Factors Related Pain Catastrophizing in Hospitalized Patients with Trauma

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ABSTRACT

Objective: This study aimed to explore the factors related to pain catastrophizing (PC) in hospitalized patients with trauma within 72 hours of injury.

Materials and Methods: The study was a cross-sectional correlation study. The sample was 109 patients who were admitted to ICU Trauma or General Trauma Unit within 72 hours after injury and were aged 18 years and over. They were diagnosed with at least one or multiple organs of injury with a Glasgow Coma Scale (GCS) between 13 and 15. Pearson's product-moment correlation coefficient, spearman rank correlation, point-biserial correlation, and linear multiple regression were used to analyze the data.

Results: The results showed that more than half of the sample was male (67.0%) with the age range from 18 to 91 years. During admission, the subjects complained about pain at moderate to severe levels (68.5%). The prevalence of PC was 11.9%. A few participants (2.8%) experienced anxiety. Also, more than half of them (63.3%) had ADLs in independent to absolutely independent levels. Almost 50.5% of the participants experienced poor sleep quality. Lastly, 49.5% of them were in frailty and pre-frailty conditions. There was a positive relationship between PC and anxiety ($r = .439$, $p < .01$). Finally, anxiety could explain the variance of PC by 19.3% ($F_{1,107} = 25.571$, $P < .001$).

Conclusion: Based on the study findings, the predictor of PC was anxiety. Thus, healthcare providers should assess this factor, in order to provide interventions to reduce high levels of anxiety leading to the prevention of PC occurrences in hospitalized trauma within 72 hours after injury.

Keywords: Pain catastrophizing; theory of unpleasant symptoms; hospitalized patients with trauma (Siriraj Med J 2023; 75: 894-901)

INTRODUCTION

Trauma has become a highly prevalent and leading cause of mortality and morbidity around the world, especially in developing countries. Therefore, it has drawn international attention. As a result of trauma, incidents have become multi-dimensional, affecting health problems in both physical and mental health well-being.[1]

Mainly, trauma even causes pain which is defined as "An upset sensory and emotional experience associated with potential damage".[2] Moderate to severe acute pain occurs due to the tissue injury, particularly pain within 72 hours after trauma events because of the physiological changes.[3]

However, the standard for pain assessment and management has been developed for trauma patients specifically. The remaining severe acute pain during hospital admission through hospital discharge was evidenced.[4] Thus, the predictors or correlated factors of pain severity (PS) were explored commonly to prevent the influencing

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Received 6 September 2023 Revised 9 October 2023 Accepted 17 October 2023
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https://doi.org/10.33192/smj.v75i12.265223

of PS. The interesting factor is pain catastrophizing (PC) because it is defined as a common problem to increase a patient's risk for high PS experience in a wide group of hospitalized trauma patients.[5-7]

PC is defined as a maladaptive cognitive for pain stimulation. It turns the patients to feel negative and induces more PS, including emotional distress.[8] PC was identified as a significant predictor of PS in hospitalized trauma, but studies of PC in Thailand are rare. Theory of Unpleasant Symptoms (TOUS) classifies unpleasant symptoms into four dimensions: distress, severity, quality, and timing and their interaction. Also, the related factors in the dimension of physiological, psychological, situational, and performance factors are defined as the influencing factors of unpleasant symptoms.[9] When studying the unpleasant symptoms of pain among other domains by using TOUS, a significant gap in knowledge was seen.

Previous studies reported the association between PS and severity of injury[4], sex and age[10], frailty[11], sleep quality[5], anxiety[6], and activities of daily living (ADLs).[12] However, the relationship between those variables and PC has been not demonstrated clearly in hospitalized trauma patients in Thailand. Thus, this study aimed to explore the predictors of PC among unpleasant symptoms of severity of injury, frailty, sex, age, sleep quality, anxiety, and ADLs in hospitalized patients with trauma within 72 hours of injury.

MATERIALS AND METHODS

Researchers selected the participants based on the purposive sampling method. The sample size was calculated by the G*power program.[13] The researchers specified effect size as medium ($f^2 = 0.15$), alpha (α) equal to .05 and level of power (β) of .80. The minimal sample size was 103 sample. The participants were admitted to ICU trauma or General Trauma Unit within 72 hours after injury in a university hospital in the metropolitan area of Bangkok, Thailand. They were aged over 18 years and were diagnosed with at least one or multiple organs of injury with a GCS between 13 and 15. The researchers excluded patients who were unable to communicate in Thai, experienced chronic pain, had diagnoses of mental health disorders, or who had critical conditions such as an altered level of consciousness, hemodynamic unstable including oxygen supplement needed with invasive mechanical ventilator requirements.

Instruments

The data collection comprised 6 parts as follows:

1) Demographic data and general information: Researchers collected the demographic data which consisted of age, sex, severity of injury, pain severity, places and times of admission, diagnosis, operation type, and surgery history.

The severity of injury was calculated by the Injury Severity Score (ISS). The overall of ISS is 75 points, and the score is ranked to 4 levels of severity: 1-8 = "minor injury", 9-15 = "moderate injury", 16-24 = "serious injury", and 25-75 = "severe injury".[14]

The Numeric Rating Scale (NRS) was used for pain severity assessment. NRS is a pain screening tool that uses a 0-10 scale with 0 meaning "no pain", 5 meaning "moderate pain", and 10 meaning "the worst pain imaginable". NRC evaluates pain into 4 levels; no pain (0), mild (1-3), moderate (4-6), and severe (7-10).

2) PC was measured by the Pain Catastrophizing Scale (PCS). The total score ranges from 0 to 52, and a total score of 30 and over indicates a clinically significant level of catastrophizing. PCS was translated into the Thai version by Youngcharoen et al. (2017).[15] Cronbach's alpha coefficient was revealed at 0.876.

3) Anxiety symptoms were measured by the Hospital Anxiety Depression Scale (HADS), in part of the Anxiety Sub-scale, which includes 7 items. The total score ranges from 0-21. The cut point is 11; an increase in score indicates a rise in psychological problems. HADS was translated into Thai version by Ninchaikowit et al. (1996).[16] In this study, Cronbach's alpha coefficient level of HADS was seen at 0.70.

4) ADLs was measured by the Barthel Index (BI). The summation of BI is 100, which interprets into 5 levels of daily activity abilities: absolutely dependent to absolutely independent. The instrument was translated into the Thai version by Laohaprasitiporn et al. (2017).[17] Cronbach's alpha coefficient was shown at 0.84.

5) Sleep quality was measured by the Pittsburgh Sleep Quality Index (PSQI). The summation of the PSQI global score ranges from 0-21. The cut-point of sleep problems is greater than 5. An increase in score indicates a high level of sleep problems. The Thai version of the PSQI (T-PSQI) was translated by Tawanchai et al. (1997).[18] T-PSQI had Cronbach's alpha coefficient at 0.70.

6) The researchers used the SHARE (Survey of Health, Ageing and Retirement in Europe) Frailty Instrument (SHARE-FI) to measure frailty condition. There is an SPSS program to calculate frailty automatically. A high overall score means increasing the severity of frailty (Romero-Ortuno et al., 2010). The SHARE-FI question was translated into many languages, including the Thai version. All of those have been provided on the online website.[19,20] The Thai version of SHARE-FI had Cronbach's alpha at 0.74.[21]

Ethical considerations

This research was conducted with proper consideration of human subjects' provision and ethical issues in nursing research. Researchers conducted the data collection under the approval of the Institutional Review Board (IRB), Faculty of Nursing, Mahidol University, and the Siriraj Institution Review Board (SIRB), Faculty of Medicine Siriraj Hospital (MU-MOU-IRB-NS 2022/92.1011). This research had a protocol for pain management. Only 30-40 minutes were requested to complete the questionnaires.

Statistical analysis

All data were analyzed by the Statistical Package for Social Science (SPSS). Demographic data were analyzed by descriptive statistics. Pearson's product-moment correlation coefficient, spearman rank correlation, point-biserial correlation, and linear multiple regression were used to analyze the relationship between PC among related variables.

RESULTS

All trauma admission, there were 109 patients included in this study. Almost all of the sample was male (67.0%). The rest of the patients (33.0%) were female. The average age was 53.9 (SD = 21.33). In detail, almost half (42.2%) of the participants represented older aged adults. The majority of hospitalized trauma patients (88.1%) were admitted to the General Trauma Unit, and the rest of them (11.9%) were included in the Intensive Care Unit of Trauma (Table 1). The period of admission was categorized into 3 categories. Most patients (60.6 %) participated in the research within 24 hours after injury. The organ of injury was described as the top five diseases presented to hospitalized trauma patients including the following: 1) Multiple organs of injuries (24.8%); 2) Orthopedic injuries (22.9%); 3) Head-spine injuries (17.4%); 4) Chest injuries (8.2%); 5) Abdominal injuries (3.7%); 6) Vascular injuries (2.8%), as well as the other injuries (20.2%) (i.e., facial fractures, animal bites, and cut wounds). The mean score of ISS was 10.81 (SD = 7.60). More than half of the patients (56.0%) received conservative treatment for close observation in the hospital. All hospitalized trauma patients presented pain with at least 1 score of PS. The average PS indicated at around 4.9 (SD = 2.54) (Table 2).

Most of the sample (88.1%) had no PC. However, the rest of them (11.9%) experienced PC during hospitalization. The mean score of PCS was 15.84 (SD = 10.72). The ratio of 13 patients who had PC was described as 23.1 % in neurological and orthopedic patients; 15.4% in

TABLE 1. The demographic characteristics of the sample.

Characteristics	Frequency	Percentage (%)
Sex		
Male	73	67
Female	36	33
Year (age)		
Young adults (18-30)	21	19.3
Middle- age adults (31-60)	42	38.5
Older adults (> 60)	46	42.2
Mean = 53.95, SD = 21.32		
Glasgow Coma Score (GCS)		
GCS 15	108	99.08
GCS 13-14	1	0.92
Places of admission		
The ICU	13	11.9
The General Unit	96	88.1
Times of admission		
Within 24 hours	66	60.6
Within 36 hours	37	33.9
Within 72 hours	6	5.5
Mean = 1.45, SD =.601		

TABLE 2. The injury characteristics and treatments of the sample.

Characteristics	Frequency	Percentage (%)
The organ of injuries		
Head-spine injuries	19	17.4
Chest injuries	9	8.2
Orthopedic injuries	25	22.9
Abdominal injuries	4	3.7
Vascular injuries	3	2.8
Other injuries	22	20.2
Multiple organ injuries	27	24.8
Injury Severity Score (ISS)		
Minor injury	37	33.9
Moderate injury	41	37.7
Serious injury	21	19.2
Severe injury	10	9.2
Mean = 10.81, SD = 7.60		
Major treatments		
Non-Operation (Conservative treatment)	61	56.0
Operative treatment	48	44.0
Pain Severity (PS)		
Mild pain	34	31.2
Moderate pain	44	40.4
Severe pain	31	28.4
Mean = 4.99, SD = 2.54		

multiple injuries, chest injuries, and other injuries such as bee sting; as well as the remaining 7.7% in abdominal injured patients. Nonetheless, PC was found mostly in the patients who presented with moderate levels of injury (61.50%) and severe pain (53.80%) (Table 3). A few of the participants (2.8%) reported anxiety experiences with a mean HADS score of 3.63 (SD = 2.97). Participants reported a mean ADLs score of 72.34 (SD = 21.24). Most of the participants (37.8%) reported an independent status of ADLs followed by moderate dependence on the functional status by almost 27.5%. The mean score of PSQI was 5.74 (SD = 2.99). Half of the participants (50.5%) reported sleep problems. The mean score of frail condition was 1.42 (SD = 2.04). Some of the participants (29.4%) indicated frailty.

There was a similarity between PC, anxiety level, sleep quality, and ADLs among the patients in the ICU and the General Trauma Unit. However, the difference was seen when comparing the ISS in both groups of patients. The average score of ISS in ICU patients (mean = 17.47, SD = 11.005), and the General Trauma Unit (mean = 9.91, SD = 6.597) was shown a bit difference (P=.005) (Table 4).

Pearson's Product Moment Correlation, Spearman Rank Correlation, and Point-Biserial Correlation were performed for exploring the association between PC and age, sex, ISS, sleep quality, anxiety, frailty, and ADLs. PC was associated with anxiety positively (r = .439, p < .01).

The model summary by an enter model of linear multiple regressions showed that anxiety could explain the variance of PC by 19.3% (R^2= .193, $F_{(1,107)}$= 25.571, P < .001). In conclusion of the results, when all variables were put into steps in the equation; PC increased by 1.465 points with each 1 score rise in anxiety mood when adjusting for age, sex, frailty, ISS, sleep quality, and ADLs (B = 1.465, P < .001) (Table 5).

TABLE 3. The information of Pain Catastrophizing in each sample's characteristic and treatment.

Characteristics	Frequency	Percentage (%)
Pain Catastrophizing in each injury type (N=13)		
Head-spine injuries	3	23.10
Chest injuries	2	15.40
Orthopedic injuries	3	23.10
Abdominal injuries	1	7.70
Vascular injuries	0	0
Other injuries	2	15.40
Multiple organ injuries	2	15.40
Pain Catastrophizing in each Injury Severity Score (ISS)		
Minor injury	1	7.70
Moderate injury	8	61.50
Serious injury	3	23.10
Severe injury	1	7.70
Pain Catastrophizing in each Major treatment		
Non-Operation (Conservative treatment)	8	61.50
Operative treatment	5	38.50
Pain Catastrophizing in each Pain Severity (PS)		
Mild pain	1	7.70
Moderate pain	2	15.40
Severe pain	10	76.90

TABLE 4. The comparison of ISS, PC, anxiety, sleep quality, and ADLs between the Intensive Care Unit and General Trauma Unit

Variables	ICU Mean (SD)	General Unit p-value	
ISS	17.47(11.005)	9.91(6.597)	.005
PC	16.92 (12.537)	15.70(1.073)	.481
Anxiety	3.85(.750)	3.06 (.308)	.308
Sleep quality	6.31(3.401)	5.67 (2.947)	.547
ADLs	47.31(24.033)	75.73(1.889)	.159

PC mean to Pain Catastrophizing
ISS mean to The Injury Severity Score
ADLs mean to Activities of Daily Living

TABLE 5. The predictors of PC among age, sex, frailty, ISS, sleep quality, anxiety, and ADLs in hospitalized patients with trauma.

Variables	b	Std.Error	Beta	t	Sig
Constant	10.258	6.326		1.621	.108
Age	-.074	.055	-.147	-1.334	.185
Sex	1.941	2.145	.086	.905	.368
ISS	.964	1.042	.088	.925	.357
Sleep quality	.206	.322	.057	.638	.525
Frailty	.406	.555	.077	.732	.466
Anxiety	1.465	.326	.406	4.491	.000
ADLs	-.029	.048	-.057	-.592	.555

ISS mean to The Injury Severity Score
ADLs mean to Activities of Daily Living
R=.439, R^2=.193, Adjust R^2=.185, df (1,107), F=25.571, Sig=P<.001

DISCUSSION

Most results were found to be congruent with previous research findings. For example, the majority group of hospitalized patients with trauma was male, and the characteristics of injury indicated in the injury of multiple organs (multiple injuries).[22] The Injury Severity Score (ISS) was average at a moderate level.[4,23] By following the low to moderate injury, most samples were admitted to the General Trauma Unit more than to the ICU. However, incongruent results were indicated in the mean age. In this study, the average age was older adults, which was not in line with previous studies.[4,5] It can be explained that, globally, society is becoming an aging society, which is related to rising in the geriatric trauma.[24] Also, a higher number of hospitalized traumas received conservative methods as their major treatments; this is opposite to the study result of Yaowares et al. (2020) who showed that the number of at least one-time receiving surgery had higher than conservative treatment.[23] However, there are many antecedents of studies that can offer explanations that support this study's results, in that physicians' considerations nowadays for each organ of injury are becoming conservative strategies.[25-29]

The average PS indicated around 4.99 (SD = 2.54), and more than half of the sample who received operative treatments complained about moderate to severe levels (4-10) of pain experiences. This result is supported by Edgley et al. (2019) who stated that severe pain was related to post-operative procedures in trauma patients.[30,31] Following surgical incisions, patterns of pain behavior showed that both peripheral and central sensitization are stimulated. The mediators, such as prostaglandins, interleukins, cytokines, and neurotrophies are released locally and systemically during and after surgery contribute to the nociceptor sensitization.[32,33]

A few samples experienced anxiety. This psychological problem occurs possibly due to trauma consequences suddenly, which impact a patient's physical health and mental health outcomes.[34] Pre-frailty and frailty were seen at 20.3%, and 29.3%, respectively. This condition was found mostly in the aging population. Its outcome was confirmed by previous studies, which stated that frailty is mostly evident in the aging group.[35,36] More than half of the participants indicated poor sleep quality; there was no significant difference between sleep quality in the two settings bacause the patients may have received care from healthcare providers with similar activities, which may interrupt their sleep time.[37] Most patients were able to perform ADLs independent to moderate dependent ADLs because their severity of injury was at a low to moderate level in the injury severity score.[38,39]

The research hypothesis was supported partially; predicting factors of PC in trauma patients during hospitalization was anxiety. Anxiety was associated with PC.[6,40] Also, it could predict PC significantly. Thus, phenomena could be explained by the following linked

model: Anxiety episodes are accompanied by emotional, cognitive, and physiological changes; these may be linked to the mechanism of PC, which is related to the Behavior Inhibition and Activation System (BIS/BAS) in emotion regulation and cognition control systems. Thus, anxiety occurring may lead to a maladaptive cognitive of pain perception manifestation.[41-43]

CONCLUSION

Based on the study findings by TOUS, the unpleasant symptoms of pain catastrophizing could be predicted by psychological factors such as anxiety in hospitalized trauma within 72 hours after injury. Other factors related to physical impairment such as injury severity, frailty, and decreasing ADLs may not forecast PC. Thus, PC should be prevented in the clinical setting because it is a condition that is independent of physical injury. The nurse is supposed to assess PC and anxiety. The interventions of PC are requested for proper management. Moreover, nurses are supposed to screen anxiety mood as a risk factor and to conduct universal interventions in order to reduce high levels of anxiety in patients, leading to the prevention of PC occurrences.

LIMITATION

This research presented the benefit of identifying a factor related to PC in hospitalized trauma patients, however, a limitation was seen. According to the inclusion and exclusion criteria of the study, the eligible participants were specified only trauma patients without critical conditions such as hypotension, unconsciousness, or hypoxia. Hence, the sample selection processes may be difficult to define as an impartial method and it might impact the outcomes of injury severity and PC. As a result, the researchers suggest that future research should be studied on PC by using a random sampling method to avoid sampling bias.

ACKNOWLEDGEMENTS

The greatest appreciation should be given to all research participants and trauma patients for their cooperation. They devoted their time to participating in research procedures during the illness progression. The authors are also thankful to the staff nurses of the Intensive Care Unit of Trauma and the General Trauma Unit, Siriraj Hospital, for their willing cooperation in all processes of data collection.

Conflict of interest

The authors have no conflict of interest.

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