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# Effectiveness of Muscle Relaxation on Pain, Pruritus and Vital Signs of Patients with Burns

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**ABSTRACT**

**Aims:** Pain is the main complain of hospitalized patients suffering from burns. Anxiety, troubled interaction with others, disturbed sleep, movement defect, loss of appetite, low quality of life, and increase in healthcare and hospitalization costs are the consequences of non-alleviated pain and pruritus. Regarding this the present study aimed to investigate the effectiveness of muscle relaxation on severity of pain, pruritus and vital signs among patients suffering from burns.

**Methods:** In a semi-experiment study and by using a simple convenient sampling method, 110 hospitalized patients of Burn Ward were randomly chosen in two separated stages and allocated to case and control groups. It took two consecutive months to choose the controls and cases respectively. Tools for data gathering were as follows; demographic information, a pain visual analogue scale, and pruritus assessment scale and documentation form (vital signs, pruritus, and pain). As the desired intervention, cases were delivered a twenty-minute Benson muscle relaxation and then their pain, pruritus and vital signs were measured and compared to these in controls. Achieved data were analyzed by SPSS software$_{16}$.

**Results:** There were no significant differences between severity of pain (mean of pain in controls and cases were 5.8 and 6.3 respectively), itching (mean of pruritus in controls and cases were 3.5 and 2.6 respectively), and vital signs (respiration, pulse rate, blood pressure, perspiration and dilated pupils) in two groups ($p>0.05$). But, conversely, a post-intervention independent t-test revealed that there were significant differences between severity of pain (mean of pain in controls and cases were 5.5 and 2.2 respectively), itching (mean of pruritus in controls and cases were 3.6 and 2.1 respectively) and vital signs (respiration, pulse, perspiration and dilated pupils) in two compared groups ($p<0.05$).

**Conclusions:** Muscle relaxation technique can be effective in relieving the pain, pruritus and vital signs of patients suffering from burns. Therefore, its use as a therapeutic and alleviative method could be suggested for patients suffering from burns.

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## 1. Introduction:

Pain is an undesirable common complain among hospitalized patients [1]. In a comprehensive study Cohert reported that, in overall, 47% of those who visit a general physician suffer from average to sever pain [2]. Number of patients with burns amounts to more than 1 million cases in USA annually [3]. In Iran, this number was close to 50 thousand cases in 2007 [4].

Pain due to burn is a unique, grand, and complex challenge for patients and healthcare staff. Despite achievements in control of burn-induced wounds, pain of burns has received an inadequate treatment so far [5]. It has been shown that lack of pain control for burned patients is closely related to depression, onset of chronic pains and suicidal thoughts among them upon discharge from hospital [6]. In a study in 1999 Roadblocks showed that pain has negative effects on patients' quality of life and pain reduction can affect the concentration, work, exercise, socialization, daily routines, and sleep of patients [7]. Among uncontrolled pain consequences; anxiety, low interaction with others, disturbed sleep, movement defect, loss of appetite, malnourishment, agitation, and increase in hospitalization and healthcare costs can be counted [8]

Pruritus or itching, as with pain, is a common but often unexpressed experience among those who are afflicted with burns. There are many strategies to minimize the pruritus including medicinal and non-medicinal ones [9]. Pruritus happens almost in 87% of patients with burns. It affects patients' quality of sleep and daily activities. Because of patients' reactions to it, thin and skin epithelium that has been newly grafted make skin damages [10].

Pain alleviation and comfort restoration are of main tasks of nurses and, in result, they are much more in contact with patients than other health care personnel [11, 12, 13].Throughout the process of pain treatment, it is of grand importance to assess the existence, severity and patients' responses to pain [14].

Among routes to relief the pain, medicinal, surgical and complementary methods are often up for grabs [1].

International association for complementary medicine has categorized the complementary therapeutics into 5 classes: alternative systems (homeopathy and etc.), mental and physical interventions (relaxation, meditation), therapeutics that use natural materials, therapeutics that directly use body limbs (massage therapy etc.), and finally energy therapy (touch therapy, Reiki etc.) [15].These methods provide more independence for patients and they do not have negative and inappropriate side-effects of pharmaceutical interventions [16].

In a research which had been done to study nurses' response to pain of patients, it was revealed that they mostly focus on the following issues; pain measurement (45.9%), non-medicinal methods (43.4%), use of painkiller drugs (29.5%), and consultation with a physician (27.9%) [17]. As above mentioned, one of the main non-medicinal routes to tranquilizing pain in patients is muscle relaxation which increases activity of parasympathetic cycle that subsequently leads to neutralization of muscle tension [16].

A silent ambience, a comfortable posture, and a repeated pattern of muscle-relaxation-and-tense from head to toe or vice versa are of the required conditions for muscle relaxation method [18]. In a study to reveal the effects of muscle relaxation on pain and 6 common digestive entangles of people who suffer from Irritable Bowel Syndrome (IBS), Hazrati showed that this method helps reducing aches severity of signs and improvement of quality of life of these patients [19].

Various studies have proven the effects of relaxation on decline of anxiety and stress, generation of tranquility, improvement of vital signs and reduction of cardiologic dysrhythmia [20]. However, to the best of our knowledge, there has been no research on muscle relaxation effect on pain, pruritus and vital signs of patients suffering from burns.

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Generally speaking, muscle relaxation is a noninvasive therapy that requires no special technology and equipment or specific time and place. Therefore this method reduces the total costs of treatment and more importantly tightens relationship between a patient and a nurse.

From the other side regarding the prevalence of pain and side-effects of tranquilizers following the side-effects that are caused due to lack of effective control of patients' pain researchers decided to improve pain control by using muscle relaxation which causes muscles to relax and reduces secretion of catecholamine, and by comparing the results of before and after muscle relaxation, in the case of success of these methods encourage other hospitals in order to perform this kind of method for controlling pain .so this study had been done for studying the effect of muscle relaxation on reduction of pain, pruritus and vital signs of patients with burns.

## 2. Methods

The present study is a quasi-experimental study in which, by using a convenient sampling method, 110 hospitalized patients suffering from burns were randomly allocated to case and control groups. To block any chance of information leakage (between cases and controls) the researcher randomly chose the cases and controls in two different but consecutive months, one month without intervention (control) and in the next month muscle relaxation (experiment). Sample size had been achieved by the following method 110 people (55 people in every group): Taking parameters of $\alpha = 5\%$, $\beta = 80\%$ and the least effect size=50% into account and based on Altman's monogram and a similar previous study [21], sample size was determined to be 100 patients. However, considering probability of %5 loss, the sample size was finally set to be 55 patients for each group (totally 110 patients). The following inclusion criteria were used to select the samples: Willingness to participate in the study, Lack of mental disorders; having information about time, place and person; being older than 9 years; lack of skin disease, depression, diabetes, renal failure, and metabolic disorders.

Ethical considerations: The present study was proven and supported by Research Council of Arak University of Medical Sciences under number of approval 614, and also by Codes of Research Ethics under number 90-110-10. Accordingly, in addition to taking an informed consent, the authors obliged themselves to consider the codes of research ethics especially subjects' privacy, freedom to resign and confidentiality of information.

Tools of data gathering were as follows: (1) a demographic information questionnaire (containing 13 questions on age, sex, education, marital status, occupation, place of residence, type of burns (degree, percent, and its place), reason for burns, history of addiction, date of admission to hospital, last time of painkillers use and type of painkiller, presence of secondary infection, and days of hospitalization), (2) a pain visual analogue scale that was introduced by Jordan and colleagues in 1994 which ranges from 0 (no pain) to 10 (sever pain) in the form of a straight line. Divisions on the line had been marked according to unit from 0 to 10. Its error is estimated to be about %2. The scale is also used as a pain reduction measure on which 0 stands for no reduction and 10 equals complete reduction of pain [22]. (3) a pruritus assessment scale and (4) a vital signs registration, pruritus and pain form that included information on pulse rate, respiration, blood pressure, perspiration, dilated pupils, tachypnea, tachycardia, pain characteristics (location, extent, duration), and pruritus place and extent, date and time. Before and after intervention had been completed by the researcher's colleague. Content validity proved the validity of used tools. Reliability of numerical tools has been proven by Jensen et.al in 1986, 1993, and 1994 [22].

Validity and reliability of numerical tools of pruritus assessment was measured in 2009 and

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since then it has been used in many studies [24, 22].

In Iran, also by using reliability equivalence method, the reliability of numerical tools was proved. To do this, the numerical tools were used for a group of students (10 students) and their pain was registered. Then, and very shortly after that, a colleague of first researcher used the scale again for those students and the correlation of numerical tools was counted (r=0.97) [23]. A same approach was also used in current study and pain and pruritus of 30 patients who were hospitalized in burns unit w. The correlation for pain and pruritus measured scales were r=0.9 and r=0.87 respectively. Then these patients were excluded from sampling. To measure blood pressure an ALPK2 stethoscope (made in Japan and with ±2 standard deviation) was used.

In the stage before the intervention, during the first month all the hospitalized patients with burns in the unit (had the characteristics of the research sample) those who were chosen as controls completed the demographic information questionnaire. Then their pain, pruritus and vital signs were measured by the researcher's colleague by using measurement tools of numerical pain and pruritus assessment tools and were registered in the form of pain, pruritus and vital signs documentation. In the next step they conducted a twenty-minute Benson relaxation method and shortly after, their pain, pruritus and vital signs were again measured.

During the second month those who were chosen as cases filled out demographic questionnaire and their pain, pruritus and vital signs were measured and registered. Then, they went through a twenty-minute Benson verbal and muscle relaxation technique. Here, a CD player was used to play a soothing music. To perform this technique the cases followed the following instructions: (1) position yourself into a comfortable posture, (2) close your eye slowly, (3) relax all your body's muscles; to do this, start from your foot sole and move slowly towards your face and try to stay in this condition (4) in this condition inhale through nose and exhale through mouth; become focused on your breath; whisper "one" when exhaling and do not bother yourself once breathing, (5) keep doing the same for 10 to 20 minutes and try to relax all your muscles; after that open your eyes slowly and do not move for minutes, (6) do not concern whether a deep relaxation is achieved or not, let it happen at its own pace; when attacked by disruptive thoughts try to ignore and do not care about them. After that the amount of pain, pruritus and vital signs had been measured again after twenty minutes by the researcher's colleague.

In order to prevent from information bias a triple-blind design was devised, so that the patients, researcher colleague and statistic specialist did not know of the type of intervention and its effects. This study has the research approved code with the number of 614 from research council of Medical Science University of Arak and ethics code in medical researches with the number of 90-110-10.

In this study in addition to achieving informed consent, it had been tried to observe provisions of the codes of ethics related to the research and specially the patients' privacy, respecting people's freedom for withdrawing from participating in the study and the confidentiality of all the individual data. Gathered data were entered into SPSS software (version 16) and chi-square, independent t-test, paired t-test and Mann-Whitney test were used to analyze the data.

## 3. Results

Findings showed that most of cases (76.2%) and controls (74.5%) were male and there was no significant difference between two groups regarding sex variable. Mean of age in cases and controls were 34.8±10.6 and 33.6±12.2 respectively and there was no significant difference in this respect.

Most of patients were married, urban dwellers, with no addiction history, with under diploma education and suffering from 5 to 32% burning. Using Kolmogorov-Smirnov test, it was

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Table1: Frequency of demographic variables

| Variables | | Cases | | Controls | | Test |
|---|---|---|---|---|---|---|
| | | F | P | F | P | |
| Sex | Male | 42 | 76.4 | 41 | 74.5 | $x^2$= 0.079 |
| | Female | 13 | 23.6 | 14 | 25.5 | p=0.825 |
| Education | Illiterate | 4 | 7.3 | 8 | 14.5 | $x^2$=0.089 |
| | Under diploma | 43 | 78.2 | 41 | 74.5 | p=0.24 |
| | Bachelor | 8 | 14.5 | 6 | 10.9 | |
| Marital status | Single | 13 | 23.6 | 20 | 36.4 | $x^2$=2.121 |
| | Married | 42 | 76.4 | 35 | 63.6 | p=0.145 |
| Residence place | Rural | 11 | 20 | 14 | 25.5 | $x^2$=0.466 |
| | Urban | 44 | 80 | 41 | 74.5 | p=0.495 |
| History of Addiction | None | 42 | 76.3 | 30 | 54.4 | $x^2$=9.24 |
| | Opium | 6 | 10.9 | 8 | 18.2 | p=0,06 |
| | Cigarette | 3 | 5.5 | 3 | 5.5 | |
| | Multiple | 4 | 7.3 | 14 | 24.4 | |

Frequency ((F) Percent (P)

Table 2: Comparison of mean of pain, pruritus and vital signs before and after relaxation between two groups of cases and controls (independent t-test)

| Variable | Group | Before relaxation | After relaxation |
|---|---|---|---|
| | | Mean & SD | Mean & SD |
| Pulse rate | Cases | 85.5±8.1 | 81.03±6.5 |
| | Controls | 86±7.9 | 85.9±8.6 |
| | P-value | p=0.749 (Ind.t-test) | p<0.001 (Ind.t-test) |
| Respiration | Cases | 22.8±3.1 | 20.2±3.2 |
| | Controls | 22.5±2.6 | 22.4±1.6 |
| | P-value | p=0.646 (Ind.t-test) | p<0.001 (Ind.t-test) |
| Blood pressure | Cases | 1.9±0.26 | 1.8±0.4 |
| | Controls | 1.8±0.31 | 1.8±0.31 |
| | P-value | p=0.512 (Ind.t-test) | p=0.191 (Ind.t-test) |
| Pain severity | Cases | 6.3±2.3 | 2.2±1.7 |
| | Controls | 5.8±2.8 | 5.5±2.9 |
| | P-value | p=0.280 (Ind.t-test) | p<0.001 (Ind.t-test) |
| Pruritus severity | Cases | 2.6±3.6 | 2.1±1.7 |
| | Controls | 3.5±3.8 | 3.6±2.6 |
| | P-value | p=0.184 (Ind.t-test) | p=0.025 (Ind.t-test) |

Ind.=independent

revealed that there was no significant difference between cases and controls regarding above-mentioned variables (Table 1).

Pre-intervention independent t-test revealed that means of vital signs (pulse rate (p=0.746), respiration (p=0.646), blood pressure (p=0.512) and perspiration (p=0.700)) were not significantly different between cases and controls. On the contrary, post-intervention independent t-test uncovered that these parameters were significantly different between two groups regarding (respiration (p<0.001) and perspiration (p=0.002)). However, as Table 2 illustrates, blood pressure did not show such a post-intervention difference (p=0.191).

Also, as it can be seen from Table 3, a paired t-test showed that vital sign parameters among controls were not of significant differences before and after muscle relaxation but, on the contrary, were significantly different (p<0.001) among cases (before and after intervention).

Generally speaking, it can be said that comparing to controls, pulse rate, respiration and perspiration in cases improved after relaxation. Furthermore, using an independent t-test, it was shown that there was no significant difference regarding severity of pain (p=0.28) and pruritus (p=0.184) between two groups before intervention. But, they were (pain (p<0.001) and pruritus (p=0.025)) significantly different between two groups after intervention (Table 2).

Also, using a paired t-test it was revealed that severity of pain and itching were not different, before and after relaxation among controls, but they were different among cases before and after intervention (Table 3).

In overall and after relaxation, severity of pain and pruritus among cases showed much more reduction comparing to that of controls. Age, mental retardation, addiction to narcotics and alcohol, type of burning (degree, percent and location) and cause of burning were of our study limitations that were controlled by using homogeneity and monotony methods.

Also lack of cooperation of the research samples and probable loss of samples were as limitations of the research that for fixing them 5% were added to the sample size.

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Table 3: Comparison of mean of pain, pruritus and vital signs before and after relaxation between two groups of cases and controls (paired t-test)

| Variable | Group | Cases | | Controls | |
|---|---|---|---|---|---|
| | | Before relaxation | After relaxation | Before relaxation | After relaxation |
| Pulse rate | Mean±SD | 85.5±8.1 | 81.03±6.5 | 86±7.9 | 85.9±8.6 |
| | P-value | p<0.001 (paired t-test) | | p=0.899 (paired t-test) | |
| Respiration | Mean±SD | 22.8±3.1 | 20.2±3.2 | 22.5±2.6 | 22.4±1.6 |
| | P-value | p=<0.001 (paired t-test) | | p=0.705 (paired t-test) | |
| Blood pressure | Mean±SD | 1.9±0.26 | 1.8±0.4 | 1.8±0.31 | 1.8±0.31 |
| | P-value | p<0.001 (paired t-test) | | p=0.083 (paired t-test) | |
| Pain severity | Mean±SD | 6.3±2.3 | 2.2±1.7 | 5.8±2.8 | 5.5±2.9 |
| | P-value | p<0.001 (paired t-test) | | p=0.364 (paired t-test) | |
| Pruritus severity | Mean±SD | 2.6±3.6 | 2.1±1.7 | 3.6±2.6 | 3.5±3.8 |
| | P-value | p<0.001 (paired t-test) | | p=0.36 (paired t-test) | |

## 4. Discussion

Present study tried to investigate the effects of muscle relaxation on severity of pain, pruritus and vital signs of patients suffering from burns ($2^{nd}$ degree burns). The results of the study were related to the aim of "determining and comparing the amount of severity of patients' pain with burns before and after muscle relaxation in case an control group".

Findings showed that the mean of severity of pain between cases and controls before intervention was not significantly different. But, there was a significant difference between means of two groups after intervention. Indeed, controls had the highest mean of severity of pain after intervention. This matter endorses the pain tranquilizing effect of muscle relaxation method among patients suffering from $2^{nd}$ degree of burns. In a study on 90 women who experienced caesarian section, Mokhtari et.al in 2010 found a similar result -].

As with our study Benson's relaxation was effective on pain reduction of the patients after caesarian surgery .[26]In another study, Feizi et.al in 2009 showed that Benson muscle relaxation method effectively reduced pain of patients who did undergo a coronary arteries by-pass surgery during 24, 48 hours after surgery [27].

Other studies, also, have shown that muscle relaxation method could damp the pain of children after surgery [28, 29]. Golian et.al in 2006 showed that muscle relaxation can decrease the extent and severity of pain during active phase of delivery [30].There are also many other studies that demonstrate the effect of relaxation on pain ease [31,32,33,34]. Regarding the aim of "determining and comparing the extent of pruritus among patients suffering from $2^{nd}$ degree burns before and after muscle relaxation in two groups of cases and controls", results of present study revealed that, against pre-intervention values, there was a significant difference between severity of pruritus in cases and controls after relaxation. Indeed, the controls had the highest mean of pruritus severity after relaxation.

These findings weigh towards effectiveness of relaxation on reduction of pruritus among patients with $2^{nd}$ degree burns. As above mentioned, there are many studies on effect of relaxation on pain across the world but we do not have such studies on pruritus effects.

Respecting the aim of "measuring and comparing the vital signs among patients suffering from $2^{nd}$ degree burns before and after muscle relaxation in two groups of cases and controls", our study demonstrated that the evidence is significantly in favor of effectiveness of relaxation on reduction of pulse rate, respiration, perspiration and dilated pupils. However, blood pressure did not show such a significant result. This issue, somehow, can be due to few times of relaxation. In a study in 2004 Hamidi zadeh showed that relaxation can lead to reduction of blood pressure among those who practice the method [31].

Furthermore, our study showed that difference of mean of blood pressure among cases before and after relaxation was greater than it among controls. To reason about effects of relaxation Benson himself puts that this phenomenon pushes autonomic equilibrium towards lower activation of sympathetic system and more activation of parasympathetic system [18].

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As a result, a sense of tranquility emerges that is accompanied by lower pulse rate and respiration. Therefore, it can be drawn that relaxation has an effective impact on vital signs of patients suffering from 2nd degree burns. This matter, however, is not in line with the study of Kiani et.al that, in a before and after design, showed relaxation had a significant effect on vital signs of patients suffering from myocardial infarcts. Kiani believed that the main reason for this matter was making patients ready for the intervention in advance [35]. Our study also showed that, contrary to pre-intervention phase, means of vital signs (pulse rate, respiration, dilated pupils and perspiration) were significantly different between cases and controls. Mohammadi et.al in 2005 revealed that muscle relaxation had a significant impact on respiration rate of patients suffering from heart failure but it had no such an effect on their blood pressure and pulse rate [36]. Other studies also obtained similar results as we did [37, 38]. In general, and taking into account research aim "to reveal effectiveness of muscle relaxation on severity of pain, pruritus and vital signs of patients with 2nd degree burns", it can be said that relaxation had the potential to reduce pain and pruritus and improve vital signs of patients. Though, blood pressure was not significantly affected by this technique.

## 5. Conclusions

Benson relaxation method is able to improve severity of pain, pruritus and vital signs (pulse rate, respiration and perspiration) of patients with second degree burns. Thus, use of this method might be suggested to be used for reducing pain severity, pruritus and vital signs (pulse rate, respiration and perspiration) of the patients with second degree burns.

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