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The Prevalence of Pain and the Role of Analgesic Drugs in Pain Management in Patients with Trauma in Emergency Department

Shahram Paydar[1], Masoumeh Alizadeh[2], Reza Taheri[2], Seyed Mohsen Mousavi[3], Hadi Niakan[1], Nazanin Hoseini[2], Shahram Bolandparvaz[1], Leila Shayan[1], Zahra Ghahramani[1], Hamid Reza Abbasi[1]

[1] *Trauma Research Center, Shahid Rajaee (Emtiaz) Trauma Hospital, Shiraz University of Medical Sciences, Shiraz, Iran*

[2] *Trauma Research Center, Department of Surgery, Shiraz University of Medical Sciences, Shiraz, Iran*

[3] *Trauma Research Center, Shahid Rajaee (Emtiaz) Trauma Hospital AND Trauma Research Center, Department of Surgery, Shiraz University of Medical Sciences, Shiraz, Iran*

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Abstract

Background: Pain could potentially affect all aspects of patient admission course and outcome in emergency department (ED) when left undertreated. The alleviation of acute pain remains simply affordable but is usually, and sometimes purposefully, left untreated in patients with trauma. This study challenged the conventional emergency department policies in reducing the intensity of acute pain considering the pharmacological treatments.

Methods: In this case-control study, the prevalence and intensity of pain in 200 patients were evaluated on admission (T1) and 24 hours later (T2) based on the valid, standardized 10-point numeric rating scale (NRS 0-10) for pain intensity. A group of patients received analgesic drugs and others did not. Changes in pain patterns regarding different aspects of trauma injuries in these two groups were compared.

Results: The pain prevalence was high both on admission and 24 hours later. 51.5% of the study population received analgesics and 77.6% of them reported a decrease in the intensity of their pain. Only half of the patients, who did not receive any medication, reported a decrease in their pain intensity after 24 hours. The most beneficial policy to manage the acute pain was a combination therapy of the injury treatment and a supplementary pharmacological intervention.

Conclusions: Pharmacological management of pain in patients with trauma is shown to be significantly beneficial for patients as it eases getting along with the pain, and still seems not to affect the diagnostic aspects of the trauma. Pain management protocols or algorithms could potentially minimize the barriers in current pain management of patients with trauma.

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Introduction

Pain is one of the most disturbing symptoms physicians may face in the Emergency Department (ED) (1-4). When undertreated, this physiological phenomenon may affect nearly all dimensions of patients' management course (4). Besides, studies which have focused on describing the prevalence and relief of acute pain in trauma patients are of shortage (2). However, several studies have concluded a mismanagement of acute pain in EDs. Nevertheless, the alleviation of acute pain remains simply affordable (5). Trauma patients are of that group of patients who receive fewer attentions from health staff to manage their painful conditions sufficiently (6-11). The purpose of this study is to challenge the quality of the conventional ED pain management policies considering the analgesics as add-ins.

Materials and Methods

This is a cross-sectional study was done at Rajaee Hospital, a tertiary care center of Shiraz University of Medical Sciences and a level I trauma center in South Iran. Local institutional review board approval was obtained. Patients have been entered the study after

Corresponding Author: Zahra Ghahramani
Trauma Research Center, Shahid Rajaee (Emtiaz) Trauma Hospital, Shiraz University of Medical Sciences, Shiraz, Iran.
Tel: +98 71 36360697/Fax: +98 71 36254206, E-mail: ghahreman2@yahoo.co.nz

informed consent was taken.

Data collection took place in Rajaee Hospital which has a 24 hours accessible ED in South Iran, with a huge load of trauma patients, to contend with. Rajaee trauma center is considered to have the first ranking among same centers, respecting referral cases, in South Iran. The pain relief, in Rajaee trauma center, is only based on the physicians' order, and there was not any defined protocol or algorithm for pain relief at the time of this study. The sample for this study consist all patients visited in Rajaee Hospital ED over a 3-month period in 2011 who fulfilled these inclusion criteria:

a. Age $\geq$ 15 years
b. Fluency in speaking Persian
c. Glascow coma scale (GCS) = 15
d. Negative history of any trauma to head
e. The ED visit is not because of a suicidal attempt
f. Hemodynamically stable regarding circulation
g. Filling the informed consent.

200 patients met the inclusion criteria. Each patient was surveyed closely for 24 hours after ED admission. The study team consisted of Rajaee Hospital ED nursing staff, one oriented medical student to interview the patients. Furthermore, we had planned to help patients getting oriented how to answer the questionnaire.

Patients were interviewed using an 11-point numeric rating scale (NRS 0-10) for pain, which is known as a valid and reliable method for self-evaluation of pain intensity in the ED (2,12). Any nurse involved in any aspect of ED course of each patient was interviewed as well. Specific items on pain management, including patient's vital signs, white blood cell count, standardized NRS, pharmacological and non-pharmacological treatments, cause of trauma, site of trauma to the body and injury severity score (ISS) were included in a questionnaire which was filled in both by patients and health care staff. All data were acquired on admission (T1) and 24 hours later (T2). Note that any medication (e.g. analgesics) prescribed for our study population was particularly ordered by physician and the study observers had no idea whether any medication was used at the time of interviewing each patient. When reviewing the records, paracetamol, opioids, non-steroidal anti-inflammatory drugs (NSAIDs), and acetaminophen and codeine were found to be administered during this study. Face validity on this questionnaire was received from members of Local Institutional Board of Shiraz University of Medical Sciences on pain expertise.

The exclusion criteria were defined as: (a) deterioration of GCS, as it gets < 15, (b) need for intensive medical care, (c) when the patient becomes hemodynamically unstable, (d) uncooperative patient is exhibiting any sign of aggression and (e) providing patient's unwillingness to continue the study.

SPSS for windows (version 16; SPSS Inc., Chicago, IL, USA) was used to statistically analyze the data. Results were statistically reviewed by frequencies, means, and standard deviations. A significance level of 0.05 was defined for all statistical tests. The NRS was divided into four categories: no pain (0 on the NRS), mild pain (1-3 on the NRS), moderate pain (4-6 on the NRS) and severe pain (7-9 on the NRS).

Results

A total of 200 patients met the inclusion criteria. They ranged from 15 to 82 years of age. The mean age was 33 years [standard deviation (SD) = 15.61] while the majority ranged from 18 to 36 years of age. 25.5% of the study population was women, whereas men formed 74.5%. Car accidents and motor vehicle turnovers formed 63% of admissions.

We used the 11-point NRS for self-pain evaluation as a core index to find out patients' satisfaction. This way, we made it possible to evaluate the quality of our management plan for each patient's urgent situation. Hence, we interviewed our study population primarily on admission (T1). Then were surveyed them again on 24 hours later (T2). At T1, 2 patients reported no pain, 21 patients reported mild pain intensity, 88 mentioned a moderate intensity and finally, 89 patients reported severe pain intensity. The mean value for pain intensity score was 6.6 at T1 (moderate to severe).

At T2, 17 patients reported no pain, 38 patients told their condition is mildly intense, 161 patients reported moderate intensity and 44 patients mentioned severe pain. The mean value for pain intensity score was 5.1 (moderate) at T2. The difference for mean pain intensity values at T1 and T2 was 1.5.

The following all 200 patients, statistics revealed that 27 patients (13.5%) reported no change in pain intensity, 44 patients (22%) experienced more intense pain during their ED course and 129 patients (64.5%) reported a decrease in pain intensity (Figure 1). 103 patients out of 200 (51.5%) were given medication to alleviate their painful condition. 80 patients out of these 103 (77.6%) reported a decrease in their pain intensity at T2 ($P < 0.010$). However, the pain intensity increased in 8 patients (6.7%) despite pharmacological treatment. Of course, most of these patients with increasing pain had special situations or painful procedures during their admission period, like chest tube insertion or casting. 15 patients (14.5%) reported no significant change in their pain intensity despite pharmacological therapy.

On the other hand, we found only 47% of our study population who reported a decrease in their pain intensity without receiving any medication. The point is 37% of patients in the group without medication, had experienced an increase in pain severity ($P = 0.000$). 16% reported no change in pain severity.

Data analysis showed that 85% of the medication

given group had reported a pain intensity score more than 8 (severe) at T1, but only 28% of them still experienced severe pain at T2. On the other hand, 2.5% of patients who did not receive medication had reported a severe intense pain at T1 and this percentage remarkably rose to 16.5% at T2 (P = 0.027). The mean value for pain intensity difference ratio in patients who have not been given medication was 0.59 (P < 0.001) (Figure 2).

ISS is an anatomical injury scoring system for trauma patients. The majority (127 patients) of our population had an ISS below 5.54 patients out of these 127 reported a severe painful condition at T1 (42.5%). This proportion decreased at T2 (10%). When reviewing these 127 patients, 62 patients found to be given medication (48.8%), out of which 49 patients (79%) reported a decrease in their pain intensity at T2. 6 patients (9.6%) reported more pain at T2.

Sixty-one patients had ISS values ranging from 6 to 15, out of which, 28 patients (45.9%) reported severe pain at T1. 34 patients out of these 61 (55.7%) had received medication during the ED course. Again the noteworthy statistic is a group of 25 patients out of these 34 (73.5%) who reported their pain intensity decreased at T2. Only one patient experienced a more intense pain despite medication at T2 (2.9%). 12 patients had ISS more than 16. 58.3% of these patients reported a severe intense pain at T1. But at T2, this percent was decreased to 33.5. When reviewing those 7 patients out of these 12 who had been given medication, we found all 7 reporting a decrease in their pain intensity at T2 (Table 1).

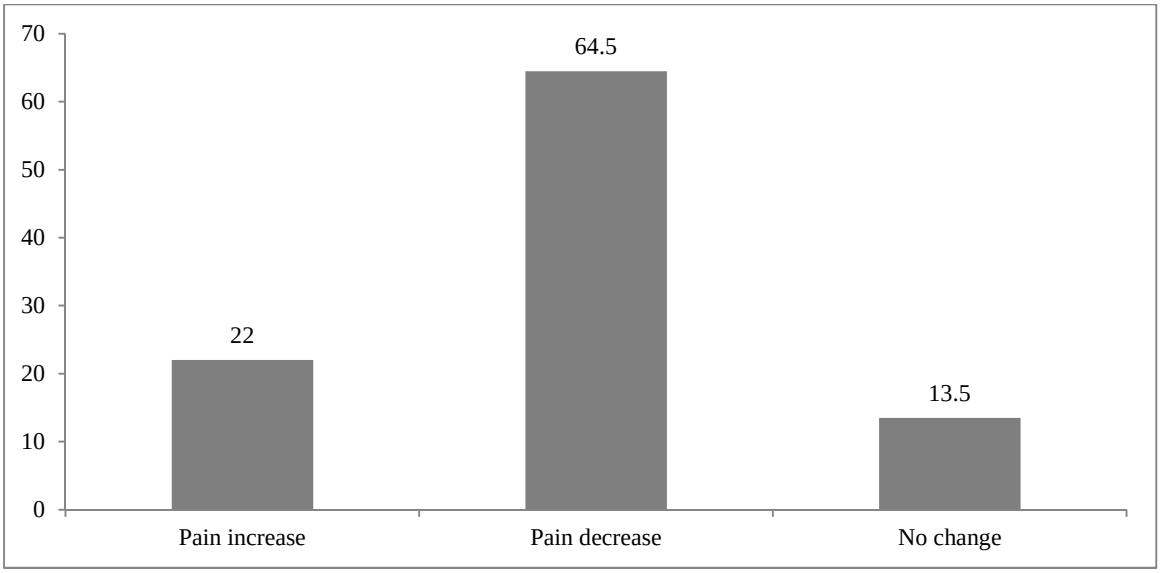

Figure 1. The pain intensity change in study population after 24 hours (in percent)

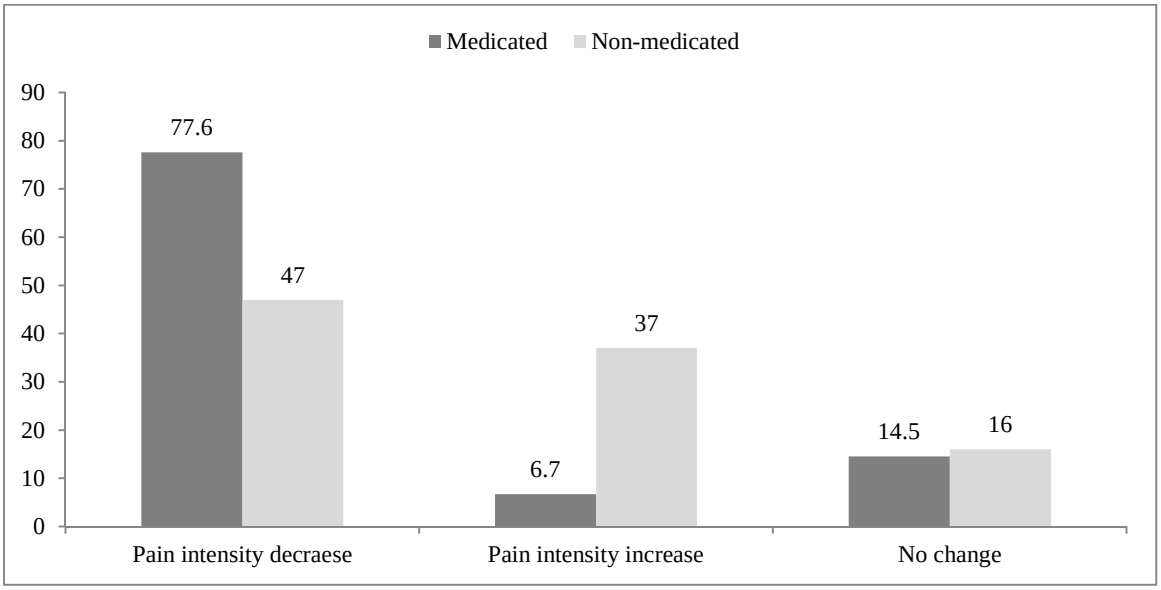

Figure 2. Pain intensity changes (in percent) in medicated group and non-medicated group of the study population

Table 1. ISS and pain intensity in study population

ISS	Patients	Time	Severe pain intensity (%)	Moderate pain intensity (%)	Mild pain intensity (%)	No pain (%)
≤ 5	127	T_1	42.5	44	11.8	1.57
		T_2	10	20.4	48.8	20.4
6-15	61	T_1	45.9	45.9	8.1	0.0
		T_2	4.9	16.3	55.7	22.9
≥ 16	12	T_1	58.3	33.3	8.3	0.0
		T_2	8.3	16.6	42.6	33.3

ISS: Injury severity score

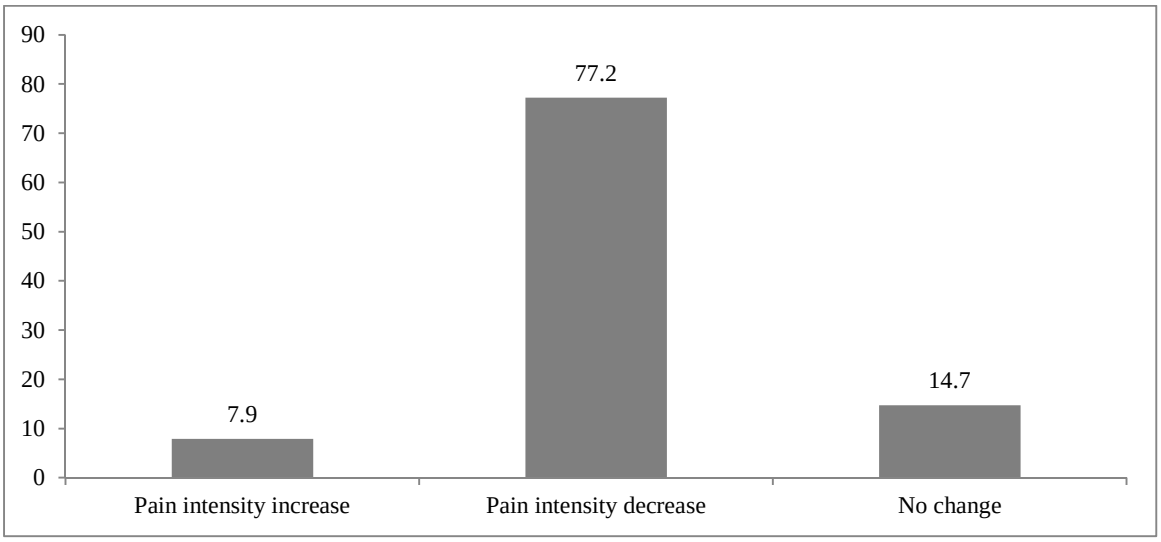

Figure 3. Effect of medication on pain intensity of patients with initial severe pain (in percent)

103 patients have received medication in our study (51.5%). We mentioned earlier that 80 patients (77.6%) in this group reported a decrease in their pain intensity at T2 (regardless of their initial pain intensity). 49 patients out of these 80 had an ISS value < 5. 25 patients had an ISS value between 6-15 and finally 7 patients had an ISS value more than 16. In medication-receiving group, 68 patients out of 88 with severe pain (77.2%) reported a decrease in their pain intensity at T2, while 7 patients (7.9%) reported an increase and 13 patients (14.7%) reported there is no change in the intensity of their painful condition when interviewed at T2 (Figure 3). Statistically analyzing the pain intensity change regarding the ISS values for our study population would give us the following graphs (Figures 4 and 5).

Discussion

Management of acute pain seems to be off the conventional ED management policies unless the patient complaints about his/her pain. Therefore, this makes pain a potential factor interfering with the outcome of patients.

This study showed that about 99% of trauma patients experienced pain at the admission time (88.5% experiencing moderate to severe pain) while 91.5% of these patients still report pain 24 hours later (72.5% still experiencing moderate to severe pain). Our findings were interestingly notable when compared to the study done by Berthier et al. (13). They reported the pain prevalence of 91% on ED arrival but 88% prevalence at T2.

Despite this theoretically accepted concept that pain management remains controversial in EDs, we tried to evaluate the prevalence of pain when it is treated pharmacologically versus common ED policy which leaves the pain, as a symptom of the structural damage, untreated.

A change in mean value of pain intensity from 6.6 at T1, to 5.1 at T2, revealed a significant decrease in pain intensity (P = 0.010). Most of our study population ranged from 18 to 36 years of age while extremities were the target for most of injuries. Because of multiplicity of trauma injuries, attributing a specific type of trauma to each NRS for self-pain intensity evaluation category still remains unsolved. Non-pharmacological treatments such as casting, stretching and reduction ice bag were considered in 47% of patients and, hence, assisted the conventional ED policy as to reduce pain intensity.

All in all, receiving pharmacological treatment found to be significantly effective as a tool to reduce the pain intensity (P = 0.038).

About 78 patients out of 103, who received medication, reported a T1 pain score more than 8. This means that lacking a defined protocol or algorithm to control pain intensity results in receiving pharmacological treatments based on the pain intensity.

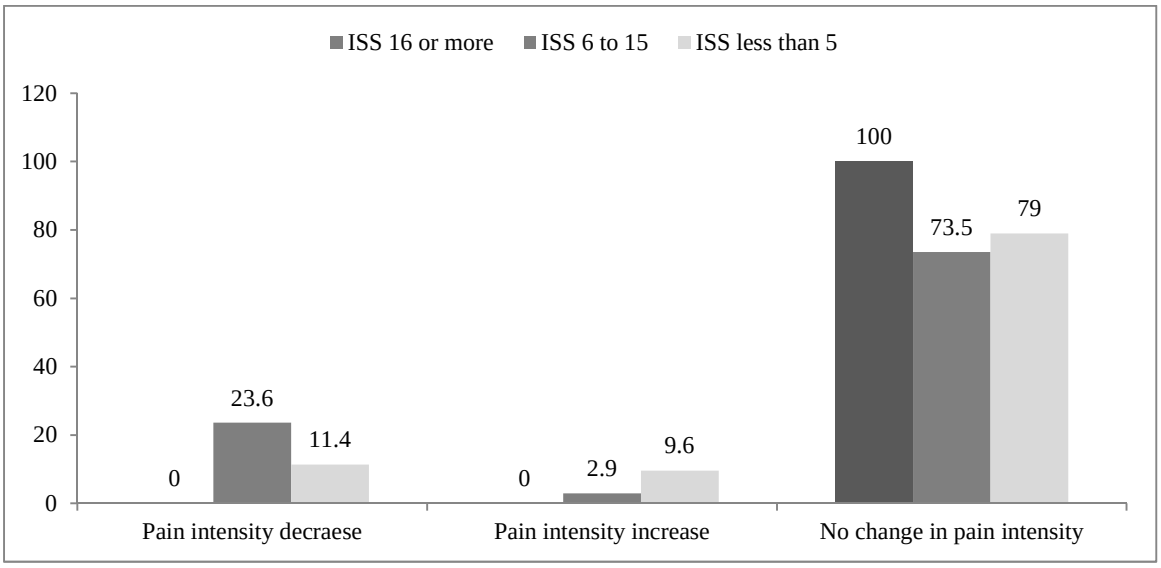

Figure 4. Relationship between pain intensity changes and injury severity score (ISS) in medicated patients (in percent)

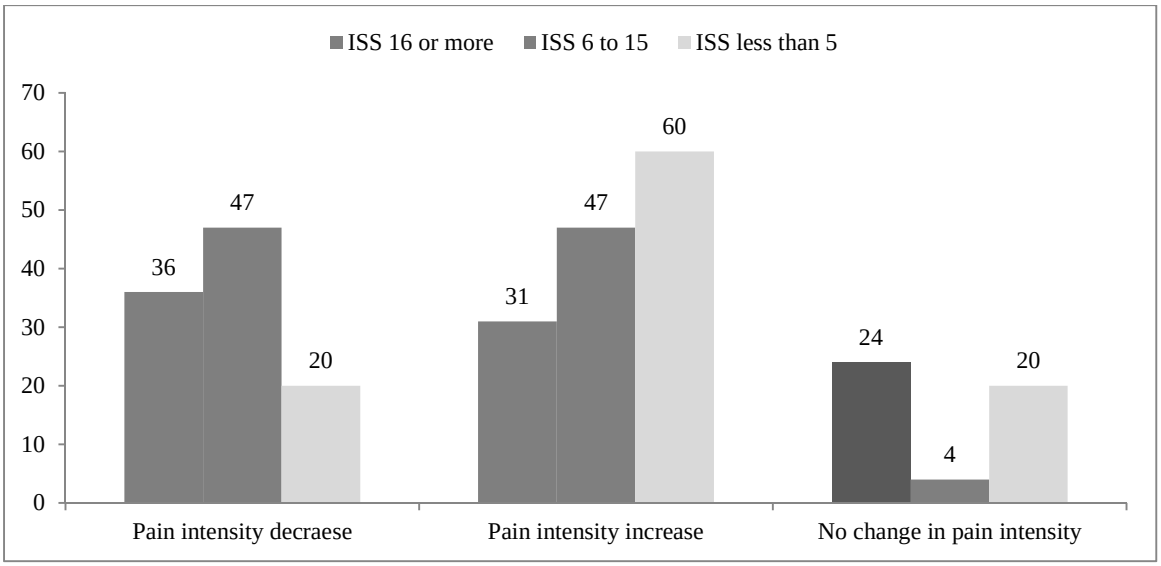

Figure 5. Relationship between pain intensity changes and injury severity score (ISS) in non-medicated patients (in percent)

14.5% of those patients who received medication reported no change in the intensity of their painful condition. However, the fact is that those 14.5% who have reported no intensity change despite pharmacological treatment had a trauma to either abdominal or thoracic cavity. Hence, they have received lower doses of pharmacological agents regarding this conventional theory that the pain in these situations is thought to be an index to clarify their definitive diagnosis.

77.6% of 103 patients who received medication plus 49% of the rest of our study population who did not receive any medication reported a decrease in the intensity of their painful condition after 24 hours. This reveals the efficacy of pharmacological treatment in decreasing the pain intensity as an acceptable fact. Furthermore, in the medication-receiving group, only a group of 6.7% of patients reported an increase in pain intensity 24 hours after T1 while this percent increases to 37% in patients who did not receive any medication. Regarding this statistics, we can state this interesting finding that pharmacological treatments are also effective in preventing any increase in the pain intensity.

Our study showed that patients who experienced an increase in their pain (44 patients) underwent a painful procedure within 24 hours, such as chest tube insertion or casting, while only 7 patients among those 44 received medication. Our study revealed a mean value of pain increment of 1.12 among patients who received pharmacological treatment and a value of 2.22 in those who did not receive any medication. After these two values were analyzed statistically, we found a significant difference between them (P = 0.038). In other word, medication also decreases the mean value

for pain increment. Moreover, when we analyzed the mean values for pain decrement in our study population, we found out a value of 3.66 with SD of 2.36 for patients who received medication and a value of 2.16 with SD of 1.21 for the rest which are significantly meaningful ($P < 0.001$). So pharmacological therapy in the ED not only decreases the pain intensity, but it also increases the mean value for pain decrement.

Even though discussing the pharmacological agents is not a matter of the current study, but 18% out of 51.5% of patients received paracetamol, 13% received opioids and finally the remained proportion received NSAIDs and acetaminophen codeine.

Taking a look on the ISS values, the statistical analysis did not reveal any significant correlation between the ISS and the pain intensity. But, the amazing finding is that there is a significant decrease in pain intensity following pharmacological therapies in all three ISS groups ($P = 0.010$), which leads us to this fact that the ISS value itself, could not be an index to initiate pharmacological treatment in order to decrease the pain intensity in trauma patients. But NRS showed to be a valid and reliable tool to start pharmacological agents. This is something against the conventional ED policy to manage pain.

Reviewing literature, we see that health care staff conventionally reports a lower pain intensity score than the patients themselves (14,15). On the other hand, the undertreatment of acute pain is still a controversial issue. In addition, studies showed that primary decision made by physicians is not based on patients' report about the intensity of their pain (16). Moreover, the attitude of each member of health staff could potentially contribute to the current issue that acute pain is undertreated and mismanaged in the EDs (5,17-19).

As a fact extracted out of our study, considering analgesic medications as the add-ins to the conventional acute pain management policies do not cause a significant change in patients' vital signs, including the blood pressure. This is what Fowler et al. (20) have discussed earlier in their study.

However, naming and approaching to the barriers to proper management of pain require further cross-sectional studies. This will clarify the prevalence of a fear of analgesic administration in order to subside pain in its acute phase among the health care personnel regarding an ancient accepted fact which claims that pain must not be suppressed because it leads us to the underlying pathologic process. This issue is the topic for our team as the next study which could theoretically boost our understanding of pain concept.

Conclusion

Pain in its acute phase in trauma patients has to be managed systematically using a standardized protocol or algorithm, in order to decide when to consider the pharmacological therapies. Pharmacological management of pain in trauma patients has been shown to be significantly beneficial for patients as it eases getting along with the pain, and still seems not to affect the diagnostic aspects of the trauma. When designed, pain management protocols or algorithms could potentially minimize the barriers in current pain management of trauma patients.

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