

The Role of Coping Behavior in Severely Burned Patients With Posttraumatic Stress Disorder

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This multicenter cross-sectional study investigates the role of coping behaviors of inpatients with severe burn injuries that determined their development of post-traumatic stress disorder (PTSD) in burn specialty center in South China. Sixty-four subjects who were in their rehabilitation period were enrolled in the study. Self-report scales, such as the Post-traumatic Stress Disorder Checklist-Civilian Version and the Medical Coping Mode Questionnaire, were applied for evaluating PTSD symptoms with the severity and classifying coping behaviors. Regression analysis evaluated the association of severity of PTSD with coping behaviors. Outcomes indicated that coping behaviors could diagnose PTSD symptoms and predict the severity of PTSD to some extent. It suggested coping behaviors might intermediate the psychological outcomes of the severely burned patients.

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Burns and trauma may cause distress because of not only physical injuries and the painful interventions involved in the ongoing burn care and rehabilitation, but also because of a range of psychological conditions. Posttraumatic stress disorder (PTSD) is one of the frequent concurrent mental illnesses that recently received extensive attention.^{1–6} PTSD usually occurs while somatogenic symptoms still exist.⁶ Previous studies have shown that gender, age, and total burn surface area could forecast PTSD scores among burn survivors.⁷ It is reported that the incidence of PTSD of burn survivors was 20%–45% in the United States,⁸ and 34% of hospitalized patients developed symptoms of mental disorder.² Psychological disorder after burn caused about 31% of patients to not return to work⁹ and also affected the quality of life of burn patients, increasing family or social burden. The heavy cost of burn injury in the community motivates researchers to question what affects burn trauma and psychological condition.

Some variables affect the relationship between events of burn trauma and the psychological outcomes of patients according to some research.^{10,11} Evidence indicated the scored PTSD symptoms of one person who coped actively were low.¹² Therefore, a formal diagnosis of PTSD using DSM-IV necessitates the experiencing three-symptom clusters: intrusive trauma, avoidance and numbing, and hyperarousal, which develop in response to a catastrophic life event.¹³ Investigation showed that coping behaviors could affect the development of PTSD symptoms among survivors of earthquakes.¹⁴ The anxiety state of patients with chronic clinical diseases have significant correlation with their coping.¹⁵ All the results above prove that coping was involved in the process of

psychological stress and influenced psychological stress or disorders.^{16,17}

Coping refers to active efforts to master, reduce, or tolerate the demands created by stress, involving a series of cognitive and behavioral strategies. Although previous studies have not reached agreement on the categories of coping styles,¹³ it intermediates the external stressor and individual psychological disorder outcome. Coping has a variety of manifestations such as confrontation, avoidance, and resignation. Whatever the results of coping turn out to be, their personal characteristics were related^{18,19}; namely, what individual adopts corresponding behaviors to cope with stress conditioned by its internal factors. Therefore, in this study we tried to explore how coping behavior affects PTSD among the severely burned patients.

METHODS

Our study population was selected from severely burned inpatients. One group has less than 31% TBSA but had serious complications, and the other group had more than 31% TBSA and third degree of burns over 10% of the body. Inclusion criteria also are normal cognition and non-treatment with antipsychotic drugs for more than 1 month after burn injuries. Patients who had suffered from psychiatric disorders and organic brain disease before the injury, or were in shock or had mild or severe inhalation injury leading to intubation in the perioperative period were excluded. Sixty-four individuals fulfilled the above inclusion criteria, and they were all admitted for the treatment for burns in the Guangzhou

Red Cross Hospital (29/64, 45.3%), Guangdong Provincial Work Injury Rehabilitation Center (29/64, 45.3%), and Guangdong Provincial People's Hospital (6/64, 9.4%). Demographic data for the 64 participants are shown in Table 1.

Self-reported scales were applied. The Post-traumatic Stress Disorder Checklist -Civilian Version (PCL-C) was used to identify the PTSD symptoms and the Medical Coping Mode Questionnaire (MCMQ) was used to classify coping behaviors.

PCL-C is a measure of PTSD symptomatology and severity and contains 17 items that proved to be a valuable tool in previous studies.²⁰ The criterion-related validity of the scale in this research adopted is good. The coefficient of consistency and test-retest reliability is 0.88–0.94 and 0.83–0.88, respectively. It corresponds to the DSM-IV's PTSD diagnostic criteria, including all three clusters. Respondents rated their symptoms in the past month, on a Likert scale of 1 (not at all bothersome) to 5 (extremely bothersome). It scored on a scale ranging from 17 to 85. Higher PCL-C scores are associated with an increased risk of PTSD disorder, with scores for no obvious symptoms (17–37 points), subclinical PTSD symptoms (38–49 points), and clinical symptoms (50–85 points).²¹ A cutoff score of 38 or higher was determined as the positive screening of subclinical PTSD.¹³

Structured Clinical Interview for the DSM-IV Axis I (SCID-I) disorders PTSD was defined as either full or subclinical PTSD. The SCID-I interview included the assessment of full and subclinical PTSD. Subclinical PTSD was defined with only one symptom from each of criteria B, C, and D. However, the regular PTSD criteria A (a traumatic event), E (duration), and F (impaired functioning) must be fulfilled.²² "Intrusion," "avoidant," are "hyperarousal" are the main three cluster symptoms to be evaluated by PCL-C in this study. Whether an individual meets DSM-IV symptom criteria as defined by at least one B item (questions 1–5), three C items (questions 6–12), and at least two D items (questions 13–17) were determined by the investigators. Subjects who responded to categories 3–5 (moderately or above) were treated as symptomatic.

Those scored more than three points in each question or whose total scores were over 15, 21, and 15 in corresponding item 1–5, 6–12, and 13–17 should be considered positive "intrusion," "avoidant," and "hyperarousal" symptomatic, respectively.

MCMQ is a valuable tool and widely used in China for measuring coping behaviors of clinical patients.²³ It contains three subscales and 20 questions of evaluating coping behavior. Three coping behavior subscales of "confrontation" (questions of 1, 2, 5, 10, 12, 15, 16, and 19), "avoidance" (questions 3, 7, 8, 9, 11, 14, and 17), and "resignation"

TABLE 1. The Assigned Instructions for the Main Symptoms of Posttraumatic Stress Disorder (PTSD) With the Risk Factors

Items	Variables	Instructions
Gender	X ₁	Female=0, Male=1
Age	X ₂	<30=1, 30–50=2, >50=3
Marital status	X ₃	Married=1, Single=2, Divorced=3
Educational status	X ₄	Primary=1, Secondary=2, University graduates=3
TBSA	X ₅	<31% with severe complications=1, 31%–50%=2, >50%=3
Time of burn injury	X ₆	≤1month=1, 1–3 months=2, 4–6 months=3, 7–12 months=4, ≥12 months=5
Confrontation behavior	X ₇	Cumulative points of confrontation behavior subscale
Avoidance behavior	X ₈	Cumulative points of avoidance behavior subscale
Resignation behavior	X ₉	Cumulative points of resignation behavior subscale
General symptoms of PTSD	Y ₁	Control group=0, Target group=1
Intrusive symptoms	Y ₂	Negative=0, Positive=1
Avoidant symptoms	Y ₃	Negative=0, Positive=1
Hyperarousal symptoms	Y ₄	Negative=0, Positive=1
The severity of PTSD	Y ₅	No PTSD=0, subclinical=1, clinical=2
The severity of Intrusive symptoms	Y ₆	Score of symptoms
The severity of avoidant symptoms	Y ₇	Score of symptoms
The severity of hyperarousal symptoms	Y ₈	Score of symptoms

(questions of 4, 6, 13, 18, and 20) evaluate three corresponding behaviors in patients with severe burns. MCMQ scales were for 1–4 assessment levels. Eight questions needed to score reversely. Standardization norm was determined from 650 cases of various kinds of patients in China (mean±SD). They are "confrontation" (19.48±3.81), "avoidance" (14.44±2.97), and "resignation" (8.81±3.17). Behavior scores that were more than the maximum value of the norm were considered abnormal; otherwise, they were considered normal.

Patients signed informed consent forms before completing the questionnaires. Patients whose hand function had not fully recovered authorized their relatives to sign the forms. When completing the questionnaires, patients received help from our investigators to understand the exact meaning of certain items. This investigation was conducted by the interviews of hospitalized patients, and the questionnaires were collected on the spot.

All data analyses were performed using SPSS 20.0 (SPSS, Armonk, N.Y.). The assignment of variables, X₁–X₉ and Y₁–Y₈, are shown in Table 2. The p values of <0.05 were considered as statistically significant for difference. T tests were applied to compare the targeted population with domestic norm standardization.

Those without PTSD symptoms were assigned to the control group, and others with subclinical or clinical symptoms were assigned to the PTSD/target group. Study matched pair according to the scale scores. Single factor analysis was used to compare the two groups with three main coping

TABLE 2. Characteristics of the Participants (N=64) in This Study

Items	Cases	Percentage (%)
Gender		
Female	10	15.6
Male	54	84.4
Age(y)		
<30	29	45.3
30–50	32	50.0
>50	3	4.7
Marital Status		
Married	37	57.8
Single	25	39.1
Divorced	2	3.1
Educational Status		
Primary	5	7.9
Secondary	50	78.1
University graduates	9	14.1
TBSA		
<31% with severe complications	15	23.4
31%–50%	23	35.9
>50%	26	40.6
Time of burn injury		
<1 month	20	31.3
≥1 month and <4 months	12	18.8
≥4 months and <7 months	4	6.3
≥7 months and <12 months	19	29.7
≥12 months	9	14.1
Cause of injury		
Flame	39	60.9%
Scald	7	10.9%
Chemical	8	12.5%
Electrical	6	9.4%
Others	4	6.3%

behaviors; multifactor analysis was used to compare variances of $X_1 \sim X_6$ in the two groups.

Logistic regression was used to investigate the role of coping behavior variable $X_7 \sim X_9$ for diagnosis of $Y_1 \sim Y_4$. In addition, multiple regression was established to evaluate the relationships of independent variables $X_7 \sim X_9$ and the dependent variables $Y_5 \sim Y_8$.

RESULTS

Our subjects were mainly male (84.4%). Fifty percent of the subjects were age 30 to 50; 57.8% were married when they were injured. Over 78.1% had completed were elementary education or above. The characteristic data of our sample are shown in Table 2. There were 30 out of 64 subjects (46.9%) with complicated PTSD symptoms in our study, and 16 (25%) of them developed “intrusive” symptoms. “Avoidant” symptoms and “hyperarousal” symptoms accounted for 8 (12.5%) and 15 (23.4%) of the total patients, respectively. Compared with norm standardization, the frequency of “confrontation” (19.0 ± 3.4 versus 19.5 ± 3.8 ; $t=1.13$, $p=0.26$) coping behaviors that subjects adopted were not significantly different ($p>0.05$). Nevertheless, the “avoidance” (16.6 ± 2.4 versus 14.4 ± 3.0 ; $t=7.06$, $p=0.00$) and “resignation” (11.0 ± 2.2 versus 8.8 ± 3.2 ; $t=7.76$, $p=0.00$) coping behaviors were significantly higher ($p<0.01$). Therefore, “avoidance” and “resignation”

behaviors were more often adopted by severely burned patients compared with the norm when confronting disease.

Among the samples, the “confrontation” (19.6 ± 3.9 versus 18.5 ± 2.9 ; $F=1.781$, $p=0.187$) and the “avoidance” (16.9 ± 2.5 versus 16.4 ± 2.4 ; $F=0.702$, $p=0.405$) were not significantly different in the PTSD group ($N=30$) compared to the control group ($N=34$) ($p>0.05$). Only the “resignation” (11.9 ± 2.3 versus 10.1 ± 1.8 ; $F=12.558$, $p=0.001$) behaviors were significantly higher and often adopted by severely burned patients compared with the control ($p<0.01$).

Besides, the variables of gender, age, marital status, educational status, TBSA, and time after injury in the PTSD group and the control group had equal variance ($F=1.765$, $p=0.101$). Age, marital status, educational status, TBSA, and time after injury in the two groups were not statistically different (p value was 0.416, 0.625, 0.064, 0.069, and 0.156, respectively).

Model coefficient of comprehensive test χ^2 in valid model Y_1 , Y_2 , and Y_4 (see Table 3) was 11.746 ($p=0.001$), 8.277 ($p=0.004$), and 8.970 ($p=0.003$), respectively. In addition, goodness-of-fit (Hosmer-Lemeshow test) χ^2 in valid models was 3.317 ($p=0.651$), 8.255 ($p=0.311$), and 3.244 ($p=0.662$), respectively. X_9 was associated with Y_1 ($OR=1.55$; 95% $CI=1.17, 2.10$) and Y_4 ($OR=1.52$; 95% $CI=1.13, 2.05$), whereas X_7 associated with Y_2 ($OR=1.31$; 95% $CI=1.07, 1.60$). Three models, Y_1 , Y_2 , and Y_4 , had acceptable goodness-of-fit, and discriminatory abilities were 0.67, 0.80, and 0.80. However, the model for diagnosis Y_3 was invalid, and $X_7 \sim X_9$ could not produce a significant effect on the occurrence of “avoidant” symptoms.

The participants were divided into three groups according to PTSD severity. Group 1 ($N=34$) was for “no PTSD”, while the group 2 ($N=19$) and group 3 ($N=11$) were for “subclinical PTSD” and “clinical PTSD,” respectively. Coping behaviors of “confrontation” (18.5 ± 2.9 versus 18.6 ± 3.6 versus 21.3 ± 3.9 ; $F=3.19$, $p=0.048$) and “resignation” (10.1 ± 1.8 versus 11.2 ± 1.4 versus 13.3 ± 3.0 ; $F=11.185$, $p=0.000$) were significantly different among the three groups ($p<0.05$). However, no significant difference in coping behaviors of “avoidance” [$(16.4 \pm 2.4$ versus 16.7 ± 1.8 versus 17.1 ± 3.5 ; $F=0.418$, $p=0.660)$ 0.4 models ($Y_5 \sim Y_8$)] were found to be valid. Moreover, the relationship between variables was statistically significant ($p<0.01$). The VIF of model $Y_5 \sim Y_8$ were less than 10. The tolerance was greater than 0.1. The eigenvalue was not equal to 0, and the condition indexes were less than 30. Therefore, there was no collinearity in the model $Y_5 \sim Y_8$ (see Table 4). X_7 and X_9 could explain the total variation in Y_5 and Y_6 at 29.3% and 19.2%. X_9 could explain the total variation in Y_7 and Y_8 at 17.1% and 33.1%. Only X_8 had no linear relationship with $Y_5 \sim Y_8$.

DISCUSSION

In this study, “avoidance” and “resignation” coping behaviors adopted by severely burned patients suggested that their coping pattern was not a positive behavior in confronting the

disease. The high frequency of passive response behaviors taken by burn-traumatic patients was similar to the clinical pattern that patients dealt with in chronic diseases.¹⁵ The similarity indicated that patients, after being injured, were under the pressure of the chronic stress from healing during the long convalescence.

Severely burned patients with PTSD mostly adopted behaviors of “resignation” in coping with the disease. Invasive surgeries and painful dressings had to treat the wound but caused lots of pain, even though pain management was very effective. During the long and painful process of recovery, patients easily slide into a state of feeling depressed, helpless, and hopeless. How patients feel about their treatment influences us to make progress in psychological rehabilitation.

“Confrontation” behavior of the burn patient could affect the possible diagnosis of symptom of “invasion” in our study. Moreover, “resignation” coping behavior might affect the diagnosis of the general PTSD symptoms and symptoms of “hyperarousal”. Meanwhile, burn patients with PTSD more often adopted coping behaviors of “confrontation” and “resignation” compared with patients without PTSD. The evidence suggested that coping behaviors could influence the patient’s psychological outcomes after trauma.

When burn patients are confronted with trauma, the tension from the trauma heightens their anxiety. Memories of traumatic events or images appears in dreams continuously. The PTSD patients re-live the trauma repeatedly, even in their conscious state because many normal scenarios in life, acting like triggers, may remind them of the trauma they experienced. When the memories of a traumatic experience haunt them, they could cause intensive emotions and physical reactions. Most patients felt that their fear and pain were so strong, seemed to have occurred recently, and were unable to extricate themselves. Clinical symptoms included difficulties falling asleep or waking up easily, irritability or anger, inattention, hypervigilance, and excessive startling reactions. Furthermore, negative emotions increased their helplessness in their recovery, which made them panic more. As a result, they coped with resignation behaviors, which in turn worsened PTSD symptoms, and thus they needed guidance from the practitioners.

TABLE 3. Binomial Stepwise Logistic Regression Models for Y1~Y4 With Coping Behaviors (X7~X9) as Predictor Variables

Variable	Model Y ₁ [*]		Model Y ₂ [†]		Model Y ₃ [‡]		Model Y ₄ [§]	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
X ₇	NA	0.158	1.31 (1.07–1.59)	0.009	NA	0.501	NA	0.964
X ₈	NA	0.213	NA	0.932	NA	0.785	NA	0.182
X ₉	1.56(1.17–2.10)	0.003	NA	0.206	NA	0.215	1.52(1.13–2.05)	0.006

CI: confidence interval; NA: not applicable; OR: odds ratio.

^{*} Model Y₁ = $-5.026 + 0.447 \times X_9$; Hosmer-Lemeshow chi-square = 3.317, *df* = 5, *p* = 0.651; C-Statistic = 0.627 (variables: X₇~X₉).

[†] Model Y₂ = $-6.323 - 0.266 \times X_7$; Hosmer-Lemeshow chi-square = 8.255, *df* = 7, *p* = 0.311; C-Statistic = 0.797 (variables: X₇~X₉).

[‡] Model Y₃ was not valid; *df* = 1, variables: X₇~X₉ could not predict Model Y₃.

[§] Model Y₄ = $-5.955 + 0.418 \times X_9$; Hosmer-Lemeshow chi-square = 3.244, *df* = 5, *p* = 0.662; C-Statistic = 0.797 (variables: X₇~X₉).

TABLE 4. Linear Regression Analyses of Coping Behaviors (X7~X9) Predicting the Posttraumatic Stress Disorder (PTSD) Symptom Severity (Y5~Y8)

Dependent/Independent Variable	β	Squared Semi-partial <i>r</i>	<i>t</i> (<i>p</i>)	Model <i>F</i> (<i>p</i>)
Model Y ₅ [*]				14.034(0.000)
X ₇	0.05	0.26	2.27(0.027)	
X ₈	0.08	0.12	0.73(0.470)	
X ₉	0.17	0.51	4.68(0.000)	
Model Y ₆ [†]				8.465(0.001)
X ₇	0.33	0.25	2.08(0.042)	
X ₈	0.07	0.11	0.60(0.552)	
X ₉	0.84	0.40	3.46(0.001)	
Model Y ₇ [‡]				14.040(0.000)
X ₇	0.12	0.13	1.00(0.319)	
X ₈	0.15	0.13	1.30(0.198)	
X ₉	1.02	0.43	3.75(0.000)	
Model Y ₈ [§]				32.182(0.000)
X ₇	0.18	0.20	1.75(0.086)	
X ₈	0.15	0.12	1.49(0.143)	
X ₉	1.14	0.59	5.67(0.000)	

^{*} Model Y₅ = $-2.257 + 0.054 \times X_7 + 0.170 \times X_9$; $\Delta R^2 = 0.293$; *df* = 2. Tolerance = 0.998, VIF = 1.002, Eigenvalue = 0.012~2.954, Condition Index = 1.00~15.699.

[†] Model Y₆ = $-4.192 + 0.330 \times X_7 + 0.839 \times X_9$; $\Delta R^2 = 0.192$; *df* = 2. Tolerance = 0.998, VIF = 1.002, Eigenvalue = 0.012~2.954, Condition Index = 1.00~15.699.

[‡] Model Y₇ = $3.652 + 1.022 \times X_9$; $\Delta R^2 = 0.171$; *df* = 1. Tolerance = 1.000, VIF = 1.000, Eigenvalue = 0.02~1.980, Condition Index = 1.00~10.036.

[§] Model Y₈ = $-0.655 + 1.144 \times X_9$; $\Delta R^2 = 0.331$; *df* = 1. Tolerance = 1.000, VIF = 1.000, Eigenvalue = 0.02~1.980, Condition Index = 1.00~10.036.

Coping behaviors of “resignation” can predict the severity of PTSD and “intrusion,” “avoidant,” and “hyperarousal” symptoms. The higher the risk of PTSD symptoms is, the more serious the “resignation” response to burn trauma. Coping behaviors of resignation by patients with PTSD are significantly higher than those questionable PTSD patients or patients without PTSD.

Psychological stress begins after patients experience trauma. Normally, individual human accesses internal resources to cope with stress. When the resources are insufficient to cope with the stress, they feel disappointment, helplessness, and loss of motivation, and cope with the resignation behavior. Failure to cope with trauma leads to psychological maladjustment. Patients with repeated experience of trauma felt emotional paralysis, alienation, and irritability.

CONCLUSIONS

In summary, “avoidance” and “resignation” behaviors are common coping modes adopted by severely burned patients to confront burn trauma. Among these patients, however, burn patients complicated by PTSD symptoms are more likely to adopt “resignation” behavior to cope with their disease. Therefore, coping behaviors can predict the severity of their mental complications to some degree and even diagnose symptoms of PTSD in severely burned patients.

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