients with burns are: simplicity, easy to learn, immediate usability and minimal expenditure of time and effort during use. Patients with burns are often too tired and ill to take the time and exert the discipline to learn complex techniques [22].

Bell and McCarthy [23] has suggested some simple measures that can be used for reducing anxiety and pain during painful dressing procedures. These measures include relaxation techniques, distraction, guided imagery, hypnosis and therapeutic touch. A simple breathing relaxation technique is a simplest behavioral intervention to manage pain and anxiety, because it involves no risk, is easy and quick to learn, equipment does not need to be purchased and it can be employed immediately by the

often exhausted and ill patient [24]. However, the information about the effects of relaxation breathing technique on pain and anxiety levels for burn patients during dressing changes is limited. Muscle tension in burned parts of the body can further increase pain during wound care. In other words, even a simple technique such as progressive muscle relaxation can be inappropriate for patients with burns. More benefit for these patients with burns is expected from the use of breathing techniques in order to gain control over their pain [25].

Pain management should include pain assessment before, during and after at dressing change to ensure that the patient's pain is managed effectively. Such ongoing assessment will allow the nurses to identify any triggers that can be modified or avoided to reduce pain [26]. However this study aimed to explore an effectiveness of relaxation breathing technique strategy on self rating pain score, patients' behavior and level of anxiety as well as physiological changes including respiration, heart rate and blood pressure.

Significant of the Study: Most wound care procedures for example cleaning, dressing and physiotherapy are very painful hence severe pain may increase risk of developing anxiety and minimize patient's participation in burn rehabilitation hence increasing hospital stay and morbidity [27]. There are limited studies conducted in Africa and especially in Egypt on pain management during wound care procedures and the effect of relaxation breathing technique for decreasing pain experience in patients with burn has not been investigated before.

Previous study as regarding effect of relaxation on pain among burn patients at wound dressing change had been developed by Alaa Eldin and Gaber [28] at Alexandria University Hospital.

These are just a few background have to search about strategies to reduce pain during dressing changes. However, we retrieve this study which aimed to determine the effectiveness of non-pharmacological strategies of relaxation breathing technique on pain experience and anxiety level at wound dressing change for patients with moderate burn injuries at Burns Hospital in Libya.

Aim of the Study: The objective of the study was to assess the effectiveness of non pharmacological strategies of relaxation breathing technique on pain experience and anxiety level at wound dressing change for patients with moderate burn injuries at Burns Hospital in Libya.

Hypothesis: Patients with moderately burn practice relaxation breathing technique will exhibit less mean pain scores than other.

- Patients with moderately burn will exhibit less mean anxiety score than others
- Mean score of physiological parameters for patients with moderately burn before relaxation breathing technique during wound care will exhibit higher than after relaxation technique.

MATERIALS AND METHODS

Research Design: This study followed a quasi-experimental study.

Setting: The study was conducted in the Burns hospital in Tripoli city at Libya. It has a capacity of 210 beds. The hospital wards are divided into 6 free wards (Three ward for male and three for female). Each ward has three rooms and one room for critical condition. Additionally, there are three private wards has a capacity 60 beds. Total number of bed side nurse was 80.

Sample: A total of 40 patients with recent moderate burn were recruited by a convenience sequential sampling approach. They were assigned randomly into 2 equal groups. Group I experimental group patients [20] were given pharmacological analgesic medications to reduce pain and encouraged to do relaxation breathing technique and assessed them by the researcher. Group II control group patients [20] were given standard pharmacological analgesic medications only as ordered.

Inclusion Criteria:

- Adults and conscious patients with recent moderate burn injuries and post 48 hours of injury.
- Both groups have on pharmacological medicine as prescribed by the doctors.
- No associated diseases (Diabetes, hypertension, renal and heart diseases).
- No previous history of burn injury.

Tools: The tools of the study were including the following:

Tool 1: a Structured Questionnaire Assessment: The researcher was administered a structured questionnaire to study participants and was comprised of four parts of assessment:

Part I-Socio demographic Characteristics: It comprised all the following: Age, sex occupation; level of education and life style in smoking.

Part II- Burn Injury Parameter: It included the following: source of fire, depth of burn and site of burn.

Part III- Subjective Expressed Pain: It comprised initial pain assessment and was modified by the researcher; it included: Incident of pain site, factors increase or reduce the pain as well as pain during wound care.

Part IV: Self rating Assessment Scale of Pain: According the International Association for the Study of Pain, IASP [29] numerical rating scale was used for subjects to express by themselves their pain experience where 0 is having no pain, 1-3(Mild pain), 4-6 (Moderate pain) and 7-10(Severe pain). It was utilized assessment for patients before and during burn wound care and relaxation breathing technique as a base line data. The scale aims to determine effectiveness of relaxation breathing technique on pain intensity during dressing change for 3 consecutive days.

Part V: Self- Evaluation Questionnaire: Anxiety was measured by the 20-items state version of the Spielberger Trait-State Anxiety Inventory [30]. Each question is answered on a 4 point rating scale with end points (From 1 to 4) labeled with opposite extreme responses (Such as “Not at all” at all versus a great ” “Not at all” versus “ Very much so”. Score 1 was allocated to the items response choice "Not at all", indicating greater level of anxiety. Score 4 was allocated to the items response choice "Very much so", indicating greater level of anxiety and vice versa. The total score of this instrument was 80. Scores < 40 was patients with low anxiety-levels, high anxiety patients had higher scores > 60. It was utilized assessment for patients before and immediate post burn wound care and relaxation breathing technique as a base line data. The scale aimed to determine effectiveness of relaxation breathing technique on anxiety of pain related wound dressing change for 3 consecutive days of assessment immediate post wound care and relaxation breathing technique.

Tool 2: Observational Assessment

Part I: Physical Signs Associated with Pain Record: The vital Signs (VS.) were recorded before and during and after wound dressing and before relaxation technique as a baseline pretest data, as well as before, during and post wound dressing and relaxation breathing technique as a

post test for 3 consecutive days. It aimed to assess potential clinical manifestations of pain related wound dressing change. It includes respiratory rate, heart rate and blood pressure.

Part II: Reflecting Behavioral Pain Assessment Scale (RBPAS): This tool was derived from study by Erdek and Pronovost [31], observe behavior that reflects the experience of pain at wound dressing change and mark appropriate number for each category. This scale consists of 5 main target behaviors namely: Face, Restlessness, Muscle tone, Vocalization and Consol ability changes. Each of which contributes equally to the total score, estimate its variable from zero to 2 for each category mentioned above, hence a range of possible scores from 0 to 10 scores. The pain assessment behavioral score column Zero=no evidence of pain Mild=1-3.Moderate=4-5. Severe pain = >6. Behavioral pain assessment scale was used by researcher utilize observation technique before and during wound care before relaxation breathing technique as a baseline pretest data, in addition to before and during wound care and practicing relaxation breathing technique for three consecutive days.

Tool 3: Relaxation Breathing Technique Program: This program was developed by Miller *et al.* [32] for the purpose of reducing the pain, it includes:

- Psychological preparation was done by explaining the purpose and effects of relaxation techniques and its importance upon body muscles,
- Physical preparation was done by assist the patient:
- Finding a quiet space where the patients won't be interrupted for at least 15 minutes.
- Sitting or lie down for relaxation - it's preferable to have your spine straight and supported by the bed back
- Assume patients' legs uncrossed, extended, so they can feel the flow of energy
- Measuring vital signs using tool 2 part I pre relaxation breathing technique
- Relaxation breathing techniques was started which include a simple breathing relaxation technique.

Procedure: Sit comfortably with your back straight and take a few minutes to relax. Put one hand on your chest and the other on your stomach. Breathe in through your nose. Focus on the feeling of the breath, the movement of your chest, rib cage, shoulders and the expansion of your lungs. Exhale through your mouth, pushing out as much

air as you can while contracting your abdominal muscles and move in as you exhale. Continue to breathe in through your nose and out through your mouth. Count slowly as you exhale and stay in this relaxed state for a moment, breathing deeply and slowly [32].

Method:

- A written approval was obtained from the Manger of Burn Hospital.
- The study tools were developed based on thorough review of literature and researches in this field (Tool 1: part I, II and III and tool 2: part I)
- The informed consent was taken from patients who are eligible for the criteria after explanation of the study purpose.
- Content validity of the tools (I, II, III and V) was done through jury of 10 experts in this field. The recommended changes were carried out and the tool 1 (V) was adapted according the culture and translated into Arabic.
- Test-retest of reliability for tool1 (V) was done by cronbach's alpha 0.80.
- A pilot study was carried out on 10 patients selected randomly to ensure the clarity of the questionnaire tool1 (I, II, III& V). Modifications were done based on the findings.
- The time spent for collecting the data were three months from October, 2014 to February, 2015.

Data Collection: It was carried out by the researcher in three phases:

Assessment and Planning Pretest Phase:

- Assessment technique was employed to assess pain experience and behavior scale exhibited for both study and control groups before the practice of relaxation technique and during wound care and lasted during relaxation breathing technique for three consecutive days.
- Physiologic assessment (Pulse, respiratory and blood pressure) was carried out three times for each patient before, during and after wound care and relaxation breathing technique for pre and post test.
- Anxiety level scale was utilized once prior the relaxation breathing technique and wound care and lasted at three consecutive days of assessment post practice.

Implementation Phase: Three sessions were done for assessing pain intensity, reactive behavior scale of pain, physiological parameters as well as level of anxiety and implementing simple relaxation technique with slow breathing exercise using interview schedule and touching communication.

Evaluation Posttest Phase: This tool was aimed to evaluate the effect of relaxation breathing techniques on pain intensity at wound care. Three consecutive days for evaluating and ascertaining changes of pain scores (Tool 1 part IV), reflecting of pain (Tool 2 part II), physiological changes (Tool 2 parts I) and anxiety level (Tool 1 part V) post relaxation breathing technique.

Statistical Analysis: The EPI INFO statistical program was utilized for data presentation and statistical analysis of the results and correlation between variables. The statistical measures used were experimental measures included were number, percentage, arithmetic mean, standard deviation and statistical tests used were Paired t-test, Chi square test, ANOVA test and Pearson coefficient. The level of significance selected was P value equal to or less 0.05.

RESULTS

Table 1 Shows distribution of the study and control groups according to their Sociodemographic characteristics and burn injury parameter. It showed that around half of patients in the study group were from 18- 30 years while it was the same range for nearly one third patients in the control group (MCp = 0.639). Approximately more than half of the studied sample of study group and more than two thirds of control groups were male (p value = 0.330). Regarding their educational level, the study group showed that more than one third were in university level, on the contrary in the control group, which they were illiterate1 (p= 0.549). In relation to their occupation, approximately more than one third of study group had no work but the control group were workers (MCp =0.292). Concerning their incidence of burn injury, the result reveals that three quarters of study subjects and around two thirds of control subjects had partial thickness of burn (p =0.295). On the other hand, they have compound site such as arm, both arm and trunk and thigh for both study and control group (p= 1.000, 0.549 and 0.501), respectively.

Table 2 Illustrates Subjective Expressed Pain among patients with moderately burn injury at wound care for study and control group.

It revealed that half of the study group feel pain directly on the wound and surrounding it, but around two thirds of control group were feel pain only directly on the wound ($P=0.368$). Burning sensation was the most description of pain for both study and control groups, ($F_{ep}=0.644$), it was caused by dressing change which made pain worse in the majority of the study and all subjects in the control group ($F_{ep}=0.489$).

As regard to steps of removing dressing, applying dressing and according dressing type were increase the pain for both study and control group. ($P=0.666$ and 0.942) respectively. Concerning, the factors reducing pain experience, two third of the study group reported that nothing reduces their pain intensity during dressing but around one third of them it reduces by medicine but still in the severe range, vise versa all the control subjects went to reduce their pain by medications.

Table 3 Exploring a significant differences between study and control group of the pain self rating scale and comparing between pretest as a baseline and posttest on consecutive three days. Regarding pain self rating scale, it revealed that all the subjects of both study and control groups had significant differences between pre and during wound care and before practicing relaxation breathing technique as a baseline data ($p < 0.001$). Regarding to an effect of relaxation breathing technique in posttest, the mean scores of pain self rating scale had high significant difference between pre and posttest of the study group during wound care ($p < 0.001^*$) but, they still had severe pain with mean score (7.45 ± 0.89).

Table 4 Show significant differences of the reflecting pain behavior scale between study and control groups and comparing between pretest as a baseline and posttest on consecutive three days. It revealed that, there was a significantly difference between pre and during wound care for both study and control groups in reflecting pain behavior in pretest ($P < 0.001$). As a result of relaxation breathing technique, the results showed a significant decrease in total reflecting pain behavior score between pre and post test on 1st 2nd and 3rd, assessment, respectively ($P < 0.001^*$) only in relation to facial Grimaces, Consol ability and Restlessness ($P=0.005$, <0.001 , and <0.001) respectively. Vise versa in control group, no significant change between pre and post test ($P=0.163$) respectively.

Table 5 represented the significant differences between study and control groups regarding vital signs and comparing between pretest as a baseline and posttest on consecutive three days pre, during and post wound care and relaxation breathing technique. Findings revealed that the mean difference between the study and control groups was almost similar before the beginning practicing relaxation breathing technique (Baseline data) in relation to all the follow up parameters namely: respiration, HR, SBP and DBP (p value = <0.001) respectively. There was statistical significant difference between study and control group as regard SBP and DBP and respiration rate ($P=0.012$, 0.003 and 0.011), respectively. Also, a significant improvement between pre, during and post relaxation breathing technique and during wound care was found among study group in respiration, heart rate and blood pressure (p value = <0.001) respectively.

Table 6 Illustrates a total mean score of the burn patients' anxiety pre and posttest assessment after relaxation breathing technique during wound care. The results revealed that, there was a significant difference between anxiety scores in pre and post relaxation breathing technique and wound care through three consecutive days of assessment at ($P < 0.001$), respectively. On 3rd assessment post relaxation the table showed that the study group's total mean score was 41-60 but all subjects in control group were still in severe anxiety > 60 with significant differences between study and control group at ($P < 0.001$)

Table 7 Shows the relation between the pain self rating scale, total of reflecting pain behavior scores, physiological changes and anxiety among patients with moderate burn injury at wound care. This table illustrates a highly significant correlation between the Pain self rating assessment and respiratory and total reflecting pain behavior scores of the patients with moderate burn injury post relaxation breathing technique and at wound care ($P < 0.001^{**}$). Also it revealed that significant positive correlation was observed between pain intensity by pain self rating assessment and heart rate and anxiety. ($P=0.002^*$ and 0.01^*), respectively.

Table 8 represents the mean scores of the study group's pain self rating scale, vital signs, reflecting pain behavior scale and anxiety pre and post relaxation breathing technique according to their level of education. It revealed that there was significant difference between systolic and diastolic blood pressure of subject of the study group with their levels of education at mean scores

Table 1: Frequency distribution of the study and control groups according to sociodemographic data and burn injury parameter

Variables	Study group (n=20)		Control group (n=20)		Test of Sig.	p
	No.	%	No.	%		
Age						
>18 – 30	9	45	7	35	$\chi^2=1.172$	MCp= 0.639
>30 – 40	8	40	7	35		
>40 – 50	3	15	6	30		
Sex						
Male	11	55	14	70	$\chi^2=0.949$	0.330
Female	9	45	6	30		
Level of education						
Illiterate	4	20	9	45	$\chi^2=3.303$	MCp= 0.549
Primary and Preparatory	3	15	3	15		
Secondary	5	25	3	15		
University	8	40	5	25		
Occupation						
Worker	3	15	9	45	$\chi^2=4.939$	MCp= 0.292
Teacher	3	15	2	10		
Employee	5	25	3	15		
Commercial	1	5.0	2	10		
No work	8	40	4	20		
Smoking						
Yes	11	55	7	35	$\chi^2=1.437$	0.231
No	9	45	13	65		
Source of fire						
Stove	13	65	11	55	$\chi^2=3.083$	MCp= 0.616
Electricity	1	5.0	0.	0.00		
Scald	3	15	5	25		
Fire wood	3	15	4	20		
Severity of burn						
Partial %	15	75.0	12	60	$\chi^2=1.097$	0.295
Full %	5	25.0	8	40		
Mean ± SD.	12.25 ± 3.44		10.24 ± 4.55		t=1.529	0.135
Site of burn *						
Arm	5	25	6	30	$\chi^2=0.091$	FEp=1.000
Trunk	3	15	2	10	$\chi^2=0.082$	FEp=1.000
Both	9	45	6	30	$\chi^2=0.359$	0.549
Face(head)	2	10	4	20	$\chi^2=1.209$	FEp=0.459
Lower(Thigh)	8	40	5	25	$\chi^2=0.452$	0.501
Chest	3	15	2	10	$\chi^2=0.082$	FEp=1.000
Trunk-Lower	2	10	0	0.0	$\chi^2=1.797$	FEp=0.489
Lower (Legs)	4	20	3	15	$\chi^2=0.033$	FEp=1.000

χ^2 , p: χ^2 and p values for Chi square test for comparing between the two groups

t, p: t and p values for Student t-test for comparing between the two groups

MC: Monte Carlo for Chi square test FE: Fisher Exact for Chi square test

*The participants may select more than one choice

Table 2: Comparison between the studied and control group according to subjects expressed pain among patients with moderately burn at wound care .

Variables	Study group (n=20)		Control group (n=20)		χ^2	p
	No.	%	No.	%		
Site of pain						
Directly on the wound	10	50.0	12.00	60	0.810	0.368
feel it in the surrounding area	0.00	0.00	0.00	0.0		
Both	10	50.0	8.00	40		
Describe the pain *						
Throbbing	5	25.0	7	35	0.466	0.495
Burring	18	90.0	16	80	0.460	^{FE} p=0.644
Stretching	3	15.0	4	20	0.436	^{FE} p=0.680
Tingling	9	45.0	12	60	2.451	0.117
Factors increase pain*						
Touch pressure	10	50.0	14	70	1.616	0.204
Change positions	2	10.0	3	15	0.460	^{FE} p=0.644
Movements out of the bed	1	5.0	1	5.00	0.014	^{FE} p=1.000
Dressing changes	18	90.0	20	100	1.797	^{FE} p=0.489
Night time	3	15.0	0	0.0	2.775	^{FE} p=0.234
Increase pain according steps of wound care*:						
Removing dressing	8	40.0	9	45	0.187	0.666
Applying dressing	8	40.0	9	45	0.187	0.666
Dressing type	8	40.0	8	40	0.005	0.942
Cleansing	1	5.0	0	0.00	0.874	^{FE} p=1.000
Touch	6	30.0	7	35	2.056	^{FE} p=0.251
Factors decrease pain*						
Pain relieving medicine	8	35.0	20	100	-	-
Bathing	0	00.0	0	0.0	2.775	^{FE} p=0.234
Dressing	0	0.0	0	0.0	-	-
nothing	12	65.0	0	0.0	0.874	^{FE} p=1.000

χ^2 , p: χ^2 and p values for Chi square test for comparing between the two groups

MC: Monte Carlo for Chi square test

FE: Fisher Exact for Chi square test

*The participants may select more than one choice

Table 3: Comparing the pain self rating scale between the study group and control group pre and post relaxation breathing technique and at wound care on three consecutive days

	Study group (n=20)										Control group (n=20)										P ₁	P ₂	P ₃
	Pretest					Posttest					Pretest					Posttest							
	Before		During			1 st ass.		2 nd ass.		3 rd ass.	Before		During			1 st ass.		2 nd ass.		3 rd ass.			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%			
Pain assessment scale																							
0-3 mild	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	-	^{FE} p=0.489	^{FE} p=0.234
4-6 moderate	8	35.0	0	0.0	0	0.0	2	10.0	3	15.0	6	30	0	0.	0	0.	0	0.0	0	0.0			
7-10 severe	12	65.0	20	100	20	100	18	90.0	17	85.0	14	70	20	100	20	100	20	100	20	100			
Mean ± SD	6.25±	8.90±	8.25±	7.90±	7.45±	6.88±	8.35±	8.41±	8.71±	8.71±	0.89	1.02	0.79	1.07	0.89	1.05	0.93	1.0	0.99	0.99	0.586	0.024*	<0.001*
Sig. before			<0.001*			<0.001*		0.049*		0.494			<0.001*			<0.001*		<0.001*					
Sig. during			<0.001*			<0.001*		<0.001*					0.332			0.009*		0.009*					

Sig. bet. grps was done using Chi square test or student t test Sig. bet. Periods was done using Paired t-test

Sig. before: p value for comparing between pain rating score before wound care and at wound care (pretest) as a baseline data

Sig. during: p value for comparing between pain rating score pre and post relaxation and at wound care

P₁: p value for comparing between study and control in 1st ass. P₂: p value for comparing between study and control in 2nd ass.

P₃: p value for comparing between study and control in 3rd ass. *: Statistically significant at p = 0.05

Table 4: Comparison between the study and control groups according to total reflecting pain behavior scale (RPBS) pre and post relaxation breathing technique and at wound care.

	Study group (n=20)					Control group (n=20)					P ₁	P ₂	P ₃
	Pretest		Posttest			Pretest		Posttest					
	Before	During	1 st ass.	2 nd ass.	3 rd ass.	Before	During	1 st ass.	2 nd ass.	3 rd ass.			
RPBS	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD			
Face	1.45 ± 0.51	1.85 ± 0.37	1.50 ± 0.51	1.30 ± 0.47	1.10 ± 0.31	1.35 ± 0.49	1.94 ± 0.24	1.82 ± .39	1.88 ± 0.33	1.82 ± 0.39	0.037*	<0.001*	<0.001*
Sig. before		0.008*	0.666	0.186	0.005*		<0.001*	0.007*	0.003*	0.002*			
Sig. during			0.005*	<0.001*	<0.001*			0.163	0.332	0.163			
Restless	1.60 ± 0.50	1.80 ± 0.41	1.70 ± 0.47	1.65 ± 0.49	1.45 ± 0.51	1.47 ± 0.51	1.59 ± 0.51	1.65 ± 0.49	1.65 ± 0.49	1.71 ± 0.47	0.740	0.986	0.124
Sig. before		0.042*	0.330	0.716	0.186		0.332	0.188	0.083	0.041*			
Sig. during			0.163	0.186	0.005*			0.579	0.579	0.163			
Muscle tone	1.30 ± 0.47	1.70 ± 0.47	1.60 ± 0.50	1.50 ± 0.51	1.45 ± 0.51	1.53 ± 0.51	1.76 ± 0.44	1.71 ± 0.47	1.82 ± 0.39	1.82 ± 0.39	0.515	0.037*	0.017*
Sig. before		0.017*	0.055	0.214	0.419		0.104	0.269	0.056	0.056			
Sig. during			0.330	0.042*	0.056			0.332	0.332	0.332			
Vocalization	1.50 ± 0.51	1.65 ± 0.49	1.50 ± 0.51	1.35 ± 0.49	1.45 ± 0.51	1.35 ± 0.49	1.65 ± 0.49	1.65 ± 0.49	1.59 ± 0.51	1.59 ± 0.51	0.382	0.156	0.416
Sig. before		0.267	1.000	0.419	0.789		0.020*	0.020*	0.163	0.104			
Sig. during			0.186	0.010*	0.104			1.000	0.668	0.579			
Consolability	1.60 ± 0.50	1.80 ± 0.41	1.55 ± 0.51	1.40 ± 0.50	1.25 ± 0.51	1.59 ± 0.51	1.82 ± 0.39	1.88 ± 0.33	1.94 ± 0.24	1.94 ± 0.24	0.023*	<0.001*	0.001*
Sig. before		0.042*	0.772	0.258	0.419		0.041*	0.020*	0.009*	0.009*			
Sig. during			0.096	0.017*	0.049*			0.579	0.163	0.163			
Total behavior	7.45 ± 0.89	8.80 ± 0.89	7.85 ± 0.93	7.20 ± 0.95	6.90 ± 0.91	7.29 ± 0.77	8.76 ± 0.97	8.71 ± 0.92	8.88 ± 0.93	8.88 ± 0.93	0.008*	<0.001*	<0.001*
Sig. before		<0.001*	0.088	0.309	0.030*		<0.001*	<0.001*	<0.001*	<0.001*			
Sig. during			<0.001*	<0.001*	<0.001*			0.750	0.163	0.163			

Sig. bet. grps was done using Chi square test or student t test Sig. bet. Periods was done using Paired t-test

Sig. before: p value for comparing between pain behavior before wound care and at wound care (pretest) as a baseline data

Sig. during: p value for comparing between pain behavior pre and post relaxation and at wound care

P₁: p value for comparing between study and control G. in 1st ass. P₂: p value for comparing between study and control G. in 2nd ass.

P₃: p value for comparing between study and control G. in 3rd ass. *: Statistically significant at p = 0.05

Table 5: Comparison between the studied and control groups according to vital signs, pre, during and post relaxation breathing technique and wound care

Variables	Study group (n=20)						Control group (n=20)						P ₁	P ₂	P ₃	P ₄
	Pretest		Posttest				Pretest		Posttest							
	Before	During	Post	Pre	During	Post	Before	During	Post	Pre	During	Post				
Respiratory	20.15±1.04	31.65±1.93	26.90±13.0	19.97±0.60	30.05±1.72	21.02±1.43	20.29±1.26	29.94±2.2	22.94±1.25	20.78±0.98	31.61±1.78	23.75±0.92	0.221	0.004*	0.011*	<0.001*
Sig. before		<0.001*	0.035*	0.371	<0.001*	0.014*		<0.001*	<0.001*	0.014*	<0.001*	<0.001*				
Sig. during			0.132	<0.001*	<0.001*	<0.001*			<0.001*	<0.001*	0.001*	<0.001*				
Heart rate	81.10±2.07	97.05±3.02	87.95±4.07	80.80±1.01	95.07±2.16	81.70±1.92	79.76±4.76	94.71±3.57	85.65±2.83	76.47±12.0	96.59±2.49	83.78±10.4	0.037*	0.159	0.054	0.387
Sig. before		<0.001*	<0.001*	0.550	<0.001*	0.322		<0.001*	<0.001*	0.212	<0.001*	0.125				
Sig. during			<0.001*	<0.001*	0.007*	<0.001*			<0.001*	<0.001*	0.017*	<0.001*				
Systolic Bp.	108.0±11.2	126.25±9.4	126.3±6.86	112.08±7.8	121.83±6.7	114.0±5.93	107.3±11.0	124.5±10.6	122.1±7.08	110.6±7.6	127.94±7.3	125.0±4.68	0.077	0.587	0.012*	<0.001*
Sig. before		<0.001*	<0.001*	0.005*	<0.001*	0.004*		<0.001*	<0.001*	0.058	<0.001*	<0.001*				
Sig. during			1.000	<0.001*	0.001*	<0.001*			0.070	<0.001*	0.006*	0.773				
Diastolic Bp.	71.50±7.96	84.75±4.72	84.50±3.59	74.67±5.23	82.50±3.84	77.33±4.24	72.94±6.63	84.41±4.29	83.53±4.60	75.29±4.61	85.69±2.05	83.14±2.49	0.476	0.704	0.003*	<0.001*
Sig. before		<0.001*	<0.001*	0.002*	<0.001*	0.001*		<0.001*	<0.001*	0.088	<0.001*	<0.001*				
Sig. during			0.772	<0.001*	0.029*	<0.001*			0.188	<0.001*	0.103	0.288				

Sig. bet. grps was done using Chi square test or student t test Sig. bet. Periods was done using Paired t-test

Sig. before: p value for comparing vital signs in pretest between before, during and after wound care and pre relaxation

Sig. during: p value for comparing between pretest during wound care and posttest, before, during and post wound care and relaxation

P₁: p value for comparing between study and control in 1st ass. P₂: p value for comparing between study and control in 2nd ass.

P₃: p value for comparing between study and control in 3rd ass. P₄: p value for comparing between study and control in 3rd ass.

*: Statistically significant at p = 0.05

0.024 and 0.036, respectively, post relaxation. But there had no significant difference between all levels of education of the study group and respiration and heart rate, post relaxation at (0.506 and 0.651 and 0.823). Concerning to pain rating scale, (P= 0.775

and 0.538), anxiety (P=0.299 and 0.814) and behavior (P=0.971 and 0.562) there were insignificant difference with the study group of subjects' levels of education in both pre and post relaxation, respectively.

Table 6: Comparison between the study and control groups according to anxiety level pre and post relaxation breathing technique and immediate post wound care

Variables	Study group (n=20)								Control group (n=20)								P ₁	P ₂	P ₃
	Pretest				Posttest				Pretest				Posttest						
	Pre		1 st ass.		2 nd ass.		3 rd ass.		Pre		1 st ass.		2 nd ass.		3 rd ass.				
No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%				
Anxiety																			
≤40 mild	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	¹⁵ p=0.002*	<0.001*	<0.001*
41 - 60 moderate	2	10.0	9	45	11	55	15	75	0	0.0	0	0.0	0	0.0	0	0.0			
>60 severe	18	90	11	55	9	45	5	25	20	100	20	100	20	100	20	100			
Mean± SD	66.70± 3.73		62.85± 5.67		60.10± 5.93		55.25± 7.78		69.24± 2.14		69.18± 2.53		69.06± 2.73		69.59± 3.32		<0.001*	<0.001*	<0.001*
Sig. before	0.003*				<0.001*				<0.001*				0.878				0.699	0.593	

Sig. bet. grps was done using Chi square test or student t test Sig. bet. Periods was done using Paired t-test

Sig. before: p value for comparing between pre and post relaxation and wound care with each other periods in each group

P₁: p value for comparing between study and control in 1st ass. P₃: p value for comparing between study and control in 3rd ass.

P₂: p value for comparing between study and control in 2nd ass. *: Statistically significant at p = 0.05

Table 7: Relation between the pain self rating scale, total of reflecting pain behavior scores, physiological changes and anxiety among patients with moderate burn injury at wound care

Variables	Vital signs												Total reflecting pain behavior scale
	Pain self rating		Respiratory		HR		Systolic		Diastolic		r	p	
	r	p	r	p	r	p	r	p	r	p			
Respiratory													
Pretest	0.116	0.493											
Posttest	0.705**	<0.001**											
HR													
Pretest	0.616**	<0.001**	0.108	0.525									
Posttest	0.492*	0.002*	0.317	0.056									
Systolic													
Pretest	-0.066	0.699	-0.119	0.484	0.030	0.861							
Posttest	0.164	0.333	0.278	0.096	-0.038	0.822							
Diastolic													
Pretest	-0.110	0.516	-0.234	0.164	-0.097	0.569	0.833**	<0.001**					
Posttest	0.289	0.083	0.400*	0.014*	-0.019	0.909	0.828**	<0.001**					
Total reflecting pain behavior scale													
Pretest	0.667**	<0.001**	-0.035	0.837	0.388	0.040*	-0.094	0.579	-0.109	0.521			
Posttest	0.723**	<0.001**	0.617**	<0.001**	0.180	0.286	0.291	0.080	0.488*	0.005*			
Anxiety													
Pretest	0.246	0.142	-0.150	0.375	-0.018	0.914	-0.177	0.295	-0.172	0.309	0.152		0.370
Posttest	0.409*	0.012*	0.558**	<0.001**	-0.012	0.943	0.186	0.271	0.208	0.216	0.627**		<0.001**

r: Pearson coefficient *: Statistically significant at p = 0.05

** : Statistically significant at p = 0.01

Table 8: The mean scores of the study group's pain self rating scale, vital signs, reflecting pain behavior scale and anxiety , pre and post relaxation breathing technique according to their level of education

Variables	Level of education					F	p
	Illiterate (n=4)	Primary (n=1)	Prep. (n=2)	Secondary (n=5)	University (n=8)		
Pain intensity score							
Pre	8.0 ± 1.08	8.50	7.50 ± 0.0	8.30 ± 1.04	8.44 ± 0.98	0.444	0.775
Post	7.92 ± 1.0	7.67	6.83 ± 0.71	7.93 ± 1.19	8.08 ± 0.64	0.811	0.538
Respiratory rate							
Pre	25.67 ± 1.05	24.67	24.67 ± 0.0	29.20 ± 8.17	25.25 ± 1.05	0.814	0.536
Post	24.50 ± 1.81	23.11	23.61 ± 0.24	23.33 ± 0.78	23.57 ± 0.73	0.868	0.506
Heart rate							
Pre	89.75 ± 2.27	89.0	87.67 ± 0.47	88.20 ± 1.30	88.71 ± 1.88	0.627	0.651
Post	86.31 ± 2.66	85.56	86.33 ± 1.10	85.27 ± 1.11	85.92 ± 0.74	0.374	0.823
Systolic Bp.							
Pre	122.50 ± 10.41	120.0	110.0 ± 0.0	115.0 ± 3.73	124.79 ± 8.57	2.236	0.114
Post	119.86 ± 7.12	119.44	105.56 ± 1.57	112.11 ± 4.88	118.61 ± 4.74	3.865*	0.024*
Diastolic Bp.							
Pre	82.08 ± 5.34	78.33	76.67 ± 0.0	77.0 ± 2.98	82.50 ± 5.35	1.590	0.228
Post	81.81 ± 4.70	80.55	73.33 ± 1.57	75.33 ± 3.13	79.03 ± 2.91	3.399*	0.036*
Total behavior scale							
pre	8.0 ± 0.91	8.50	8.0 ± 0.71	8.30 ± 0.91	8.06 ± 0.94	0.125	0.971
Post	7.50 ± 1.14	7.0	6.33 ± 0.94	7.40 ± 0.92	7.46 ± 0.69	0.770	0.562
Anxiety							
Pre	63.25 ± 2.50	70.0	67.0 ± 0.0	66.80 ± 4.82	67.88 ± 3.44	1.346	0.299
Post	58.08 ± 4.75	54.0	63.33 ± 1.89	59.73 ± 7.64	59.54 ± 7.08	0.388	0.814

F, p: F and p values for ANOVA test *: Statistically significant at $p \leq 0.05$

DISCUSSION

The main factors influencing burn pain intensity included burn size, depth and location, psychological issues, inflammation and healing progression [1]. Smeltzer *et al.* [33] reported that pain and anxiety activate the autonomic nervous system and results in releasing catecholamine, which in turn provokes the changes in blood pressure and heart rate and other physiologic measures. These physiological events could have negative consequences e.g. Increasing muscle nociception and tension for burn patients with hyper metabolism and hemodynamic instability. Furthermore, anxiety can increase the pain perception and vice versa. Relaxation breathing technique is most benefit for these patients that they gained control over their pain and anxiety.

This current study aimed to determine the effect of relaxation breathing technique on pain at wound care for patients with moderate burn injury through measuring the pain self rating scale, physiological reaction and pain reflecting behavior scale as a result of perceived pain as well as anxiety level. This was similar with De Jong *et al.*

[34] The finding of this study revealed that the study and control group subjects had partial thickness burn. It is very painful, with deeper burns more damage to nerve endings.

Also, regarding subjective expressed pain among moderately burn patients at wound dressing, both study and control group were feel pain directly on the wound and surrounding it and burning sensation was the most description of pain and increased in intensity during wound care. It was may caused by removing dressing, applying dressing, or according dressing type as reported by them. According the Solowiej *et al.* [6] and Connor-Ballard [7] and supported by Brown [9] and Price *et al.* [11]. It may be attributed to that they had compound site such as both arm and trunk and thigh for both study and control group. The same characteristics were found in Egypt study by Alaa El Din and Gaber [28].

Concerning, the factors reducing pain experience, the majority of the study group reported that nothing reduces their pain intensity during dressing but, it reduces by medicine but still in the severe range as for all the control subjects group. When non-pharmacological methods are used in combination with pharmacological interventions,

a positive effect on pain relief can be seen, Van *et al.* [20] and De Jong *et al.* [21]. This study exhibited that there was a significant difference in pain self rating scores on three days of assessment post practicing the relaxation breathing technique at wound care between study and control group but they still had severe pain. It was attributed to small sample size, timing of the intervention is too early and implementing of relaxation breathing technique was post 48 hours and the wound still inflamed and incomplete healing, in addition, posttest evaluation was only on three consecutive alternatively assessment. Brown [35] reported that if the pain is getting worse, it may be indicative of healing problems such as infection, or the use of an inappropriate dressing, for example poor dressing choice. However, it is a vital to keep this under review in nursing studies on relaxation breathing technique. On the other hand, de Jong and Gamel [24] supposed that using a combination of techniques of non pharmacological of pain management will have a better effect than using one technique alone.

The findings of the present study revealed a significant difference of heart, respiration rate and systolic and diastolic blood pressure among study group between pre and post test. It indicated that there was evidence supporting of use the relaxation breathing technique in reducing pain care at wound. This is inconsistent with Kahar *et al.* [36] but it agrees with Nilsson [37]. On the contrary, when comparing between study and control group regarding the benefits of relaxation breathing technique, it had a positive effect on respiration and systolic and diastolic blood pressure before, during and after wound care on third assessment. This is inconsistent with a study done on effectiveness of music intervention by Price. [11] stated that it only decreased respiration rate and did not improve other physiologic measures as pulse rate and systolic and diastolic blood pressures of burn patients in experimental group.

The current study subjects were in severe anxiety on pretest time and they became in moderate level till third assessment immediate post relaxation breathing technique which aimed to eliminate the pain at wound care. It may be depending on its location, can cause issues with body image and self-esteem as well as embarrassment at exudates and odor. This was support by Vuolo [38]. But all subjects in control group were in severe anxiety with significant differences that affected by pain at wound care. Also the study finding showed the significant positive relation was observed between pain intensity and

anxiety. It has been suggested that with reduce anxiety can increase one's pain threshold and increase pain tolerance [33, 39]

It was reflecting on pain behavior score of the study subjects with significant difference between pre and post relaxation breathing technique at wound care in relation to facial Grimaces, Consol ability and Restlessness. Also, it was seen between the study and control groups as regard in facial, muscle tone and consol ability behaviors. It is consistent with Mohamed *et al.* [40]. It contributes to an individual patient's behaviors at wound care which indicates signs of pain intensity and anxiety, so, anxiety and reflecting pain behavior are thought to be interlinked with pain perception.

However relaxation breathing techniques can also enhance coping skills in migraine sufferers and reduce anxiety, as well as improve mood. On the other hand immobilization of a part of the body or the whole body helps to minimize pain by Immobilization. In general, studies show the benefit of relaxation breathing techniques that potentially reduce symptoms or improve outcomes.

Concerning level of education, the study revealed that there was significant difference between blood pressure (Systolic and diastolic) only of the study group with their levels of education post relaxation. This is inconsistent with Price *et al.* [11] and Keith [26] who reported that factors such as educational level, environment and culture can all influence patients' experience of pain and ability to communicate their pain.

CONCLUSIONS

This study revealed to the benefit of relaxation breathing technique for patients with moderately burn injuries at wound care. It found out that the majority of patients reported significant decrease in their pain intensity and anxiety level during wound care post practicing relaxation breathing technique but they still had severe pain with moderately level of anxiety. Which in turn with reflecting pain behavior scale significantly decreased post practicing relaxation breathing technique at wound care. Also, there was significant difference between patients who received both pharmacological and non pharmacological pain management and those patients who received pharmacological pain management as regard SBP and DBP and respiration rate. In addition, a significant improvement between pre, during and post

relaxation breathing technique and during wound care was found among study group in respiration, heart rate and blood pressure. If the patient is less anxious and therefore more relaxed, then less pain is experienced and vice versa.

Recommendations: This study recommended the following:

- Evidence-based guideline toward effect of complementary therapy interventions during wound care using visualization, distraction, relaxation exercises and imagery on pain and stress level among patients with severe burn injury.
- Develop standard of care for wound pain management for patients with burns injuries

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