

**ASSESSMENT OF SEVERITY OF BURN PAIN AND ASSOCIATED FACTORS AMONG
BURN PATIENTS IN YEKATIT 12 HOSPITAL, ADDIS ABABA, ETHIOPIA, 2017**



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ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCE
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ANESTHESIA

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ABSTRACT

Background: Burn pain is a complex challenge for all health professionals and the patients. The only way to insure that patients receive quality pain relief is rely on reliable indicator of pain by the patient's self-report. Thus assessment of severity of pain and its associated factors are important in treatment plan. Inadequate assessment of burn pain may leads to inadequate pain control, which contributes to the development of chronic pain, psychiatric disorders, such as depression and posttraumatic stress disorder.

Objective: To assess severity of burn pain and associated factors among burn patients in yekatit 12 hospital from January 01, 2017 to March 30, 2017.

Methods: Hospital based cross sectional study design was conducted. Data was collected by using structured questionnaires from all eligible patients who were admitted to burn unit of Yekatit 12 hospital during the study period. Severity of burn pain was assessed by using numerical, facial and behavioral pain scale measurement tools. Multivariate logistic regression analysis was conducted to identify significant predictors based on p-value less than 0.05 with 95% confidence interval.

Results: A total of 62 burn patients were included in the study of which majority of the patients (87.1%) had felt severe pain and 12.9% had felt moderate pain. The independent predictors of severity of burn pain are age groups of ≥ 15 year old are 0.09 times less likely to feel severe pain than 1-14 years old [AOR=0.090; CI 0.009, 0.883], (P=0.039) patients and patients with total body surface area $\geq 25\%$ are 7.773 times more likely to feel severe burn pain than those total body surface area $< 25\%$ [AOR=7.773; CI 1.184, 51.043], (P=0.033).

Conclusion and Recommendation: Pediatrics age groups and high percentage total body surface area of are major associated factors of severity of burn pain. Majorities of burn patients had felt severe pain and burn pain was not appropriately treated. Therefore, health care providers were recommended treat burn patient's according pain management protocol as mentioned in WHO pain ladder of pain management.

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ACRONYMS (ABBREVIATIONS)

AAU Addis Ababa University

ASD Acute Stress Disorder

BP Blood Pressure

ICU Intensive Care Unite

LA Local Anesthesia

NSAIDs Nonsteroidal Anti-inflammatory Drugs

OR Operation Room

PTSD Post Traumatic Stress Disorder

SPSS Statistical Package for the Social Science

TBSA Total Body Surface Area

CHAPTER ONE: INTRODUCTION

1.1 Background

Burns is extremely painful and the most common causes of distress to the patients. High levels of anxiety following burn can increase the perception of pain. Poor pain and anxiety management are contributed to delay wound healing and increased hospital stay (1).

Burn injury in resource-poor settings is a complex problem. World Health Organization (WHO) estimates that the annual death due to burns in low and middle income countries is over 310,000, which accounts about 95% of all annual burn deaths(2).

According to the WHO Global Burden of Disease estimates for 2004, just over 310 000 people died as a result of fire related burns, of whom 30% were under the age of 20 years. Overall, children are at high risk for death from burns, with a global rate of 3.9 deaths per 100 000 population. These data show that, fire-related burns made up 93.0% of all burn deaths, scalds contributed 5.4% and the rest, 1.6%, were contact, chemical or electrical burns(3, 4).

Unrelieved pain in the burn injured client has been described as a significant public health problem. The long-term risk of undertreated pain is associated with the development of chronic pain, depression and Post Traumatic Stress Disorder (PTSD). Studies show there is an alarmingly high prevalence of chronic pain, Acute Stress Disorder (ASD) and depression among individuals who have suffered severe burns, rendering the issue of pain management essential in modern burn care (5).

Wound care and therapies can generate pain that is equivalent or exceeds that experienced by the patient at the time of the injury. Pain, in addition to being a source of suffering in patients, it also interfere with wound care and therapies as well as lengthen hospitalization. Because burn pain is highly variable and cannot be reliably predicted by clinical assessment of the patient or their burn wound, it recommend a structured approach to burn analgesia that incorporates both drugs and alternative therapies, which targets specific pain issues unique to the burn patient(6).

Anxiety and depression are frequently reported to accompany the pain of burns, due to the emotional and physical effects of trauma. The experience of anxiety also intensifying the perception of pain. It is important that treatment methods simultaneously target both the physical and psychological aspects of burn injuries(7).

1.2 Statement of the problem

Burn injuries are classified as one of the most devastating of all injuries and a major global public health crisis. Approximately 90% of burns occur in low to middle income countries. Burn injury is a serious pathology, potentially leading to severe morbidity, significant mortality and it has also a considerable health-economic impact (8).

Burns are the fourth most common type of trauma worldwide, following traffic accidents, falls, and interpersonal violence, yet despite of the magnitude of the problem appropriate assessment of burn related pain remains an issue(9).

There are different factors that affect the severity of burn pain, which directly or indirectly affects its management. These include age of patients, sex, degree of burn, and source of burn, duration of burn and management gaps.

Burn patient suffers from various degree of pain dependent on the period post burn & depth of burns. Usually patient with large area of full thickness burn suffers more than patient with equivalent amount of full thickness burns. The experience of pain largely related to patient development age, prior experience with pain cultural characteristics of the patient (10).

Management of burn pain is also based on tradition, personal bias, and/or institutional preference rather than based upon scientific approaches. Despite significant recent advances regarding treatment for burn victims, the inappropriate analgesic management is still seen. This is due to the complex nature of pain presented by this patient (11, 12)

Pain is a subjective experience that cannot be verified by traditional diagnostic methods. In burn unit the only way to insure that patients receive quality pain relief is rely on the severity of pain, reported by the patient"s. Thus assessment of pain is important in treatment planning programs & in establishing effectiveness of treatments.

Inadequate control of pain may diminish trust within the medical team, which may negatively affect the treatment outcome. Moreover, it may contribute to the development of chronic pain, some psychiatric disorders, such as depression and PTSD (13).

A successful treatment requires careful assessment of its nature, understanding the different types and patterns of pain and knowing the best treatment. A good initial assessment serves as a baseline to evaluate the results of subsequent interventions (14).

There are limited studies conducted in Africa and no study in Ethiopia on assessment of severity of burn pain. This study would wish to establish evidence based management of burn pain based on its severity and used as a baseline finding for other researchers.

1.3 Justification of the study

Pain is the most frequent complaint following burn injuries, which causes different psychological, physical and economic impacts on the patients. Inadequate assessment of burn pain may lead to inappropriate treatment which affects the management outcomes of the patients. Thus it increases morbidity and mortality. Therefore it is important to conduct research on this topic. This study was also helpful for programme planners and policy makers in order to implement different strategies which help to improve pain management by assessing the severity of pain during wound care procedures and enhancing quality of life in burn patients. As to my knowledge there was no study conducted on this topic in our country so that it can be used as a base line data for other researchers. There have been many studies done abroad on this topic. But, it is not possible to apply the results of those studies to our country because of quite different context.

CHAPTER TWO

2.1 Literature review

Pain scales are used to monitor pain and it is faster communication between patient and their health care providers by using the 0-10 point scale, people have a means to communicate their pain intensity and clinicians have means to track it, just as they would keep track of other vital signs, like, blood pressure, respiration and pulse rate. Pain is a subjective experience that cannot be verified by traditional diagnostic methods. This nature of pain makes measurement difficult. Yet pain cannot be effectively treated or relieved unless it is measured (15).

According to National Institute for Health, the most commonly used pain assessment methods are numerical and behavioral assessment scale. Numerical scales can be used for both adults and children who can express themselves where 0 is having no pain, 1-3 mild pain, 4-6 moderate pain and 7-10 severe pain. For children and adult patients who are unable to provide a self-report of pain, behavioral assessment scale can be used to assess pain(16).

Pain intensity is a quantitative estimate of the severity of perceived pain, and the most commonly used pain scales include the Verbal Rating Scale (VRS), the Visual Analogue Scale (VAS), and the Numerical Rating Scale (NRS) and the Faces Pain Scale (FPS), which was originally developed for children(17).

The Faces Pain Scale-Revised (FPS-R) is a visual scale composed of 6 faces illustrating an increasing level of pain intensity. Children are asked to choose the face that best describes the intensity of the pain they are currently experiencing. Scores range from 0 to 10 with the faces representing the lower and higher levels of pain intensity, 0 is no pain, 1-3 mild pain, 4-6 moderate pain and 7-10 severe pain (18).

Behavioral or FLACC Tool (Face, Legs, Activity, Cry, and Consolability), should be used to assess pain in infants or in those with cognitive impairment or language difficulties. It has five categories and each category scores on a scale of 0–2, which results in an overall score of between 0–10. The child should be observed for 2–5 minutes. The child's pain score should be assessed and recorded at regular intervals, especially before and after analgesia or after non pharmacological intervention(19).

A randomized multicenter trial reported that 72% of patients actually preferred the Faces Pain Rating Scale, when they compare with other. The pain scale used must be appropriate for the age and cognitive ability of the patient. The scales could be adapted to different languages to allow complete understanding (20).

WHO “pain ladder” guidelines recommend that pain is treated according to its severity. Mild pain, treat with non-opioid drugs such as paracetamol, non-steroidal anti-inflammatory drugs. Then, if complete pain relief is not achieved, a weak opioid such as tramadol are added to the existing non-opioid regime. If this is also becomes insufficient, a weak opioid is replaced by a stronger opioid, such as morphine, fentanyl, pethedine while continuing the non-opioid therapy. If the initial presentation is severe pain, this stepping process should be skipped and a strong opioid should be started immediately in combination with a nonopioid analgesic (21).

The study done in South Korea revealed older age (OR [odds ratio] = 1.017, 95% CI [confidence interval] 1.001–1.032, $P = 0.034$) and anxiety (OR = 1.162, 95% CI 1.020–1.324, $P = 0.024$), were significantly associated with severe pain. Female patients reported more severe pain than male patients, but the difference was not statistically significant ($\chi^2 = 3.106$, $P = 0.082$)(22).

Some studies show that women report more pain or required more analgesic medication than men. It has been suggested that men are able to tolerate more pain than women. However, this may be due to the different ways in which men and women are socialized. For example, in some societies, men are expected to be „brave” or unemotional. These expectations may be see female patients as suffering more physical pain and psychological distress than male patients(23).

Robinson et al, studied on the effect of gender and fear on of pain. Pain is a phenomenon that occurs in both men and women. After repeated thermal stimulation, but women felt greater pain intensity as compared to men(24)

According to Blankenburg M et al, there is a difference in pain intensity between adults and children. Children are feeling more pain than adults but sex differences were minimal, during childhood(25).

The majority of the studies show that pain thresholds have been reduced in elderly as compared with younger individuals. This is may be due to a possibility of reduction in endogenous pain inhibition in elderly individuals(26).

The study, conducted in Toronto, showed that in addition to gender, ethnicity was also an important factor for pain. The differences were found between white Americans and African-Americans living in the same social and geographical environment. African-Americans felt more pain than white Americans(27).

The study done in India General Hospital, Kochi, Kerala in 2015 showed a significant relation between pain and level of education. The percentage of patients who were suffering from pain increased with the level of education from 8% in the illiterates to 19% in the partially educated and then 46% in the university graduates ($P = 0.002$). This may due to increased awareness levels or constant attention to pain may intensify it(28).

The degree and percentage of total burns surface area (TBSA) accounts for the extensive differences in the perception and expression of pain. The amount of pain experienced depends on the surface area and the depth of the burn. Usually deep dermal burns or 3rd degree burns are the least painful as the nerve endings have been burnt. In contrast, patients with 1st and 2nd degree burns experience greater pain as the ultra-sensitiv nerve endings are exposed. Additionally, the higher the TBSA of patients who suffered 1st and 2nd degree burns, suffer the more intense pain(29).

According to Villarea and Meyer there is a bi directional relationship between pain and anxiety. They reported that fear and anxiety are frequently present in patients with severe burns which intensify the severity burn pain(30).

Non-pharmacological therapy is an important measure complementary to medication to manage pain and anxiety in burn patients. It should be initiated as early as possible in order to prevent the development of anxiety, which can prolong the cycle of pain (31).

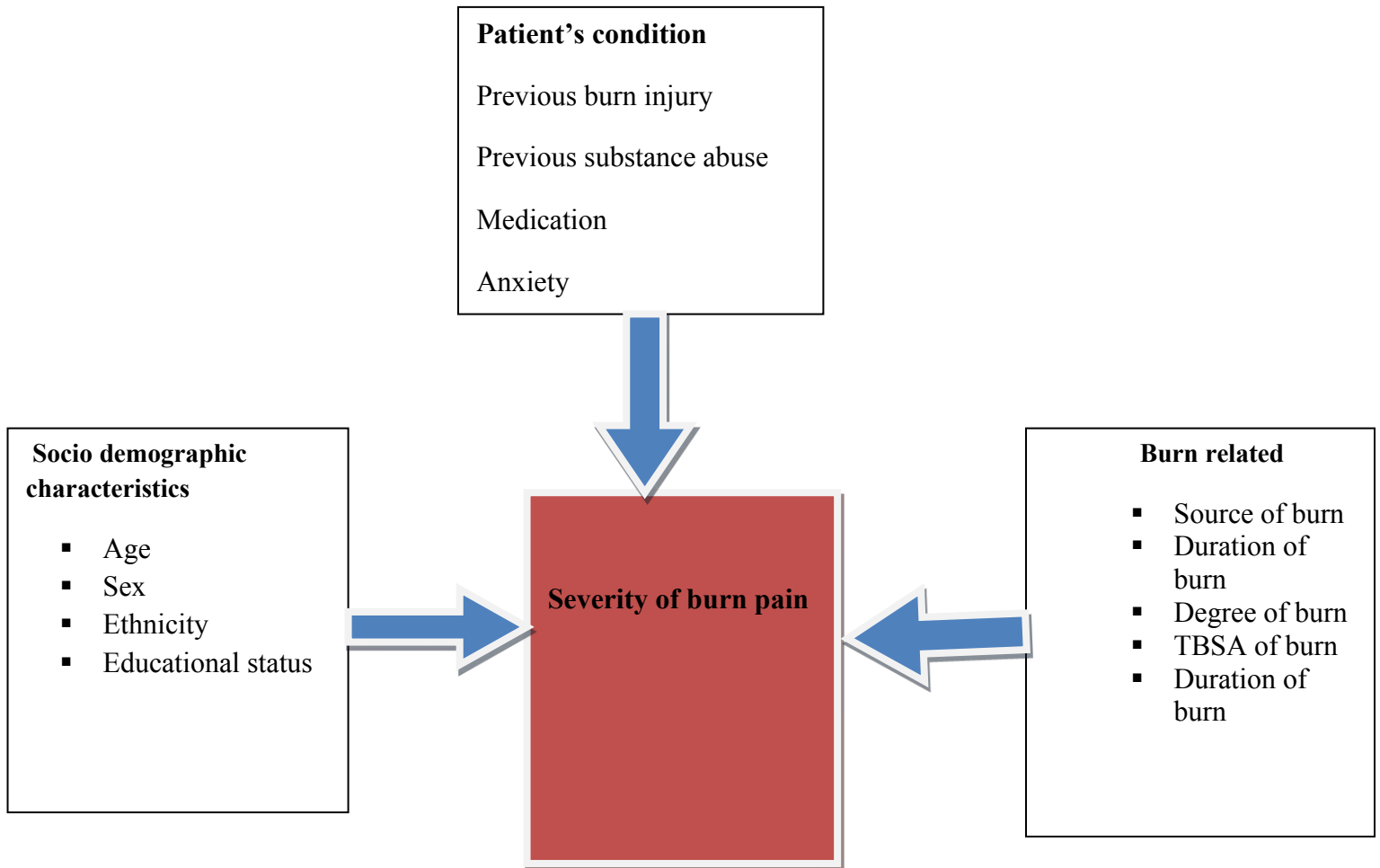
Studies at Utrecht university shows that the use of non-pharmacologic measures has also proven effective in the management of burn pain. These measures include relaxation techniques, distraction, guided imagery, hypnosis, and music therapy. Music diverts the patient,,s attention from the painful stimulus; provides reality orientation, distraction, and sensory stimulation(31).

Hypnosis is an altered state of consciousness characterized by increased receptivity to suggestion, ability to change perceptions and sensations, and increased capacity for dissociation. It has been used in pain management in burn patients during procedures and to control anxiety (32).

In randomized clinical trial, amongst women hospitalized in a burn unit, 44 patients were selected and divided into intervention and control groups. The intervention group underwent hypnotherapy sessions and the control group remained without hypnotherapy intervention. Pain and anxiety were evaluated in both groups. The degree of pain and anxiety were decreased significantly in the intervention group, as compared to the control group ($P < 0.001$)(33).

Another approach used successfully is virtual reality. It consists of a technology that isolates the patient from the real world, letting his vision only in contact with a three dimensional virtual environment. In the context of burn patients, this virtual world is called Snow World, specially created to counter sensations most commonly caused by a burn injury. In some studies, virtual reality used as a technique of distraction during procedures was effective in reducing the intensity of pain in burn patients (34).

2.2 Conceptual Frame Work



CHAPTER THREE: OBJECTIVES

3.1 General objectives

To assess the severity of burn pain and associated factors among burn patients in Yekatit 12 hospital, Addis Ababa, Ethiopia. .

3.2 Specific objectives

To assess the severity of burn pain in Yekatit 12 hospital burn unit.

To identify factors affecting severity of burn pain at Yekatit 12 hospital burn unit.

.

CHAPTER FOUR: METHOD AND MATERIALS

4.1 Study area and study period

The study was conducted in Yekatit 12 hospital burn unit, Addis Ababa, Ethiopia from January 01, 2017 to March 30, 2017. Yekatit 12 hospital is one of the hospitals under Addis Ababa city administration health bureau that has been giving routine health services for Addis Ababa and other referral cases from different regional states of Ethiopia. The hospital provides services for a population of approximately 4 million people. It has 9 departments and 6 units and has 265 beds. It has been the main referral hospital for treatment of burns patients for many years. The burn unit has 19 beds, 12 of them for adult and 7 for pediatrics. The burn unit had 11 staff (1 anesthetist & 10 nurses) those provide burn care and pain management.

4.2 Study design: Hospital based cross sectional study design was employed.

4.3 Population

4.3.1 Source population: All burn patients in Yekatit 12 Hospital burn unit.

4.3.2 Study population: Selected burn patients those fulfill inclusion criteria and admitted to burn unit of Yekatit 12 hospital during the study period.

4.4 Inclusion and Exclusion criteria

4.4.1 Inclusion criteria: All burn patients those are willing to participate in the study.

4.4.2 Exclusion criteria: patients with communication problem like psychiatric patients.

4.5 Sample size determination and sampling technique

All burn patients those fulfill the inclusion criteria in the specified time period were included in the study.

4.6 Study variables

4.6.1 Dependent variable: Severity of burn pain

4.6.2 Independent variables:

- Age
- Sex
- Ethnicity
- Educational status
- Anxiety
- Degree of burn
- Size of burn(TBSA)
- Source of burn
- Duration of burn
- Previous drug (substance) used
- Previous injury
- Management gaps (medication)

4.7 Data collection tools and procedure

Data was collected using pretested structured questionnaires which include socio demographic data of the patients and characteristics of the burn and it was collected by two degree holder nurses and supervised by one MSc anesthetist. A numerical, facial and behavioral pain scale measurement tools was employed to assess the severity of burn pain. Numerical assessment scale is used for adults and older children (>12year), facial pain assessment scale is used for children between 4-12 years and behavioral pain assessment scale is used for children 1-4 years old. Pain assessment scale was deployed for patients by data collectors before medication. The data was collected through observation, chart review and patient's interview.

4.8 Data Quality Assurance

Data was collected by using structured questionnaire, which address the objective of the study. The questionnaire was prepared in English first and translated to the local language, Amharic and afan Oromo and again back to English to ensure that the consistency of the question. Pretest was done on 5% of the study population. Data collectors and supervisors were trained on each items included in the study tools, objective, relevant of study and the right of respondents. During data collection, regular supervision and follow up was made. Investigator was checked for completeness and consistency of data on daily basis. All materials used for data collection was arranged sequentially and data was stored in safe and secure place. All materials used for data collection was arranged sequentially and data was stored in safe and secure place.

4.9 Data Analyzing and processing

The data was entered on Epi info version 7 and exported to SPSS version 20 computer program for analysis. Descriptive statistics was used to summarize data, tables and figures for display results. Bivariate and multivariate analysis was used to see the effect of independent variable on outcome variable. Variables which are significant on bivariate analysis at p-value less than 0.2 was taken to multivariate analysis. In multivariate analysis P- value of less than 0.05 was used as a cut of point for presence of association. Strength of association was measured by 95% confidence interval and odd ratio.

4.10 Ethical Considerations

Ethical clearance and approval was obtained from ethical review committee, Anesthesia department, Addis Ababa University. Permission was obtained from Yekatit 12 Hospital. Informed verbal consent was secured from every study participants. The obtained data was only used for study purpose. Confidentiality and anonymity was ensured.

4.11 Dissemination Plan

The copies of final results will disseminated to college of health science, school of medicine and department of anesthesia, ministry of health and yekatit 12hospital. After presentation on workshops and seminars, it will be send to international journals for publication.

4.12 Operational Definition

Anxiety: feeling of fear, tension and nervousness.

Acute pain: is a type of pain that related to soft tissue damage which lasts less than 3 to 6 months.

Burn: damage to the skin or other body parts caused by flame, electricity or chemical.

Burn pain: It is the actual tissue damage that resulted from burn injury.

Chronic pain: Malignant or nonmalignant pain that exists beyond its expected time frame for healing. It is persistent pain that is not amenable to routine pain control methods.

Illiterate: patients those who cannot write and read.

Primary hyperalgesia: an intense inflammatory response and the release of chemical mediators that sensitize the active nociceptors at the site of injury.

Secondary hyperalgesia: Continuous or repeated peripheral stimulation of nociceptive afferent fibers induces a significant increase in sensitivity in the surrounding unburned areas of skin.

CHAPTER FIVE: RESULTS

Socio demographic characteristics of burn patients

A total of 62 patients were included in the study over three months of the study period with 38 female and 24 male (female : male ratio of 1.6:1). Among them, the highest number 41(66.1%) are found in the age group of 1-14 years and 21(33.9%) are in the age groups of ≥ 15 years. The mean age of respondents was 12.84 with the SD of 11.05 and minimum 1year and maximum 40 years. Majority of them were Amhara and Oromo (Table 1).

Table 1: Socio demographic characteristics of burn patients in yekatit 12 hospital, Addis Ababa, Ethiopia from January 01, 2017 to March G.C. (N=62).

Variables	Categories	Frequency	Percentage	Mean $\pm$ SD
Age	1-14 years	41	66.1	12.84 $\pm$ 11.05
	≥ 15 years	21	33.9	
	Total	62	100.0	
Gender	Male	24	38.7	
	Female	38	61.3	
	Total	62	100.0	
Ethnicity	Amhara	26	41.9	
	Oromo	22	35.5	
	Gurage	7	11.3	
	Tigre	4	6.5	
	Others	3	4.8	
	Total	62	100.0	

Among adults patient's (≥ 15 years) of age severity of burn pain is increased with the level of education from 9.8% in the illiterates to 14.3% in the primary and secondary educated and then 19.1% in the university graduated (Table 2).

Table 2: Association between severity of burn pain and educational status of the patients at yekatit 12 hospital, Addis Ababa Ethiopia from January 01, 2017 to March 30, 2017 G.C. (N=62).

Severity of pain	Educational status						Total	
	Illiterate		Primary & secondary school		University graduated			
	frequency	percent	frequency	percent	frequency	Percent		
Moderate	3	14%	7	33.3%	2	13.8%	12	61.1%
Severe	2	9.8%	3	14.3%	4	19.1%	9	38.9%
Total	5	23.8%	10	47.6%	6	28.6%	21	100.0%

Burn related variables of the patients in Yekatit 12 hospital.

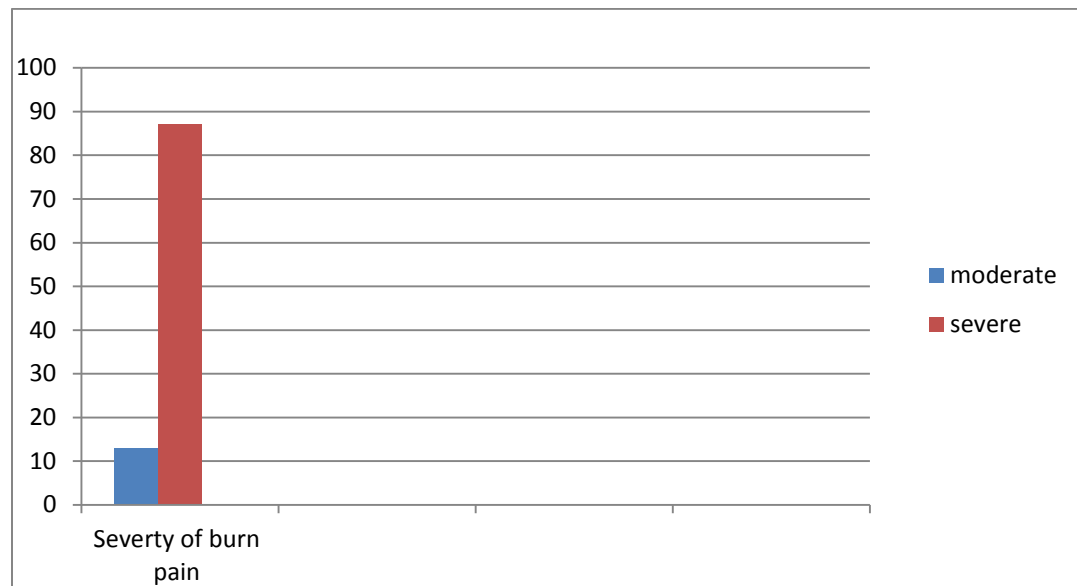


Figure 1: Categories of severity of burn pain, at yekatit 12 hospital, Addis Ababa, Ethiopia from January 01, 2017 to March 30, 2017G.C. (N=62).

Among patients who had felt severe pain majority of them 48.4% were took paracetamol and the remaining were took tramadole and diclofenac (Table 2).

Table 3: Distribution of severity of burn pain and medication given to the patients at Yekatit 12 hospital, Addis Ababa, Ethiopia from January 01, 2017 to March 30, 2017G.C (N=62).

Severity of pain	Medication						Total	
	Diclofenac		Paracetamol		Tramadol			
	frequency	percent	frequency	percent	frequency	percent		
Moderate	1	1.6%	2	3.2%	5	8.1%	8	12.9%
Severe	5	8.1%	30	48.4%	19	30.6%	54	87.1%
Total	6	9.7%	32	51.6	24	38.7	62	100.0%

The major causes of burn were hot water 35.5% and electricity 30.6%. Majority of the burn 74.2% were second degree burn and the rest 25.8% were third degree burn. Majority total surface area of burn was > 25% which accounts 75.8%. Most of burns duration was one month (Table 4).

Table 4: Distribution of TBSA, degree, source and duration of burn among patients at yekatit 12 hospital, Addis Ababa, Ethiopia from January 01, 2017 to March 30, 2017G.C. (N=62).

Variables	Categories	Frequency	percentage
TBSA	≤25%	15	24.2
	>25%	47	75.8
	Total	62	100.0
Degree of burn	Second degree	46	74.2
	Third degree	16	25.8
	Total	62	100.0
Source of burn	hot water	22	35.5
	electricity	19	30.6
	fire wood	10	16.1
	gas	7	11.3
	others	4	6.5
	Total	62	100.0
Duration of burn	0-30 day	39	62.9
	31-60 day	11	17.7
	61- 90 day	4	6.5
	>90 day	8	12.9
	Total	62	100.0

Among patients those had anxiety majority of them were felt severe pain and those had no anxiety had felt moderate pain.

Table 5: Relation between anxiety and severity of burn pain at Yekatit 12 hospital, Addis Ababa, Ethiopia from January 01, 2017 to March 30, 2017 G.C. (N=62).

Severity of burn pain	Anxiety		Total
	Yes	No	
Moderate	5	7	11
Severe	47	3	51
Total	52	10	62

Factors associated with Severity of burn pain

In Multivariate analysis, where 95% CI for the adjusted odds ratios were calculated among these variables, severity of pain is statistically significant with ages ($P=0.039$) and those patients whose TBSA $\geq 25\%$ ($P=0.033$) of the study groups. From those study participants whose age ≥ 15 year old the odds of feeling severe pain were 0.09 times less likely as compare to the odds of those age between 1-14 years old patients (AOR=0.090; CI 0.009, 0.883). Those study subjects whose TBSA $\geq 25\%$ the odds of feeling severe pain were 7.773 times more likely as compare to the odds of those TBSA $< 25\%$ of patients (AOR=7.773; CI 1.184, 51.043) (Table 6).

Table 6: Patient characteristics and associated factors of severity of burn pain at yekatit 12 hospital, Addis Ababa, Ethiopia from January 01, 2017 to March 30, 2017 G.C. (N=62).

Variables		Severity of pain		Odds Ratio		P-Value	95% C.I
		moderate	severe	Crude	Adjusted		
Age	1-14 year	1	40	1		0.039*	0.009,0.883
	≥ 15 year	7	14	0.050	0.090		
Sex	male	6	18	1		0.102	0.526, 20.452
	Female	2	36	6.000	3.278		
Degree of burn	Second	3	43	1		0.072	0.036, 1.155
	Third	5	11	0.153	0.204		
TSAB	$< 25\%$	6	9	1		0.033*	1.184,51.043
	$\geq 25\%$	2	45	15.00	7.773		
Anxiety	Yes	5	47	0.248	0.262	0.151	0.042, 1.629
	No	3	7	1			

CHAPETR SIX: DISCUSSION

In this study majority of the patients (87.1%) had felt severe pain and most of them (48.4%) were treated by paracetamol, 30.6% were by tramadol which is weak opioid and the rest were treated by diclofenac. However, WHO “pain ladder” guidelines of pain management recommended that severe pain should be treated with strong opioids (21), otherwise it leads to in adequate pain treatment which end up with chronic pain.

These study revealed that females patients feel more severe burn pain than male patients, but the difference was not statistically significant which is comparable with the study done in South Korea shows that female patients reported more severe pain than male patients, but the difference was not statistically significant (22). This may be due to the effects of female sex hormonal excite spinal and primary afferent neuron leading to pain perception and the superficial dorsal horn of the spinal cord also have estrogen sensitive neurons, that will increase the sensitivity of pain in female. Other studies also show that women required more analgesic medication than men. It has been suggested that men are able to tolerate more pain than women. However, this may be due to the different ways in which men and women are socialized. In some societies, men are expected to be „brave“ or unemotional and these expectations may be see female patients as suffering more physical pain and psychological distress than male patients(23).

This study also shows that the study participants whose age ≥ 15 year old are 0.09 times less likely to feel severe pain as compare to those 1-14 years old patients i.e. pediatrics age groups are 11.1 more likely to feel more severe pain than adults. According to Blankenburg M, et al, there is a difference between adults and children in pain sensitivity. Children are more sensitive to pain stimuli as compared to adults(25). This is due to both physical and physiological adaptation of the children to the pain.

The study, conducted in Toronto, showed that in addition to gender, ethnicity was also an important factor for pain. The differences were found in white Americans and African-Americans living in the same social and geographical environment. African-Americans felt more pain than white Americans(27). However, in contrast to the above study, in our study there is no association of pain with ethnicity. This may be due to our study conducted in the same Race.

This study also shows that among adult's patient's severity of burn pain is increased with the level of education from 9.8% in the illiterates to 14.3% in the primary and secondary educated and then 19.1% in the university graduates which is comparable with the study done in India General Hospital, in 2015 which revealed that the percentage of patients who were suffering from pain increased with the level of education from 8% in the illiterates to 19% in the partially educated and then 46% in the university graduates. This due to increased awareness levels, they give more attention to pain which intensify the severity of pain (28).

This study also revealed that burn patients with high percentage of total surface area ($TBSA \geq 25\%$) are 7.773 times more likely to feel severe pain than those $TBSA < 25\%$ of patients. According to Miller C NS, severity of burn pain is depends on degree of burn and percentage of total burns surface area (TBSA). As the TBSA increased the patients are suffer more intense pain as compare with patients with small body surface area burned. This study also shows that second degree burn patients had felt more severe pain than third degree burn patients but the difference was not statistically significant which is comparable with the study done by Miller C NS, which stated that Patients with 3rd degree burns are felt least burn pain as compare 2nd degree burns, this is due to the nerve endings have been burnt and patients with 2nd degree burns experience greater pain as the ultra-sensitiv nerve endings are exposed (29).

This study shows that patients those had anxiety had felt more severe pain as compare to those had not anxiety. According to Villarea and Meyer also there is relationship between pain and anxiety. They reported that patients with anxiety are frequently suffer with severe burns pain (30). This may be due there is no any non-pharmacological treatment is given in our study. According to the research done in Iran shows that, the degree of pain and anxiety were decreased significantly in the patients those took non-pharmacological treatment, as compared to the control group ($P < 0.001$) (33).

6.1 Strength of the Study

- As to my knowledge this is the first study conducted in this study area specifically on assessment of severity of burn pain and associated factors; so it can be used as a baseline data for other researchers.

6.2 Limitation of the Study

- The study lacks literatures from Africa and Ethiopia.
- Sample is not adequate.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION

7.1. Conclusion

Majorities of burn patients had felt severe pain. Paracetamol was mostly used treat burn pain. Pediatrics age groups and high percentage of TBSA were major independent factors which affects the severity of burn pain. The major causes of burn were hot water and electricity. Majority of the burn were second degree burn.

7.2. Recommendation

Based on the finding of the study the following recommendations were drawn.

- Health care providers should treat burn patient's according pain management protocol as mentioned in WHO pain ladder of pain management.
- Health care providers should give non-pharmacological pain management to reduce anxiety which exacerbate severity of burn pain.
- Hospital administration should provide adequate resources needed for burn pain management.
- Researchers should conduct further researches on risk factors of severity of burn pain.
- Health care providers should measure pain by using pain measurement scale through adoption.

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Annex I: Check list

Addis Ababa University College of Health science, school of medicine department of anesthesia;
format for assessment of severity of burn pain and associated factors at yekatit 12 hospital, Addis
Ababa, Ethiopia from January 01, 2017 to March 30, 2017.

1. Card number
2. Age
3. Sex; a. Male b. Female
4. Ethnicity a. Oromo b. Amahara c. Tegre d. Gurage E. other (specify)
5. Educational status a. Illiterate b. primary school c. secondary school d. diploma e. degree and above
6. Anxiety a. yes b. no
7. Pervious burn injury or surgery A. yes B No
8. Previous substance (drug) use A. yes B No
9. Degree of burn
 - a. First degree
 - b. Second degree
 - c. Third degree
10. Duration of burn
11. Source of burn;
 - a. Electricity
 - b. Gas
 - c. Firewood
 - d. Hot water
 - e. Others
12. Do you have pain? A. yes B. No
13. If question number 12 is yes, what is the severity of pain?
 - a. mild pain
 - b. moderate pain
 - c. severe pain

14. Pharmacological drugs given for burn pain management.

A. NSAIDS

B. Paracetamol alone

C. opioid alone (specify)

D. Paracetamol with opioid

E. Ketamine alone

F. Ketamine with midazolam

G. Others (specify)

15. Is there any non-pharmacological pain management is given to the patients? A.Yes B. No

16. If question number 15 is yes what types of non-pharmacological therapies given to the patients?

Name of data collector.....

Date

Signature

Annex II: Pain score scales

- Behavioral pain assessment tool (FLACC scale) for children between 1- 4yrs who
Can't provide self-report on pain:

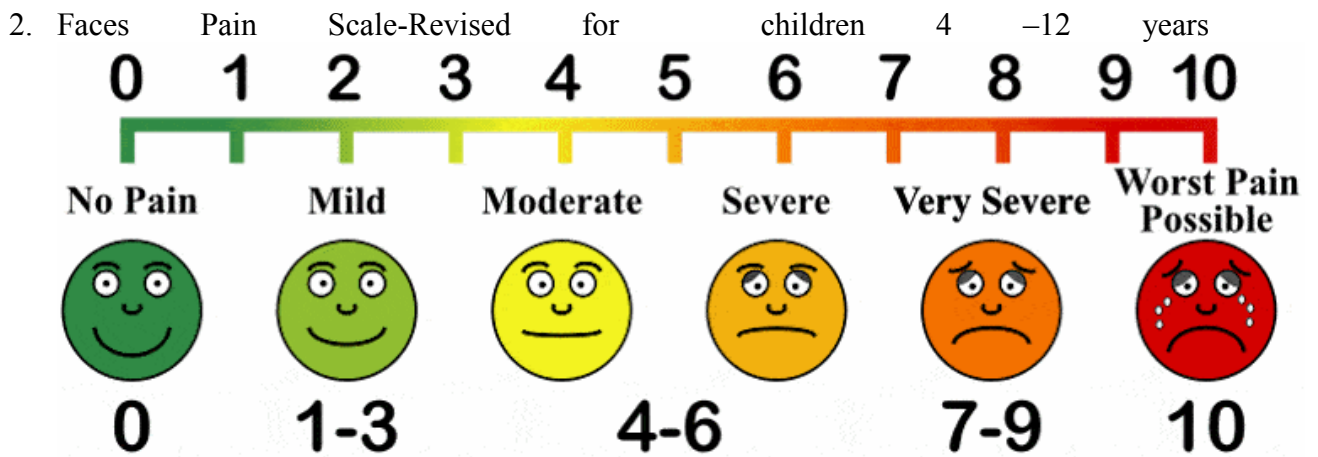
Face	0 Face muscles relaxed, smile	1 Facial muscle tension & occasional frown	2 Frequent frown, clenched jaw	Face Score
Restlessness (legs)	0 relaxed & normal movement	1 Occasional restless, shifting position	2 Frequent restless, movement may include extremities or head	Restlessness score
Muscle tone* (Activity)	0 Normal muscle	1 Increased tone, flexion of fingers and toes,	2 Rigid tone	Muscle tone score
Vocalization (Cry)	0 No abnormal	1 Occasional moans, grunts	2 Continuous moans, cries or grunts	Vocalized score
Consolability (comfort)	0 Content, relaxed	1 Reassured by touch or talk	2 Difficult to comfort by touch or talk	Consolability score
Total				

Each of the five categories (FLACC scale) F = Face, L= Legs, A = Activity, C = Cry, C = Consolability, is scored from 0-2. This results in a total score of 0–10.

NB *Assess muscle tone in patients with spinal cord lesion or injury. Assess patients with hemiplegia on the unaffected side.

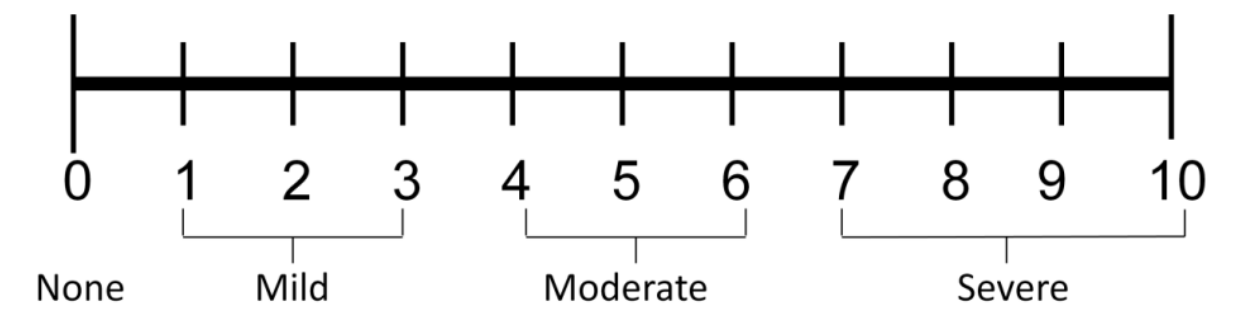
Zero = no evidence of pain. 1-3 = mild pain. 4-6 = moderate pain. 7-10 = severe pain

Behavioral pain assessment scale.(Erdek and Pronovost, 2004).



Elisabeth C, Barbara T, Ricardo C, Patricia C, Frédérique L, Christine R, Florence R, Pascale T, Bénédicte L, Alexia L, Bruno F.(2012). EVENDOL, a new behavioral pain scale for children: Design and validation. Pain.Vol 153, (8) Pg. 1573-1582.

3. The Numeric Pain Rating Scale for adult and older children (>12years).



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Dear Respondent,

My name is Negashu Dadi. I am MSC student at Addis Ababa University. I am carrying out a research on “Assessment severity of burn pain and associated factors in burn patients those admitted to Yekatit 12 hospital.” The research was approved by the Ethics and Research committee and permission is granted by the Hospital. In order to obtain the information, I have developed a questionnaire. I am kindly requesting you to participate in the study by filling in the questionnaire. Participation is voluntary and there is no penalty for declining to participate. There are no risks involved in participating in this study.

The information you provide was treated with confidentiality as permitted by law. You are not required to write your name or any other identification number on the study questionnaire. You are free to withdraw from the study at any stage without fear of victimization. The results of the study were enable clinicians to evaluate the severity of burn pain. The results of the study were availed to you after the study is completed in case you wish to know the findings. You may ask any questions about your rights as a participants or anything else about the research that is not clear. Your participation was highly appreciated.

In case of any questions or clarifications feel free to contact the principal investigator on mobile number 0912164988 or email negashudadi@yahoo.com.

Thank you.

Negashu Dadi (Investigator).

Respondent’s consent

I have read and understood the above details about the research. I voluntarily agree to participate in the study.

Respondent’s signature Date

Investigator signature..... Date.....

N.B: If participant is a child, parent/guardian to consent.