

# Association Between Behavioral Responses and Burn Pain Intensity

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## Abstract

**Background:** Few studies have assessed the association between behavioral responses and burn pain intensity.

**Objectives:** This study aimed to assess the afore mentioned association in an Iranian adult population.

**Methods:** A cross-sectional study was done on 100 eligible burn patients referring to one of the referral teaching hospitals in the north-west of Iran. A numerical rating scale was used to assess pain intensity during dressing change (procedural pain) and rest time (background pain). A self-administered validated and reliable questionnaire was used to determine behavioral responses.

**Results:** The mean pain intensity related to dressing change was  $8.5 \pm 1.8$  and the mean pain intensity during rest time was  $5.6 \pm 2.0$ . The most frequent behavioral responses to procedural pain (at dressing change) were grimacing (%93), moaning (%71) and restlessness (%52). The most frequent behavioral responses at the rest time was silence (%95), refusing to move (82%), and protecting the painful area (73%). The behavioral responses including moving away from painful stimuli, moaning, crying, grimacing, restlessness, protesting, and being silent were found to be significantly associated with burn pain intensity at the dressing change time ( $P < 0.05$ ). In addition, refusing to move seemed to be the only behavioral response associated with burn pain intensity at rest ( $P < 0.05$ ).

**Conclusions:** Burn patients experience severe and mild to moderate pain at the time of dressing change and during rest, respectively. Accurate multidisciplinary care plan including pain assessment scales and responses to pain is offered to provide effective treatment and care.

**Keywords:** Behavioral Responses, Burn Pain

## 1. Background

Burns are among the most intensive and painful injuries. All patients will experience pain, regardless of the cause, size, or depth of the burns. Despite advances in topical wound care and pharmacology and a growing emphasis on palliative care, wound care is the main source of the pain associated with burn injury (1).

It is estimated that 6 million patients seek medical help for burns annually (2). Burn injuries in Iran, like other developing countries, are much more common than in the USA and Europe (3). Investigations related to injuries in Iran have found that burns are the most common cause of injuries accounting for 40% of those injuries in all ages (4).

Burn pain is not a single entity but it can be classified as background (a pain that is present while the patient is at rest; with lower intensity and longer duration), procedural (a pain that is more intense and short lived generated by wound care or therapies), breakthrough (spiking of pain levels that occur when current analgesic efforts are exceeded), and post-operative (5).

Evaluation of burn pain and its successful treatment

has been challenging for all who care for burn patients. As successful pain relief is important for full physical and psychological recovery, accurate assessment of burn pain is essential (6). Also, awareness of care givers about the nature of burn pain and patients' reaction to pain make it possible to provide comfort (7). The multidisciplinary care plan that includes these factors is necessary to provide optimal pain relief for burn patients.

## 2. Objectives

The present study aimed to assess the association between behavioral responses and burn pain intensity at the time of dressing change and during rest time in an Iranian adult population.

## 3. Methods

### 3.1. Design

This descriptive-analytical cross-sectional study was conducted during March and June 2008 at the burn wards

of Sina Hospital. The duration of the study was three months, from March 20 to June 23, 2008.

### 3.2. Participants and Sample Size

About 100 inpatients aged 15 - 60 years with different degrees of burn wounds were included in our study using convenience sampling method. The sample size was determined using the formula for comparing two means while statistical power and type one error were considered 80% and 0.05, respectively.

### 3.3. Study Tool and Data Collection

A self-administered questionnaire was developed and used in the present study, after studying related texts and articles. Face validity was evaluated by asking 15 experts to scrutinize the questions. The questionnaire was modified and confirmed based on their comments.

The reliability of the study questionnaire was evaluated by test-retest examination. In the pilot study, the questionnaire was distributed to 10 participants. After one hour, the same participants filled out the questionnaire for the second time. The study period for assessing the reliability was designated as one hour because the burn pain intensity highly varies during the time. Then, the reliability of burn intensity-related questions was assessed using the paired t test and the reliability of behavioral response-related questions was assessed using Kappa statistics. Questions with P values above 0.05 in paired t test were considered as reliable questions. Also, questions with Kappa statistics above 0.6 remained in the final questionnaire.

Also, a numerical rating scale (NRS) was used to assess pain intensity at the two aforementioned times.

### 3.4. Statistical Analysis

The quantitative and qualitative variables were presented as median  $\pm$  Interquartile range, and frequency (percentage), respectively. The normality assumption was checked using the Kolmogorov-Smirnov test and variables with P values above 0.05 were considered as normally distributed. The non-normally distributed variables were compared between two groups using Mann-Whitney U test as non-parametric analog to independent sample t-test. The significance level in this study was set at 0.05. All statistical analyses were done by SPSS for Windows (release 13.5; SPSS, Chicago, IL).

## 4. Results

The patients were mostly female (53%) and married (56%). The age range of the patients was between 15 and

65 years. Most of the patients had a combination of II and III degree burn wounds (74%). The mean length of hospital stay was  $5.3 \pm 3.9$ . All burns were accidental. The most frequent cause of the burns was flames. The most frequent site of burns was on the limbs (46%). The mean extent of burn injuries was  $18.0 \pm 14.7$  percent. The mean time interval between the burning event and pain assessment was  $5.3 \pm 3.9$  hours. More details are found in [Table 1](#).

The mean pain intensity was  $8.5 \pm 1.8$  at the time of dressing change and  $5.6 \pm 2.0$  during rest.

The most frequent behavioral responses at the dressing change time were grimacing (%93), moaning (%71), and restlessness (%52) ([Table 2](#)), whereas the most frequent behavioral responses during the rest were being silent (%95), refusing to move (82%), and protecting the painful area (73%) ([Table 3](#)). It should be noted that no patients had suicidal intentions, drug abuse, and aggressive behaviors.

The behavioral responses including moving away from painful stimuli, moaning, crying, grimacing, restlessness, protesting, and being silent were found to be significantly associated with burn pain intensity at the dressing change ( $P < 0.05$ ) ([Table 4](#)). In addition, refusing to move seemed to be the only behavioral response associated with burn pain intensity during the rest time ( $P < 0.05$ ) ([Table 5](#)).

## 5. Discussion

In this study, most of the patients had severe pain (8.5) at the time of dressing change and mild to moderate pain (5.6) at the rest time. There are several studies that support our findings (8-14). There are 3 types of responses to pain including physiological, behavioral (voluntary), and affective (psychological). The common examples of behavioral responses are moving away from painful stimuli, grimacing, moaning, crying, restlessness, protecting painful area and refusing to move (15). In our study, the most frequent behavioral responses to procedural pain were grimacing (%93), moaning (%71) and restlessness (%52). The most frequent behavioral responses at rest were being silent (%95), refusing to move (82%), and protecting the painful area (73%).

Also, the behavioral responses of moving away from painful stimuli, moaning, crying, grimacing, restlessness ( $P < 0.001$ ), protesting ( $P = 0.001$ ), and being silent ( $P < 0.001$ ) were associated with procedural burn pain intensity. Behavioral responses of moving away from painful stimuli ( $P = 0.07$ ) and refusing to move ( $P = 0.05$ ) were associated with background burn pain intensity.

These findings indicate that behavioral responses are perceptible indicators of pain that can be used as the key to understand the severity of pain. A combination of these responses with an appropriate pain assessment tool can

**Table 1.** Demographic and Burns Characteristics in an Iranian Adult Population

Variables	Classification	Frequencies	Percent
Sex	Male	53	53
	Female	47	47
Education level	Illiterate	20	20
	Elementary	32	32
	Secondary	20	20
	High school	20	20
	University	8	8
Residential status	Rural	29	29
	Urban	29	29
	From Tabriz	42	42
Life style	Nuclear	92	92
	Expanded	8	8
Occupation	Labor	2	2
	Employee	5	5
	Household	40	40
	Out of Job	6	6
	Self employed	47	47
Marital status	Married	56	56
	Single	43	43
	Divorced	1	1
Family economic status	Low	21	21
	Moderate	60	60
	Good	19	19
Burn degree (depth)	II	14	14
	III	12	12
	II,III	74	74
Burn location	Face & Hands	5	5
	Limbs	46	46
	Body	0	0
	Perinea	1	1
	Distributed	48	48
Burning agent	Hot fluids	20	20
	Hot semi solids	5	5
	Chemicals	2	2
	Electrical	8	8
	Flames	39	39
	others	26	26
Burn severity	Mild	0	0
	Moderate	5	5
	Severe	95	95

**Table 2.** Frequency of the Patients' Behavioral Responses at the Dressing Change Time

Behavioral Responses	Frequencies	Percentages
Grimacing	93	93
Moaning	71	71
Restlessness	52	52
Crying	43	43
Being silent	36	36
Moving away from painful stimuli	33	33
Refusing to move	18	18
Protesting	14	14
Protecting the painful area	13	13
Physical conflict	3	3
Stupor	0	0

**Table 3.** Frequency of Patients' Behavioral Responses at the Rest Time

Behavioral Responses	Frequencies	Percentages
Being silent	95	95
Refusing to move	82	82
Protecting the painful area	73	73
Grimacing	8	8
Restlessness	7	7
Crying	5	5
Moving away from painful stimuli	4	4
Moaning	3	3
Suicidal intentions	0	0
Drug abuse	0	0

provide a comprehensive pain management plan. We have discussed the psycho-affective responses of burn patients, in our previous work (16). Besides, other factors such as sex, age, ethnicity, religion, and culture should be considered in designing better reliable tools for the assessment of severity of burn pain. Cultural factors may affect the expression of pain, feelings and emotions especially in females (17, 18). Different cultures and different beliefs may also make patients have different degrees of tolerance to burn pain (17, 19). Regarding behavioral responses that we assessed in burn patients, a literature review indicated that the behavioral responses to pain include motor responses (as facial expressions such as grimacing, protecting the burn area from stimuli, lying quietly, moving away from painful stimuli (15), posture- and gait-related responses, decreased level of activity, guarding, muscle tension) and moaning, crying, withdrawal, irritability, and restlessness,

as well (1, 20). It is very important to consider these responses especially in burn patients with airway intubation who are unable to communicate. Without verbal communication from the patient, nurses must look for visible indicators of pain. Using biometric parameters such as vital signs, in combination with visual cues such as body position and movement (21-24).

**5.1. Conclusion**

It is necessary to consider both pain intensity and responses to pain in burn patients to achieve optimal recovery outcomes.

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**Table 4.** Association Between Behavioral Responses and Burn Pain Intensity at the Dressing Change Time

Behavioral Responses	Median (Interquartile Range)	Mann-Whitney U	P value
<b>Moving away from painful stimuli</b>		90.5	0.07
Yes <sup>a</sup>	10.0 (.50)		
No <sup>b</sup>	8 (4)		
<b>Moaning</b>		107	0.43
Yes	10.0 (2)		
No	6 (2)		
<b>Crying</b>		107	0.43
Yes	10.0 (0.00)		
No	8.0 (3.0)		
<b>Protecting the painful area</b>		754	0.14
Yes	10.0 (1.0)		
No	9.0 (3.0)		
<b>Grimacing</b>		287.5	0.13
Yes	9.50 (2.0)		
No	4.50 (3.75)		
<b>Restlessness</b>		182.5	0.14
Yes	10.0 (1.0)		
No	7.0 (3.0)		
<b>Refusing to move</b>		493.5	0.05
Yes	9.00 (2.25)		
No	9.00 (3.00)		
<b>Protesting</b>		-	-
Yes	10.00 (0.00)		
No	9.00 (3.00)		
<b>Physical conflict</b>		-	-
Yes	-		
No	9.00 (3.00)		
<b>stupor</b>		-	-
Yes	-		
No	9.00 (3.00)		
<b>Being silent</b>		141	0.92
Yes	7.00 (2.25)		
No	10.00 (1.25)		

<sup>a</sup>Yes: Patients who showed behavioral responses as mentioned above.

<sup>b</sup>No: Patients who did not show behavioral responses as mentioned above.

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**Footnote**

**Financial Disclosure:** The authors have nothing to disclose.

**References**

1. Connor-Ballard PA. Understanding and managing burn pain: part 1. *Am J Nurs.* 2009;**109**(4):48-56. doi:

**Table 5.** Association Between Behavioral Responses and Burn Pain intensity at the Rest Time

Behavioral Responses	Median (Interquartile Range)	Mann-Whitney U	P value
<b>Moving away from painful stimuli</b>		573.5	< 0.001
Yes <sup>a</sup>	7.00 (3.00)		
No <sup>b</sup>	6.00 (3.00)		
<b>Moaning</b>		291.5	< 0.001
Yes	6.00 (0.00)		
No	6.00 (3.00)		
<b>Crying</b>		406.5	< 0.001
Yes	6.00 (0.00)		
No	6.00 (3.00)		
<b>Protecting the painful area</b>		376.0	0.08
Yes	6.00 (3.00)		
No	5.00 (3.50)		
<b>Grimacing</b>		36.0	< 0.001
Yes	6.00 (3.00)		
No	5.00 (3.00)		
<b>Restlessness</b>		416.5	< 0.001
Yes	7.00 (5.00)		
No	6.00 (3.00)		
<b>Refusing to move</b>		716.5	0.83
Yes	6.00 (3.00)		
No	4.00 (4.50)		
<b>Protesting</b>		291	0.001
Yes	-		
No	6.00 (3.00)		
<b>Physical conflict</b>		66	0.08
Yes	-		
No	6.00 (3.00)		
<b>Stupor</b>		-	-
Yes	-		
No	6.00 (3.00)		
<b>Being silent</b>		386.5	< 0.001
Yes	6.00 (3.00)		
No	6.00 (0.00)		

<sup>a</sup>Yes: Patients who showed behavioral responses as mentioned above.

<sup>b</sup>No: Patients who did not show behavioral responses as mentioned above.

- 10.1097/01.NAJ.0000348604.47231.68. [PubMed: 19325318] quiz 57.
2. Brusselaers N, Monstrey S, Vogelaers D, Hoste E, Blot S. Severe burn injury in Europe: a systematic review of the incidence, etiology, morbidity, and mortality. *Crit Care*. 2010;**14**(5):R188. doi: 10.1186/cc9300. [PubMed: 20958968].
3. Hasani L, Aghamolei T, Boushehri E, Sabili A. Analysis of hospitalized burned patients in bandar abbas, iran. *J Res Health Sci*. 2009;**9**(1):50-3. [PubMed: 23344147].
4. Othman N, Kendrick D. Epidemiology of burn injuries in the East Mediterranean Region: a systematic review. *BMC Public Health*. 2010;**10**:83. doi: 10.1186/1471-2458-10-83. [PubMed: 20170527].
5. Loncar Z, Bras M, Mickovic V. The relationships between burn pain,

- anxiety and depression. *Coll Antropol.* 2006;**30**(2):319-25. [PubMed: 16848146].
6. Wibbenmeyer L, Sevier A, Liao J, Williams I, Latenser B, Lewis R2, et al. Evaluation of the usefulness of two established pain assessment tools in a burn population. *J Burn Care Res.* 2011;**32**(1):52-60. doi: 10.1097/BCR.0b013e3182033359. [PubMed: 21116190].
  7. Wiechman SA, Patterson DR. ABC of burns. Psychosocial aspects of burn injuries. *BMJ.* 2004;**329**(7462):391-3. doi: 10.1136/bmj.329.7462.391. [PubMed: 15310609].
  8. Latarjet J. The management of Pain Associated with Dressing Changes in Patients with Burns. *EWMA.* 2002;**2**(2):10.
  9. Dauber A, Osgood PF, Breslau AJ, Vernon HL, Carr DB. Chronic persistent pain after severe burns: a survey of 358 burn survivors. *Pain Med.* 2002;**3**(1):6-17. doi: 10.1046/j.1526-4637.2002.02004.x. [PubMed: 15102213].
  10. Jaywant SS, Anuradha VP. A Comparative Study of Pain Measurement Scales in Acute Burn Patients.. *Indian J Occup Therapy.* 2003-4;**35**(3):4.
  11. Carrougner GJ, Ptacek JT, Sharar SR, Wiechman S, Honari S, Patterson DR, et al. Comparison of patient satisfaction and self-reports of pain in adult burn-injured patients. *J Burn Care Rehabil.* 2003;**24**(1):1-8. doi: 10.1097/01.BCR.0000039743.42589.7F. [PubMed: 12543984].
  12. Byers JF, Bridges S, Kijek J, LaBorde P. Burn patients' pain and anxiety experiences. *J Burn Care Rehabil.* 2001;**22**(2):144-9. [PubMed: 11302603].
  13. de Jong AE, Gamel C. Use of a simple relaxation technique in burn care: literature review. *J Adv Nurs.* 2006;**54**(6):710-21. doi: 10.1111/j.1365-2648.2006.03858.x. [PubMed: 16796663].
  14. JC G. Management of Pain & Anxiety. In: B. B. , editor. *Burn & Therapy.* United State of America: Coon NL; 1998. .
  15. Carol R. Taylor PDRN, Wilkins LW, Lillis C, LeMone P, Lynn P, Lebon M. *Fundamentals of Nursing: The Art and Science of Nursing Care.* Lippincott Williams & Wilkins; 2014. p. 424.
  16. Esfahlan AJ, Lotfi M, Zamanzadeh V, Babapour J. Burn pain and patients' responses. *Burns.* 2010;**36**(7):1129-33. doi: 10.1016/j.burns.2010.02.007. [PubMed: 20471755].
  17. Miller C, Newton SE. Pain perception and expression: the influence of gender, personal self-efficacy, and lifespan socialization. *Pain Manag Nurs.* 2006;**7**(4):148-52. doi: 10.1016/j.pmn.2006.09.004. [PubMed: 17145488].
  18. Narayan MC. Culture's effects on pain assessment and management. *Am J Nurs.* 2010;**110**(4):38-47. doi: 10.1097/01.NAJ.0000370157.33223.6d. [PubMed: 20335689] quiz 48-9.
  19. Budo Mde L, Nicolini D, Resta DG, Buttenbender E, Pippi MC, Ressel LB. Culture permeating the feelings and the reactions in the face of pain [in Portuguese]. *Rev Esc Enferm USP.* 2007;**41**(1):36-43. [PubMed: 17542124].
  20. Davis A, Thomas D. Pain assessment and management in the adult patient 2008. Available from: <https://ceufast.com/course/pain-assessment-and-management>.
  21. Chanques G, Jaber S, Barbotte E, Violet S, Sebbane M, Perrigault PF, et al. Impact of systematic evaluation of pain and agitation in an intensive care unit. *Crit Care Med.* 2006;**34**(6):1691-9. doi: 10.1097/01.CCM.0000218416.62457.56. [PubMed: 16625136].
  22. Payen JF, Bru O, Bosson JL, Lagrasta A, Novel E, Deschaux I, et al. Assessing pain in critically ill sedated patients by using a behavioral pain scale. *Crit Care Med.* 2001;**29**(12):2258-63. [PubMed: 11801819].
  23. Puntillo KA, Stannard D, Miaskowski C, Kehrle K, Gleeson S. Use of a pain assessment and intervention notation (P.A.I.N.) tool in critical care nursing practice: nurses' evaluations. *Heart Lung.* 2002;**31**(4):303-14. [PubMed: 12122394].
  24. Puntillo KA, Morris AB, Thompson CL, Stanik-Hutt J, White CA, Wild LR. Pain behaviors observed during six common procedures: results from Thunder Project II. *Crit Care Med.* 2004;**32**(2):421-7. doi: 10.1097/01.CCM.0000108875.35298.D2. [PubMed: 14758158].