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Severity and Risk Factors of Post-Operative Pain in University of Gondar Hospital, Northeast Ethiopa

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Abstract

Background: Pain is a sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage according to Association of the Study of Pain. Despite advances in medical science inadequate post-operative pain management exists in Ethiopia and worldwide. Several perioperative and pre-clinical factors are recognized in contributing to enhancement of pain severity and its adverse effect.

Objective: This study is aimed at assessing the severity and identifying the risk factors contributing to post-operative pain.

Methodology: A hospital based cross sectional study was conducted on all patients who came to Gondar university hospital, Ethiopia operating theatre from March-of April 15, 2013. Data was collected by administering questionnaires via interview and reviewing the patients chart after taking consent. Numeric rating scale was used to assess pain severity. Logistic regression was used to identify independent risk factors for post-operative pain.

Result: 150 patients are included in the prospective study. Moderate to severe pain was reported in 85(57%) of patients in the immediate post-operative period and 117(78%) in the 1st 12 hour. On multivariate analysis ASA I and II OR (4.0) P (0.013), age less than 60 OR (2.642) P (0.042), female gender with an OR (2.580) P (0.005), general anesthesia OR (5.562) P (0.000), and incision length >10cm OR (1.991) P (0.041) were identified as independent risk factors for post-operative pain severity.

Conclusion: The study confirms that post-operative pain is still severe and under managed. Identifying perioperative factors for the occurrence of moderate/severe post-operative pain may be useful for designing factor specific interventions to relieve patient suffering.

Keywords: CPSP: Chronic Post-Surgical Pain; POP: Post-Operative Pain; GUH: Gondar University Hospital; ASA: American Association of Anesthesiologists; IASP: International Association for the Study of Pain

Introduction

Pain is defined as a sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage [1]. Although pain is a predictable part of the postoperative experience, inadequate management of pain is common and can have profound implications. Untreated post operative pain (POP) may result in clinical and psychological changes that increase morbidity and mortality also decreasing quality of life [2].

Some of the negative clinical outcomes resulting from ineffective postoperative pain management include deep vein thrombosis, pulmonary embolism, coronary ischemia, myocardial infarction, pneumonia, poor wound healing, insomnia, and demoralization, this all effects economic and medical implications, such as extended lengths of stay, readmissions, and patient dissatisfaction with medical care [3,4].

The morbidity and mortality associated with surgeries in the developing countries is high. A 5 year review of inpatient mortality in Tikur Anbessa Ethiopia, showed that there is a 7% overall and 4.5% post-operative mortality [5]. This shows us that there is still need for research on the factors that will significantly determine the perioperative morbidity and mortality.

Annually over 70 million patients in America [6] and 40 million patients in the European Union are operated [7]. Despite several advances in the understanding of pain previous researches have reported a 20-80% prevalence of moderate to severe postoperative pain [8]. Research done in Nigeria about the incidence of POP among 200 Nigerians showed that more than 68% of patients experienced moderate to severe pain while surgery conducted in the Anorectal region took 90% of the complaints [9].

Although POP is an acute response to a surgical intervention resolving spontaneously or with some analgesics sometimes it may become persistent that can lead in to chronic post-surgical pain (CPSP). In Canada surgery is a major predicting factor for chronic pain in more than 20% of persons attending pain clinic [10]. Routine procedures in GUH such as hernias and mastectomies pose greater danger [11].

Some of the risk factors are common surgical procedures that are done at the upper abdomen and thoracic region (e.g. laparatomy, Cholecystectomy, thoracotomy) [12]. Patients who have experienced acute to severe pain preoperatively are said to experience more severe pain with a tendency to develop to chronic pain [13]. Patients with ASA classification of III and above have higher tendency to develop post-operative pain [9]. Age is also another factor which has chronic relation with the development of POP. Older patients are said to experience less pain, fewer complaints and less requirements for post-operative analgesics than younger people [9]. Together with age is gender in which females and those with high pre-operative anxiety tend to develop severe post-operative pain [14]. Type of anesthesia duration and site of surgery were also other factors noted as important in increasing post-operative pain [15].

Research conducted in and out of Africa show the still uncontrolled and higher incidence of POP whilst sometimes providing the best available treatment modalities [16,17]. Currently there isn't enough evidence that shows how severe the problem is and also what the different psycho social and socio economic factors that affect POP are in developing countries.

The management of POP and prevention of all the complication that follow mainly depends on adequate knowledge on the severity of the problem. The inadequate understanding of the severity of the problem and lack of knowledge on the common risk factors POP results to poor pain management in postoperative period which has high incidence of progressing to chronic pain throughout their life. The objective of this study was to assess the severity of post-operative pain and associated risk factors.

Methodology

A hospital-based quantitative cross-sectional study was conducted from March 1- April 15, 2012 in Gondar university hospital. All patients who came to the operating theatre either for emergency or elective procedures during the study period were included except patients with the age less than 8 years, patients discharged in less than 24 h, patient with cognitive dysfunction. A pretested and structured questionnaire containing the numeric rating scale (NRS) was taken 3 times in 24 h first post operatively 2 h the return of full consciousness, second on the 12th h and third on the 24th hour. Patient's preoperative assessment, intraoperative status, medication, and post-operative events were recorded from their Medical record. Independent variables were age, sex, ASA status, premedication, type and location of surgery, type of anesthesia, previous acute or chronic painful experiences are used to predict the severity postoperative pain measured with NRS. Pain-in a NRS described as 0 -no pain, 1-3 Mild pain, 4-6 Moderate pain and 7-10 severe pain.

After obtaining ethical clearance letter from Gondar University ethical review board, Patients were interviewed at 2, 12, and 24 h after operation about the progress of pain. Two recovery room nurses were trained on numeric rating scale and patient interview by the questionnaire. Data was checked, coded and entered to SPSS version 16.0 version statistical package and analysis was made. Analytic statistics was calculated for most variables in the study. The association between the outcome and exposure variables was assessed using binary logistic regression and the chi squared test.

Results

Socio-demographic characteristics

A total of 150 patients were analyzed with patients at the age of 30-60 taking the majority (46%). The majority of the respondents were 82 (54.7%) were females, orthodox religion 144 (96%) and Amhara ethnicity 141 (94%). A total of 114 (76%) of patients were married. While the rest (23%) were unmarried that includes single, divorced and widowed (Table 1).

Variable	Frequency	Percentage
Age		
14-29	59	39
30-59	69	46
>60	22	15
Sex		
Male	68	45
Female	82	55
Religion		
Orthodox	141	94
Muslim	9	6
Marital status		
Married	114	76
Single	28	19
Divorced	5	3
Widowed	3	2
Educational status		
Illiterate	84	56
Can read and write	25	17
Primary school	17	11
Secondary school	16	11
College and above	8	5
Ethnicity		
Amhara	143	95
Tigre	7	5

Table 1: Sociodemographic of the study participants in GUH march-April 15, 2012.

Figure 1 shows the preoperative factors and the responses of patients. ASA classification showed the bulk of patients lie on ASAI and II 132(88%) while ASAIII and IV took only 18 (12%) of patients. The responsible anesthetists ordered different types of drugs for 49 (33%) of patients. While the rest of patients had none ordered, of the drugs ordered pethidine took the majority with 38 (25%) of patients

and Diclofenac 7 (5%) of patients while Tramadol and paracetamol took 0.7 and 1.3% of the cases respectively, and for around 100 (62%) of patients none was ordered.

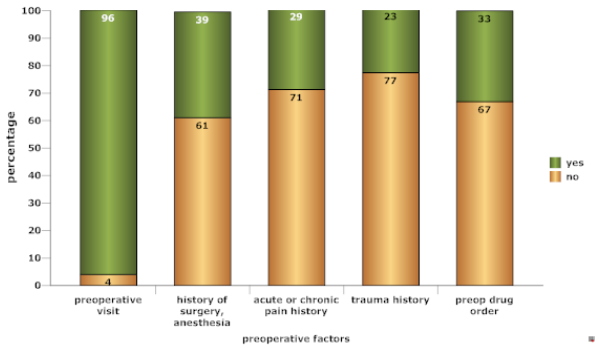

Figure 1: Percentage of preoperative factors of the study participants in GUH march-April.

Intrabdominal and Urogenital procedures took the majority of cases 100 (66%) of patients (Figure 2).

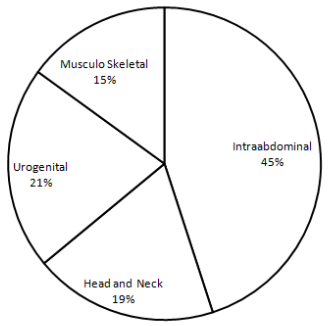

Figure 2: Pie chart showing the number and percentage of types of surgeries of the study participants in GUH march- April 15, 2012.

Intrabdominal 62% and head and neck 68 % procedures reported the most amounts of patients complaining moderate to severe pain (Figure 3).

88 (59%) patients had a greater than 10 cm surgical site incision length while the rest 41% were below 10 cm only pethidine was used as a premedication in 7 (5%) of patients. General anesthesia with inhalational maintenance was the anesthesia of choice in 56 (55%) patients.

Maintenance with Ketamine and propofol shared equal number of patients 39 (26%) each. Diclofenac 40 (27%) and pethidine 11 (7%) were the most commonly given analgesics. 18 (12%) of patients had some kind of nerve block (mostly TAP block) done for them before they went to recovery (Table 2).

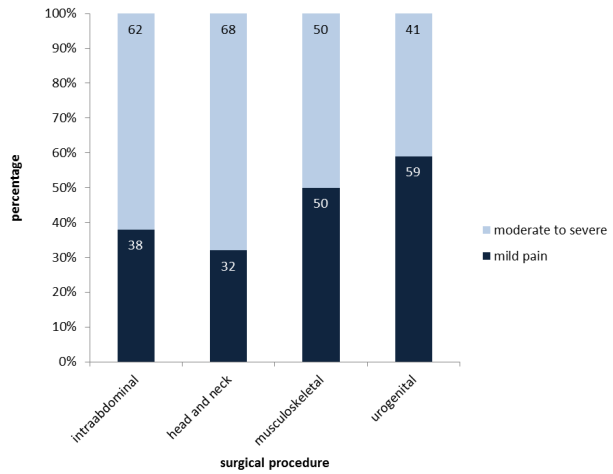

Figure 3: Association of percentage of surgical procedure versus post-operative pain of the study participants in GUH march-April 15, 2012.

Variable	Number (%)	2nd hour		12th hour	
		Mild (n)	Moderate to severe (n)	Mild (n)	Moderate to severe (n)
Type of surgery					
Intraabdominal	68 (45)	26	42	15	53
Head and neck	28 (19)	9	19	8	20
Urogenital	32 (21)	19	13	5	27
Musculoskeletal	22 (15)	11	11	5	17
Incision length					
<5 cm	27 (18)	12	15	9	18
5-10 cm	35 (23)	21	14	8	27
>10 cm	88 (59)	32	56	16	72
Premedication before induction					
Pethidine	7 (5)	1	6	1	6
None	143 (95)	64	79	32	111
Type of anesthesia					
General anesthesia	102 (68)	31	71	26	76
Spinal	46 (31)	33	13	7	39
Nerve block	2 (1)	1	1	0	2
Patient induction					
Ketamine	39 (26)	12	27	8	31
Thiopental	24 (16)	4	20	4	20

Propofol	39 (26)	15	24	14	25
Other	48 (32)	34	14	7	41
Patient maintenance					
TIVA with ketamine	15 (10)	4	11	4	11
TIVA with ketamine and propofol	8 (5)	5	3	4	4
Inhalational + Opoid	23 (15)	7	16	5	18
Inhalational	56 (37)	15	41	13	43
Other	48 (32)	34	14	7	41
Surgery time					
<1 hour	68 (45)	32	36	16	52
2-3 hour	52 (35)	26	26	13	39
>3hour	30 (20)	7	23	4	26
Anesthesia time					
<1 hour	40 (27)	17	23	7	33
2-3 hour	60 (40)	32	28	20	40
>3hour	50 (33)	16	34	6	44
Analgesic before emergence					
Diclofenac	40 (28)	18	22	8	32
Paracetamol	2 (1)	1	1	1	1
Pethidine	11 (7)	2	9	2	9
Morphine	2 (1)	1	1	1	1
Tramadol	4 (3)	2	2	1	3
None	91(61)	41	50	20	71
Nerve block before emergence					
Yes	18 (12)	10	8	6	12
No	132 (88)	55	77	27	105

Table 2: Sociodemographic of the study participants in GUH march-April 15, 2012.

The 2 hour post-operative numeric pain rating scale shows that 65 (43%) of patients experienced mild pain and 85 (57%) of patients reported that they are experiencing moderate to severe pain (Figure 4). The 12 hour pain score showed different result from that of the 2 hour in that only 33 (22%) of patients replied mild pain and the majority 117 (78%) of patients reported moderate to severe pain. At the 24th hour 71 (47%) of patients reported that they are experiencing mild pain while, 79 (53%) experience moderate to severe pain consecutively (Figure 4).

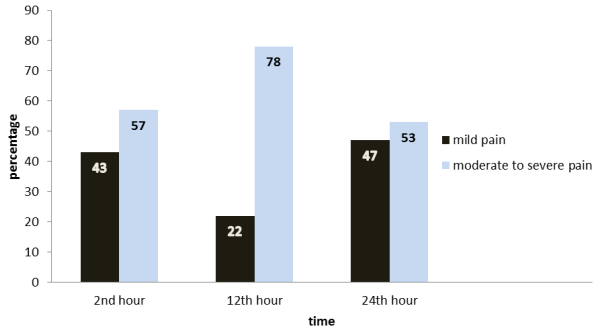

Figure 4: Bar graph showing the post-operative pain reports in different time lines of the study participants in GUH march-april15, 2012.

Univariate and multivariate analyses were carried out using the Statistical Package for the Social Sciences16 for windows. In order to control potential confounding variables, and to determine the independent association between postoperative pain and potential predictors of pain, the chi square test was employed for potential association and logistic regression was employed.

The following variables were found to have an association with moderate to severe pain post operatively.

Age OR (2.642) P (0.042) was found to show significant association with pain in the immediate post-operative period, sex with an OR (2.580) P(0.005), ASA OR (4.0) P (0.013), incision length of greater than 10 cm was another factor for causing moderate to severe post-operative pain OR (1.991) P (0.041), and type of anesthesia OR (5.562) P(0.000) (Table 3).

Variable	No or mild pain (n=150)	Moderate to severe pain (n=150)	P value	Odds ratio	95% CI
Age					
<59	51	77	0.042	2.642	(1.034-6.750)
>60	14	8			
Sex					
Male	38	30	0.005	2.58	(1.328-5.014)
Female	27	55			

ASA					
I & II	52	80	0.013	4	(1.346-11.88)
III & IV	13	15			
Incision length					
<10 cm	33	29	0.041	1.991	(1.028-3.858)
>10 cm	37	56			
Type of surgery					
Intraabdominal & Head and neck	35	61	0.025	2.179	(1.105-4.295)
Urogenital & Musculoskeletal	30	24			
Type of anesthesia					
General anesthesia	31	71	0	5.562	(2.62-11.7)
Spinal and nerve block	34	14			
Previous acute or chronic painful experiences					
Yes	23	21	0.156	1.669	(0.822-3.388)
No	42	64			
Analgesic before emergence					
Diclofenac	18	22	0.771	0.978	(0.845-1.133)
Paracetamol	1	1			
Pethidine	2	9			
Morphine	1	1			
Tramadol	2	2			
None	41	50			

Table 3: Pain severity, p value and odds ratio at the 2nd post-operative hour of the study participants in GUH march-April 15, 2012.

No significant association was found between BMI, preoperative visit, history of surgery and anesthesia, trauma history, maintenance drug surgical and anesthesia time, and whether nerve block was done or not (which were only 2 in number).

Discussion

The purpose of this study was to find out the severity of post-operative pain and to establish a relationship between the demographic, preoperative/preclinical and intraoperative factors as predictors of post-operative pain severity.

The main finding of this research is that moderate to severe pain was reported in 57% of cases 2 h after end of surgery and 78% in the first 12 hour. Despite the introduction of new standards, guidelines, and educational efforts, data from around the world suggest that postoperative pain continues to be undermanaged. Researchers agree that post-operative pain is still uncontrolled and plays a major role in the outcome of surgery. In agreement with our finding several researchers have found a 20–80% prevalence of moderate to extreme pain in post-operative patients [8]. Our observation was supported by a Meta-analysis which shows that overall, current practice standards have had minimal impact on decreasing patients' account of pain and the incidence of moderate to severe pain, and that surgical specialties such as cardiac, abdominal, and orthopaedic inpatient procedures has been reported as high as 25% to 50%, and even the incidence of moderate/severe pain after ambulatory procedures is 25% or higher [18].

In agreement with our finding a research done in Nigeria on 200 adult patients who presented for a variety of surgical procedures found out 68% of patients experienced moderate to severe post-operative pain, while the remaining 32% complained of only mild pain [9]. This is no surprise in Africa. A 5 year survey on a random sample of 250 adults who had undergone surgical procedures in the United States showed that approximately 80% of patients experienced acute pain after surgery. Of these patients, 86% had moderate, severe, or extreme pain. Experiencing postoperative pain was the most common concern in 59% of patients [19].

In Netherlands a study done to find out The prevalence of postoperative pain in 1490 surgical in patients who were receiving

postoperative pain treatment according to an acute pain protocol found out that 41% of the patients on day 0 and 30% on day 1 experienced moderate to severe pain. the fact that they were in acute pain treatment and still experiencing pain shows that we need to do a lot more to avoid post-operative pain [20].

Whatever the predictors or factors involved researchers widely agree that under treatment of acute pain is an important issue in health care. Although difficult to find researches done in Africa, In the USA alone researches have estimated that only one in four surgical patients received adequate relief of acute post-operative pain [21]. One possibility to support this outcome is the wide spread patient dissatisfaction with post-operative analgesia protocols, studies show that Patients routinely receive less analgesia postoperatively than they require and nurses tend to underestimate the amount of analgesia needed [22]. Nurses usually are remiss in using pain rating scores to assess analgesia needs, a research in Sweden showed that nearly half of nurses do not use a pain rating score for assessing pain in surgical ward [23]. Our research finding shows large proportion of patients (78%) have encountered more severe pain at the 12th hour, (which is when they are usually transferred from the recovery to their respective wards) than they had in the recovery room. This implies that the pain management and follow up of patients in the wards might be poor. Some of the restricting factors might be the "absence of pain assessment and documentation practices, absence of specific written postoperative pain protocols, deficiencies in educational pain management programmes, absence of effective analgesic techniques (e.g., epidural analgesia and peripheral nerve catheters)" and if there are any; poor adherence to available guidelines [24-26].

Another finding was that "the younger the more painful", those <60 are 2 times more likely to report moderate to severe pain than the elders. Research done in Spain for predictors of post-operative pain in abdominal procedures also puts age (OR=4.72) as a major factor [8]. This might be attributed to reduction of peripheral nociceptive function which in other words means that older people experience less pain [27]. This goes in accordance with other research which also suggests that older people require less analgesia than younger for post-operative pain management [28].

The research found out that Gender was another predictive factor in the 1st 12 h postop with an OR (2.5) P (0.05). 55 (67%) of females reported moderate to severe pain compared with 30 (44%) of males. Gender-related differences in pain have been clearly shown in experimental settings. A study done in Germany on independent risk factors for postoperative pain verifies our findings: females are 1.9 times more likely to encounter severe pain post operatively than males [26], actually studies show women are more likely than men to experience a variety of recurrent pains. "Many women have moderate or severe pains from menstruation, pregnancy and childbirth. In most studies, women report more severe levels of pain, more frequent pain and pain of longer duration than do men. Women may be at greater risk for pain-related disability than men", but women also respond more aggressively to pain treatments [29]. A study has shown that females have much lower requirements for analgesia than males [30]; another study also supports this idea in that similar doses of analgesics will have the same or greater responses in females than males [31]. Gender is also a major factor in "pain perception with females typically reporting more negative responses to pain than males" [32]. One research suggests that psychosocial factors such as "sex role beliefs, pain coping strategies, mood, and pain-related expectancies may expose females to exhibit greater sensitivity to noxious stimuli than men" [33].

Surgical incision was another major determinant of post-operative pain severity in the first 12 hours after surgery p value (0.041). In the 2nd hour of post-operative period 56 (64%) of patients with surgical incision length longer than 10 cm reported that they experienced moderate to severe pain when compared to 29 (46%) of patients with incision less than 10 cm. In accordance with our research finding a large incision together with other factors was found to be a predictive factor [34]. But one research shows that depending on surgeons experience and setup, incision length might not have any impact on post-operative outcome [35].

Our study showed that patients who had general anesthesia had a higher incidence of developing post-operative pain. Of the 102 (68%) of patients who had general anesthesia, in the second hour postoperatively, 71 (70%) of the patients (compared with 14(29%) of spinal patients) with an OR of 5.5 reported that they are experiencing moderate to severe pain. The best argument could be that spinal anesthesia has better post-operative analgesia than GA as it lasts for several hours postoperatively, but one big result is that 41 (85%) of the spinal patients reported moderate to severe pain at the 12th hour mark in relation to 76 (75%) patients in the GA group. This finding actually shows that there is an underestimation of analgesic requirement in patients who undergo surgery with neuraxial blockade in the wards. Some researchers agree that spinal anesthesia is superior in decreasing pain intensity of constant incisional pain and movement-associated incisional pain [36], but other studies results support our observation in that general anesthesia with an odds ratio of 3.96 is a significant risk factor for developing POP [16].

At the start of the study we hypothesized that those patients with a poor physical status might encounter more pain than those with a good physical status but in contrary our findings showed that those with poor physical status reported 4 times less severe pain than those with a good physical status P (0.013). This statistical result might be subject to bias in that there were 7 times more patients in the ASA I, II group than the ASA III, IV group. Researchers have a contradictory results with this aspect in that one study showed that Moderate to intense acute postoperative pain was associated with ASA III (odds ratio (OR) 1.99) [18]. While other study supports our finding in that ASA I and II patients have much more complaints of severe pain than do ASA III and IV [26].

The researcher was bound by budget and time to apply probability sampling and minimum sample size of 220, our sample size 150 from statistical point of view is few. So the research is not applicable to the larger population except for the hospital where the research is done. The data collectors were forced to collect some of the data retrospectively as it was very difficult to track down patients at the exact time of the data collection like midnight. Many of the patients included were elective schedules, which explain the lack of patients with poor physical status. The researcher believes that this might undermine or shift the severity of the outcome variable. The poor documentation system was another challenge in that it was difficult or unreliable to analyze factors such as preoperative and preinduction premedication as there was no documentation on patients chart even when the drug was given. The strengths of this study might be that this research was the first of its kind paving way for further study on the subject. And also we used the numeric rating scale which in studies proved to be the best way of documenting pain intensity.

Determining the severity and risk factors involved in postoperative pain is one way of contributing to the evaluation of health care setting in the hospital and as a Nation at large. In the present study we showed that majority of patients experienced moderate to severe pain in the first 12 h post operatively, which actually shows that the analgesic treatment and pain control are inadequate both in the recovery and the wards. We also showed that several perioperative factors have contributed to this outcome. The results from this study are even more relevant in that pain is the most important determinant factor in patient's surgical outcome.

As the research findings show that there are a large proportion of patients with acute post-operative pain. Controlling post-operative pain paves the way to avoiding complications and lessening time patients take to recover and leave from hospital, therefore decreasing any expenditure the government and the hospital has to spend. Although knowing perioperative factors for severe pain is important the researcher believes that a further study needs to focus on developing guidelines and pain services in the postoperative period.

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