Annals of Medical Research
DOI: 10.5455/annalsmedres.2018.06.104 2018;25(4)553-8

Original Article

Measurement of the pain levels of patients with extremity traumas and assessment of the attitudes of emergency physicians to pain management

Emrah Akgun[1], Nalan Kozaci[2], Mustafa Avci[2]

[1]Kepez State Hospital, Clinic of, Emergency Medicine, Antalya, Turkey
[2]Antalya Education and Research Hospital, Clinic of, Emergency Medicine, Antalya, Turkey

Abstract

Aim: In this study, we aimed to measure the pain levels of patients with isolated extremity injuries due to low energy trauma, using pain scales in the emergency department (ED).

Material and Methods: Patients were included in the studybetween January and March 2017. The trauma-related pain levels of the patients were assessed at the time of the initial examination and in the 45th minute. Three different scales; the 'Wong-Baker FACES Pain Rating Scale'(WBS), 'Verbal Rating Scale'(VRS), and 'Numeric Pain Rating Scale' (NPRS) were used to measure the levels of pain.

Results: 236 patients were included in the study. At the time of the initial admission to the ED, 77% of patients had "Even More" pain and worse according to the WBS, 67% had a pain score of 60 and above according to the Scale NPRS, and 74% had severe and worse pain according to the VRS. Analgesics were given to 11% of patients. A statistically significant decrease was detected in the pain scale scores of patients who were treated in the ED compared to the patients who were not treated ($p<0.001$).

Conclusion: In this study, it was observed that the severity of pain was high in patients with isolated extremity injuries due to low energy trauma and that their pain decreased with the treatment given at the ED. However, it was concluded that treatment for the patients' pain was not given adequately by emergency physicians.

Keywords: Extremity Trauma; Pain Measurement; Pain Management.

INTRODUCTION

The care of an injured patient is one of the basic pillars of emergency medical practice. Emergency physicians play a vital role in the management of trauma patients. The management of trauma patients is complex and requires time-based decision making and leadership skills as well as technical skills. Appropriate resuscitation can improve functional outcomes even in those with severe injuries (1).

Trauma patients have a wide physiological distribution including patients such as young athletes, children, elderly people, and pregnant women. In addition, patients may have injuries concerning multiple systems, substance abuse, delayed care, and psychological and emotional problems. Modern, evidence-based practices should be developed for practitioners to ensure optimal pain management for these patients. Providing appropriate and timely pain management provides early recovery, reduces the stress response of the patient, shortens the length of hospital stay, reduces cost and the risk of chronic pain due to neuroplasticity, and as a result, reduces morbidity and mortality (2).

The use of scales in pain evaluation allows patient-reported severity and quality of pain to be transformed into objective forms, allowing abolishing a collection of various commentaries by physicians and nurses, who provide care for patients. Today, many single and multidimensional scales are used for pain measurement. The most commonly used scales by clinicians, researchers, patients, and families are the Visual Analogue Scale (VAS), Numeric Rating Scale (NRS), Verbal Rating Scale (VRS), and the FACES Pain Scale - Revised (FPS-R) (3,4).

In this study, we aimed to measure the pain levels of

Received: 02.06.2018 **Accepted:** 31.07.2018 **Available online:** 03.08.2018
Corresponding Author: Mustafa Acvi, Kepez State Hospital, Clinic of Emergency Medicine, Antalya, Turkey
E-mail: dravcimustafa@gmail.com

patients with isolated extremity injuries due to low energy trauma using pain scales in the emergency department and to assess the attitude of emergency physicians to pain management.

MATERIALS AND METHODS

Hospital ethics committee approval was obtained for this study. The study was performed prospectively between January 2017 and March 2017 at the emergency department.The patients, who were admitted to Antalya Training and Research Hospital emergency department due to trauma, who had low energy extremity trauma identified in physical examination and who had stable vital signs were included in this study.The patients were included to study if;

- they had isolated extremity injuries due to low energy trauma,
- they were admitted within the first 24 hours after trauma,
- they were 18 years and older,
- they had a Glasgow Coma Scale (GCS) score of 15,
- they had no communication barriers,
- they had normal systemic examination results other than those of the trauma and had normal vital signs findings, and
- they were discharged from the emergency department after treatment.

The patients were excluded if;

- they were admitted more than 24 hours after trauma,
- they were under the age of 18,
- they had a GCS score of 14 or below,
- they had unstable vital signs,
- systemic examinations revealed any life-threatening conditions,
- any other system injuries were detected in addition to extremity trauma,
- any neurovascular injuries were detected in one or more extremities,
- they were treated in another health care center before admission,
- they used analgesics before admission,
- they had communication barriers,
- they did not give consent to participating in the study, and
- that were hospitalized.

The patients were evaluated by two emergency physicians. Patient who have low extremity trauma was examined by first emergency physician in the emergency department. The evaluation and management of the patients were done by a first emergency physician. The second emergency physician observed managementof the patients. A second emergency physician measured the pain levels of the patients during the initial examination and in the 45th minute, using the 'Wong-Baker FACES Pain Rating Scale', 'Verbal Rating Scale', and 'Numeric Pain Rating Scale'. A standard data entry form was created for the study.The following data were recorded in the study data forms including the demographic data, examination results, and pain level measurements) of the patients, the mechanisms of the trauma, the drugs administered, and any interventions made during the time period between the time of the initial examination and until the 45th minute.

Statistical Analysis

Statistical analyses were performed using the SPSS version 21.0 software. Mean and standard deviation values were used when presenting descriptive analyses. They were compared in 2x2 tables using Pearson's Chi-Square Test and Fisher's Exact Test. Normally distributed (parametric) variables were evaluated among groups, while Student's T-Test was used for pairwise comparison of independent groups and the One-Way ANOVA test was used for multiple group comparisons. Results were considered statistically significant when the P value was below 0.05.

RESULTS

Three hundred and three patients were asked to fill in the study data forms for the study. Sixtyseven patients who fulfill one or more of the exclusion criteria were excluded from the study. Of the 236 patients included in the study, 86 were females (37%) and 150 were males (63%). The average age of the patients was 35±14, 40±14 in women and 33±14 in men. The causes of the traumas of the patients were a simple fall/bump/sprain injuries (87%), sharp object injuries (12%), beating (0.3%), and burning (0.7%).

One hundred and twenty nine (55%) of the patients had upper extremity injuries and 107 (45%) had lower extremity injuries. Soft tissue injury (69.5%) was the most common diagnosis made in the emergency department. Closed soft tissue injuries were detected in 64.4% of patients, open soft tissue injuries were detected in 6.4% of the patients, bone fractures were detected in 15.7% of the patients, skin cuts were detected in 12.3% of the patients, and burns were detected in 1.3% of the patients (Table 1).

Table 1. Diagnosis and Treatments administered to patients in the emergency department

Diagnosis	N	%
Closed STI	152	64.4
Open STI	15	6.4
Bone Fracture	37	15.7
Skin Cut	29	12.3
Burn	3	1.3
Total	236	100
Treatment	**N**	**%**
No Treatment	79	33.5
Analgesic	27	11.4
Splint	93	39.4
Wound Suture	18	7.6
Dressing	17	7.2
Hematoma Drainage	2	0.8
Total	236	100

STI: Soft Tissue Injury

During the first examination, 77% of patients had "Even More" or worse pain according to the WBS, 74% of the patients had severe or worse pain according to the VRS, and 67% of the patients had a pain score of 60 and above according to the NPRS (Tables 2).

Table 2. Wong-Baker FACES Pain Rating Scale, Verbal Rating Scale and Numeric Pain Rating Scale

WBS	Before Treatment		After Treatment	
Pain Scale	N	%	N	%
No Hurt	6	2	11	5
Hurts Little Bit	16	7	49	21
Hurts Little More	33	14	62	26
Hurts Even More	75	32	61	26
Hurts Whole Lot	82	35	46	19
Hurts Worst	24	10	7	3
Total	236	100	236	100
WBS	Before Treatment		After Treatment	
Pain Scale	N	%	N	%
Mild Pain	15	6.3	47	20
Moderate Pain	47	19.9	76	32
Severe Pain	96	40.7	66	28
Very Severe Pain	48	20.3	30	13
Worst Possible Pain	30	12.7	17	7
Total	236	100	236	100
NPRS	Before Treatment		After Treatment	
Pain Scale	N	%	N	%
0	4	1.7	7	3
10	4	1.7	19	8
20	7	3	18	8
30	14	5.9	34	14
40	24	10.2	34	14
50	24	10.2	23	10
60	33	14	27	11
70	37	15.7	30	13
80	44	18.6	24	10
90	27	11.4	13	6
100	18	7.6	7	3
Total	236	100	236	100

It was observed that 157 (66.5%) of the patients were treated and that 79 (33.5%) of them received no other treatment for the injury other than injections. It was observed that 11.4% of patients were treated with analgesia, 39.4% were treated with a splint, 7.6% were applied sutures, 7.2% of the patients were applied wound dressing, and 0.8% of the patients underwent hematoma drainage. Diclofenac sodium (75 mg intramuscular) was administered to the patients as the analgesic treatment solely(Table 1).

Fifty one percentof the patients, who were included in the study, had left the emergency department with a pain level of "Even More" and worse according to the 45th minute WBS evaluation. There was no reduction in the pain level in 41% of the treated patients (Table 2,3).

Forty eight percentof the patients, who were included in the study, had left the emergency department with a pain level of severe or worse according to the 45th minute VRS evaluation. There was no reduction in the pain level in 38% of the treated patients (Table 2,3).

Forty three percent of the patients included in the study had left the emergency department with a pain score of 60 and above according to the 45th minute NPRS. There was no reduction in the pain level of 30% of the treated patients (Table 2,3).

Table 3. Wong-Baker FACES Pain Rating Scale diference, Verbal Rating Scale difference and Numeric Pain Rating Scale diference in treated patients

Wong-Baker FACES Pain Rating Scale difference	N	%
-4	1	0.6
-2	5	3.2
0	58	36.9
2	38	24.2
4	42	26.8
6	10	6.4
8	2	1.3
10	1	0.6
Total	157	100
Verbal Rating Scale difference	N	%
-2	1	0.6
-1	14	8.9
0	55	35.0
1	52	33.1
2	25	15.9
3	8	5.1
4	2	1.3
Total	157	100
Numeric Pain Rating Scale difference	N	%
-20	1	0.6
-10	2	1.3
0	44	27.1
10	34	21.7
20	26	16.6
30	20	12.7
40	13	8.3
50	9	5.7
60	2	1.3
70	2	1.3
80	1	0.6
90	2	1.3
100	1	0.6
Total	157	100

Compared to the untreated patients, there was a statistically significant reduction in the pain level of patients treated at the emergency department, as measured by the WBS, VRS, and NPRS scales ($p<0.001$). The WBS difference

was 2.01±2.28 in the treated patients and 0.63±1.52 in the untreated patients. The VRS difference was 0.75±1.09 in the treated patients and 0.27±0.71 in the untreated patients. The NPRS difference was 19±20 in the treated patients and 6±13 in the untreated patients.

When the pain scales measurement results were compared between the treated and untreated patients at the end of the 45th minute period, it was found that according to the WBS, a statistical difference occurred only after splinting and hematoma drainage (Table 4). A statistical difference was observed only after splinting, according to the VRS (Table 4), and according to the NPRS, a statistical difference occurred after splinting and suturing solely (Table 4).

Table 4. Comparison pain scales of with untreated patients and applied treatments

Wong-Baker Faces pain scale difference	Average differences	p	95% Confidence Interval	
			Lowerbond	Upperbond
No Treatment -Analgesic	-1	0.251	-0.3	2.3
No Treatment - Splint	-1.5	0.001	-0.6	2.4
No Treatment - Wound Suture	-1.5	0.068	-0.06	3.0
No Treatment - Dressing	-1	0.436	-0.56	2.6
No Treatment - Hematoma Drainage	-4.4	0.038	0.15	8.6
Verbal rating scale diference	**Average differences**	**P**	**95% Confidence Interval**	
			Lowerbond	Upperbond
No Treatment - Analgesic	-0.2	0.922	-0.84	0.42
No Treatment - Splint	-0.6	0.003	-0.99	0.13
No Treatment - Wound Suture	-0.4	0.622	-1.14	0.33
No Treatment - Dressing	-0.5	0.402	-1.25	0.25
No Treatment - Hematoma Drainage	-1.2	0.495	-3.25	0.78
Numeric Pain Rating Scale difference	**Average differences**	**P**	**95% Confidence Interval**	
			Lowerbond	Upperbond
No Treatment - Analgesic	-9	0.312	21	3
No Treatment - Splint	-14	0.001	22	-5
No Treatment - Wound Suture	-16	0.016	30	-2
No Treatment - Dressing	-12	0.19	26	3
No Treatment - Hematoma Drainage	-34	0.12	72	5

Of the 152 patients with closed soft tissue injuries, 22 (14%) were treated with analgesia, 57 (38%) were splinted, and 73 (48%) were not given any treatments. When the pain scale measurement differences were compared between the results obtained at the initial examination and those obtained in the 45th minute of the treatment, it was seen that splinting was the treatment that was the most effective in the reduction of pain (Table 5).

Table 5. Comparison of pain differences with treatments given to patients with soft tissue injury (closed wound)

Pain Scales	Treatment comparisons	Average Differences	P
Wong-Baker FACES Pain Rating Scale Difference	No treatment-analgesia	1.03	0.09
	No treatment -splint	1.3	0.01
	Splint- analgesia	0.3	0.82
Verbal Rating Scale Difference	No treatment-analgesia	0.3	0.45
	No treatment -splint	0.4	0.09
	Splint- analgesia	0.07	0.90
Numerical Pain Rating Scale Difference	No treatment-analgesia	8	0.12
	No treatment -splint	13	0.01
	Splint- analgesia	5	0.45

Thirty seven of the patients (15.7%) included in the study had fractures in one bone and it was observed that all of them were splinted and none of them received analgesia. When the pain scales results of the patients were compared between those measured at the the initial examination and those obtained in the 45th minute, it was found that there were no statistical reductions in their pain levels (Table 6).

Table 6. Pain scale differences in patients with bone fracture

Pain Scales	Mean ±SS	P
Wong-Baker FACES Pain Rating Scale Difference	2.6±2.2	0.299
Verbal Rating Scale Difference	0.7±1.2	0.177
Numerical Pain Scale Difference	24±25	0.249

DISCUSSION

Orthopedic injuries most commonly occur in young, healthy individuals, and especially in working individuals, as a result of accidents. The severity of injuries may vary from simple superficial injuries to the injuries of bones, joints, tendons, and neurovascular injuries in patients who are admitted to the emergency department due to extremity traumas (5).

Seventy percent of patients admitted to the emergency department present with varying levels of pain. Pain is moderate to severe in more than a third of them. In trauma patients, the frequency and severity of pain are higher. But managing the pain of trauma patients is more difficult as there can be accompanying various system traumas (6).

In our study with low energy trauma patients, at the time of the admission, 77% of patients had "Even More" and worse pain according to the WBS, 67% had a pain score of 60 and above according to the NPRS, and 74% had severe and worse pain according to the VRS. These results are important in that they demonstrated that the patients with

extremity injuries due to low energy traumas experienced a significant level of pain.

If the pain of the patients is not controlled, this can result in disruption of the hemodynamic state, in changes in the immune system, and in psychosocial lability (anxiety, posttraumatic stress disorder, impaired orientation). For this reason, effective and rapid control of pain is among the indispensable tasks of emergency physicians in the ethical,legal and clinical sense (6,7).

In a study investigating the use of analgesics in trauma patients in the emergency department, it was found that analgesics were used in a total of 38% of the patients, that the amount of time that had elapsed before the administration of the first dose of analgesic was 109 minutes and that morphine, at an average dose of 14 mg was the most commonly used analgesic substance(8). Another study on pain management in adult patients with long bone fractures showed that no analgesics were given to more than half of the patients (54%), that the most commonly given analgesic was diclofenac sodium (46%), that none of the patients were given opioids (Pethidine/ Morphine), and that the severe or moderate pain of 76% of patients continued after the administration of analgesics(9).

Similar to these studies, in our study, it was seen that the treated patients had reported decreased pain levels compared to those reported by the untreated patients. Only 11% of the patients were treated with analgesics. The opioid type of drugs was not administered to any patients. Physicians' avoidance of opiate-type drugs may be attributed to the fear that these drugs might mask the primary symptoms of the patients, that they may negatively affect their vital signs, and that they may cause respiratory depression (6).

In addition to the injuries of bones and joints, soft tissue injuries, abrasions, lacerations, and burns may also occur in the extremities as a result of trauma. Even abrasions and lacerations that are considered to be simple are very painful. In injuries with accompanying simultaneous contusions, the level of pain increases in the following 24-48 hours. Interventions aimed to alleviate the pain, such as splinting to reduce the tissue edema, will help relieve the pain. These include the use of appropriate analgesics, and anti-inflammatory drugs (10).

In our study that while diclofenac sodium was administered to some portion of the patients with closed soft tissue injuries, only splints were applied to the other portion. When the results of the patients who were only splinted were compared with those of the patients who were administered analgesics, it was found that splinting was more effective compared to analgesic administration in reducing pain. For this reason, it was concluded that in order to reduce the severity of the pain, interventions aimed at treating the wound should also be planned and should be applied in a short time, in addition to administering drugs.

For optimal success, certain general principles should not be overlooked when conducting pain management at the emergency department. In the planning of treatment for pain, the clinical condition of the patient, the severity of pain, and the condition of the wound are important. For this reason, the treatment to be applied will also vary. It is necessary to determine the adequate analgesic dose, to be aware of the serious side effects of pain relief medications, and to regularly reassess patients after drug administration (2,7).

In addition, it was observed in this study that 48% of patients were discharged from the emergency department with "Even More" or worse pain according to the WBS, 48% were discharged with severe or worse pain according to the VRS, and 43% were discharged with a pain score of 60 and above according to the NPRS. This result is similar to other studies and it is important that the emergency physician does not assess patients' pain prior to discharge and that patients are discharged without adequate analgesia. (9,11-14) This problem can be corrected by recognizing pain as a vital sign and measuring the severity of pain at regular intervals.

LIMITATION

The limitation of our work is that the number of interventions that are applied to the illness is inadequate. This may be due to the small number of patients. We think that there is a need for large-scale studies where the number of patients is higher.

CONCLUSION

In conclusion, it was determined in this study that the level of pain is high in patients with single extremity traumas due to low energy and that their level of pain is reduced with the intervention and drug treatment applied at the emergency department. However, it was observed that the treatment for the pain of the patient was not applied adequately by the emergency physicians and that there was no pain monitoring. It was concluded that emergency physicians' lack of knowledge on pain control should be remedied and that training on newly developed pain control methods and practices should become more widespread.

Acknowledgements: We would like to thank Ertan Ararat for his language support.

Competing interests: The authors declare that they have no competing interest.
Financial Disclosure: There are no financial supports
Ethical approval: Hospital ethics committee approval was obtained for this study. The study was performed prospectively between January 2017 and March 2017 at the emergency department.

REFERENCES

1. Gross E.A., Martel M. Multiple Trauma, Chapter 36 Trauma part 2. John Marx Robert Hockberger Ron Walls Rosen's Emergency Medicine, Concepts and Clinical Practice, 8th Edition New York: Mc Grav Hill Education; 2013. p. 287-98.
2. Ahmadi A, Bazargan-Hejazi S, Heidari Zadie Z, et al. Pain management in trauma: A review study. J Inj Violence Res. 2016;8:89-98.

3. Ferreira-Valente MA, Pais-Ribeiro JL, Jensen MP Validity of four pain intensity rating scales. PAIN. 2011;152 2399-404.
4. Stephen H Thomas. Management of Pain in the emergency department, ISRN emergency medicine volume. 2013;
5. Geiderman JM, Katz D, General principles of orthopedic injuries. chapter 49, orthopedıc lesıons. Section Three. Rosens 2014.
6. Alavi NM, Aboutalebi MS, Sadat Z. Verbal and. non-verbal rating scales in the determination of pain severity in trauma patients in the emergency department. Trauma Mon. 2017;22:e25780.
7. Motov SM, Marshall JP. Acute pain management curriculum for emergency medicine residency programs. Acad Emerg Med. 2011;18:S87-S91.
8. Silka PA, Roth MM, Geiderman JM. Patterns of analgesic use in trauma patients in the ED. Am J Emerg Med. 2002;20:298-302.
9. Haonga BT, Makupa JE, Muhina RI, et al. Pain management among adult patients with fractures of long bones at Muhimbili Orthopaedic Institute in Dar es Salaam, Tanzania. Tanzan Health Res. 2011;13:107-11.
10. Adam J. Singer, Judd E. Hollander. Wound evaluation chapter 39. Wound Management. section 6. Tintinalli JE, Stapczynski JS, Ma OJ, Yealy DM, Meckler GD, Cline DM, editor. Tintinalli's Emergency Medicine: A ComprehensiveStudy Guide. 8th ed. New York: Mc Grav Hill Education; 2016. p. 263-67.
11. Pollack CV Jr, Viscusi ER. Viscusi. Improving acute pain management in emergency medicine. Hosp Pract(1995). 2015;43:36-45.
12. Todd KH, Ducharme J, Choiniere M, et al. Pain in the emergency department: results of the pain and emergency medicine initiative (PEMI) multicenter study. J Pain. 2007;8:460-6.
13. Silka PA, Roth MM, Geiderman JM. Patterns of analgesic use in trauma patients in the ED. Am J Emerg Med. 2002;20:298-302.
14. Puntillo KA, Wild LR, Morris AB, et al. Practices and predictors of analgesic interventions fo radults undergoing painful procedures. Am J Crit Care. 2002;11:415-29.