COLLEGE OF HEALTH SCIENCE, SCHOOL OF MEDICINE

DEPARTMENT OF ANESTHESIA

INCIDENCE AND ASSOCIATED FACTORS OF ACUTE POSTOPERATIVE PAIN IN WOMEN UNDERGOING CESAREAN SECTION AT GANDHI MEMORIAL WOMEN AND CHILD CARE HOSPITAL, ADDIS ABABA, ETHIOPIA, 2020

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THESIS SUBMITTED TO THE DEPARTMENT OF ANESTHESIA, COLLEGE OF MEDICINE AND HEALTH SCIENCE; ADDIS ABABA UNIVERSITY IN THE PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR MASTER OF SCIENCE IN ADVANCED CLINICAL ANESTHESIA

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Declaration

I, the undersigned, take the responsibility that this thesis is my own work in partial fulfillment of the requirements for the Master of Science degree in Anesthesia. I understand that plagiarism will not be tolerated and all directly quoted materials have been appropriately referenced.

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Submission to Msc Tutor, Department of Anesthesia, Addis Ababa University

Date of Submission**:** _____

This thesis work has been submitted for examination with our approval as Advisors and Tutors on the Msc in Advanced Clinical Anesthesia course

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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. Although advances in medical science, poor post-operative pain management exists in developed as well as developing countries including Ethiopia. Several preoperative, intra-operative and postoperative factors are realized to cause enhancement of postoperative pain. Therefore in resource shortage settings to take appropriate plan of treatment and proper use of multimodal analgesia, it is obliged to identify the problem and its factors.

Objective: The aim of this study is to assess the incidence and associated factors of post-operative acute pain after cesarean section in the first 24 post-operative hours in Gandhi memorial Hospital, Ethiopia, 2020.

Methods: An institutional based prospective follow up study was conducted in parturient undergone cesarean section in Gandhi memorial hospital from December 1-2019 to February 30-2020, data was collected by through interview and reviewing the patients chart after taking consent. Numerical rating scale was used to evaluate incidence of acute postoperative pain. Data was analyzed using SPSS version 20. Logistic regression was applied to point out independent risk factors for post-operative acute pain. Variables with a p-value of < 0.05 were taken as significant association with dependent variables.

Result: A two hundred ninety parturient were participated in the study with a response rate of 98%. Moderate –severe acute postoperative pain after cesarean section was 76.2 %(95% CI: 71%, 81%) in the first 24 hours postoperatively. On multivariable analysis, history of previous cesarean section (AOR: 2.80 95% CI: 1.40, 5.55), preoperative anxiety (AOR: 2.70, 95%CI: 1.45, 5.05), transverse incision type (AOR: 3.35, 95% CI: 1.67, 6.72), incision length (AOR: 2.46, 95% CI: 1.24, 4.85) were identified as associated factors of postoperative moderate-severe acute pain after cesarean section.

Conclusion: The study confirmed that moderate-severe acute postoperative pain after cesarean section is enormous in proportion and also undertreated. Previous cesarean section, preoperative anxiety, incision type and incision length were determinants of post operative acute pain after cesarean section. Evaluate and document the pain rating scale, communicate with other integrative departments for a better management and organize a master plan to lessen the pain occurrence problem must be required.

Key words: incidence, factors, cesarean section, acute postoperative pain, Addis Ababa, Ethiopia.

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Abbreviations and Acronyms

APSP: Acute Post-Surgical Pain

ASA: American Society of Anesthesiologists

BSC: Bachelor of Science

CPSP: Chronic Post Surgical Pain

CS: Cesarean Section

DRERC: Departmental Research and Ethics Review Committee

GA: General Anesthesia

IASP: International Association for the Study of Pain

IM: Intra-Muscular injection

IPRCC: Interagency Pain Research Coordinating Committee

MSC: Master of Science

NRS: Numeric Rating Scale

NSAIDs: None-Steroidal Anti-Inflammatory Drugs

PACU: Post Anesthesia Care Unit

PCA: Patient-Controlled Analgesia

RA: Regional Anesthesia

SPSS: Statistical Package for Social Science

1. Introduction

1.1. Background

Pain is a symptom of sensory and emotional experience influenced by physiological, psychological, and situational factors. Based on the International Association for the Study of pain (IASP), pain is defined as ‘‘an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage’’ (1). The Interagency Pain Research Coordinating Committee (IPRCC) of the U.S. Department of Health and Human Services describes acute pain as “an expected physiologic experience in response to noxious stimuli that can become pathologic, is normally sudden in onset, time limited, and motivates behaviors to avoid actual or potential tissue injuries”(2).

Cognitive and emotional patient characteristics that together with other multiple factors like age, gender, level of preoperative pain, and negative psychological conditions like, anxiety and depression were found to be very important risk factors of postoperative pain (3). Several degree of postsurgical pain is expected after most surgical procedures with variable extent among individuals undergoing similar surgery. Generally, more extensive surgical procedures are associated with greater acute pain (4). Severe postoperative pain affects performance of daily activities and it contributes to persistent postoperative pain. In patients submitted to cesarean section, pain can also interfere with women’s ability to care for their babies, breastfeed effectively, and interact with their children satisfactorily (5). Self-reporting pain assessment is one of the most accurate methods, from this numeric rating scale (NRS) is easy or less complicated to understand (6). Among different techniques of post operative pain management, pharmacological methods are most common which includes opioid analgesics, Non-Steroidal Anti-inflammatory Drugs (NSAIDs) and regional techniques (7). Effective and adequate post-operative pain management increased patient ambulation, decreased the risk of morbidity, and improves maternal and fetal outcome (8). Despite several advances in the understanding of pain physiology and its management, parturient still suffer from post-surgical pain. Cesarean section is associated with post-operative pain which can result in a negative impact both on the mother and the new born at the post-operative period. Pain after cesarean birth can be related to postoperative pain from the wound and uterine contractions. Generally, multiparas experience more painful postpartum contractions than primiparas (9).

1.2. Statement of the problem

Caesarean section is one of the commonest surgical procedures in low, middle and high income countries as 3%, 36%, and 31% cesarean section rate respectively (10). A national review of cesarean section, in Ethiopia 2011 reported institutional cesarean section rate as 18% (11). A study also conducted in Addis Ababa, the capital of Ethiopia in 2016 reported 19.2% birth was by cesarean section (12).

Acute post-operative pain is the most common and anticipated problem after this procedure as data obtained from developing country hospitals, showed 62% pain incidence in all surgical procedure, from this incidence of acute post cesarean section pain was 87% (13). Postoperative pain comes from lesion in tissues or organs generating stimulus perceived as painful. This type of pain can cause a series of undesirable adverse events, like, losses for daily activities, increase consumption of analgesics, harm their capacity to care for their babies; poor wound healing and developing persistent pain (14). Untreated postsurgical pain results in reduced patient satisfaction, increases morbidity and mortality, and places a burden on health care finances. Moreover, the progression of APSP to CPSP can affect quality of life, interfere with daily activities, and result in physical disability. Therefore, early identification and adequate management of postsurgical pain is vital (15). There are many options of treatment modalities of pain management after cesarean section but there is no standard guideline specific to post operative pain management after C/S. Among treatment modalities are; systemic and intrathecal administration of opioids, patient-controlled analgesia (PCA), and Intramuscular (IM) injection of None-steroidal anti-inflammatory drugs (NSAIDs) and regional nerve blocks. Mostly these pain management modalities applied as part of multimodal analgesia, which results in additive or synergistic analgesia with lowered side effects (16).

Even though, pain management is advanced as such, parturient experience moderate to severe acute pain in the postoperative period, which was recognized as a major clinical problem that affects the mother and her baby (17). Studies done in America, Europe and Asia reported incidence rate of moderate to severe pain after C/S is 78.4% - 92% due to barriers in attitudes and educational status on both health care provider and patients about analgesics use and lack of adequate pain management service (18).

Therefore, determination and identification of incidence and associated factors of pain after cesarean section in the first 24 post-operative hours respectively was the first important event in a resource-limited environment, for proper utilization of basic analgesic modalities, and to take appropriate intervention at Gandhi memorial hospital.

1.3. Justification of the study

Inadequate management of acute pain after C/S is a major problem in the world that negatively impacts numerous aspects of patient health, and may increase the risk of developing chronic pain. Studies have shown a high incidence of moderate to severe pain after cesarean section (78.4–92.7%), which is uncontrolled and treated poorly (14, 19).

These much incidence of acute post cesarean section pain can interfere in maternal dissatisfaction, poor feeding and post depression, even if studies have shown higher incidence of postoperative pain, still there is not enough evidence about the incidence and associated factors of acute post operative pain after cesarean section in developing countries. In nowadays, very little is known about the incidence and associated factors of post-cesarean section acute pain in Ethiopia particularly in Gandhi memorial hospital but there was a published research with similar topic in Brazil by 2016; predictors for moderate to severe acute postoperative pain after cesarean section. However, there is an inter-individual variability in pain perception, assessment and recognition which is affected by genetic, social, cultural, and cognitive factors and the pain management practice in Brazil might also be different from Ethiopian hospitals, particularly Gandhi memorial hospital. These all might result different outcomes from the study done before and also there is no published research done with similar topic in Ethiopia as well as in the study area. So, it can be used as a source of information for further researchers and a sole input to the literature. This study is also helpful for program planners and policy makers to incorporate different strategies which help to improve and select appropriate post operative pain management plans for mothers undergoing cesarean section. A better way of finding incidence and associated factors of post operative pain after C/S must be continued to reduce bad outcomes of postoperative pain. Literatures, we reviewed stated that sorts of associated factors related with the development of acute post-operative pain.

Therefore, the target of this study is to recognize about the incidence and its associated factors of post operative pain after cesarean section in the first 24 hours postoperative period at Gandhi memorial hospital, Addis Ababa, Ethiopia.

2. Literature review

A caesarean section (CS) is a life-saving surgical procedure when certain complications arise during pregnancy and labor. However, it is a major surgery and is associated with immediate maternal and per natal risks. The use of CS has increased dramatically worldwide in the last decades particularly in middle- and high-income countries (20). In 2015, the World Health Organization (WHO) released a declaration on cesarean section stating that rates exceeding 10% were not associated with reductions in maternal and neonatal mortality. However, Molina et al. (2015) in their ecological study stated that national cesarean section rates up to 19% were associated with lower maternal and neonatal mortality (21). Due to different reasons caesarean section rates differ across many countries. Data obtained from 150 countries, currently, 18.6% of all births were by C/S, from similar studies the rate of C/S in Africa is 7.3% (22). Unfortunately Acute Post operative pain after cesarean section is one of the risks that can be related to at least pain from the wound and uterine contractions. Postoperative pain also impairs organ function and delays mobilization and over all recovery (9).

Descriptive patient survey conducted in Sweden, March 2007 on 60 women undergoing cesarean birth found that, women reported high levels of experienced pain during the first 24 hours, 78% of the women scored $\geq$4 on the Visual Analog Scale, and was reported as inadequately treated pain. There was no difference between elective and emergency cesarean births in the levels of pain (9).

A prospective, longitudinal cohort study conducted in New York, July 2008 on 1288 women stated that the incidence of severe acute pain within 36 h post cesarean delivery was 10.9% (23).

A prospective observational study done in Israel in 2012 on 77 women were given general and 76 taken regional anesthesia from a total sample of 153, Postoperative pain perception and analgesia requirements after C/S by using general versus spinal anesthesia showed postoperative meperidine in the first 24 h were significantly higher in the GA group while pain scores were mostly comparable between the groups. Therefore, in terms of post-operative pain control, spinal anesthesia is comparable to general anesthesia (24).

A prospective longitudinal study done in Brazil on October 2016, on 1062 women undergoing cesarean section found the incidence of moderate-sever post operative pain was 78.4%. Preoperative anxiety and intrathecal morphine with fentanyl increases moderate-severe acute postoperative pain after cesarean section, whereas intrathecal morphine with fentanyl added to bupivacaine decreases this pain (14).

A retrospective study conducted in Malaysia on September 2017, on 400 caesarean deliveries reported that BMI ≥30, operation time >60 minutes, single women and general anesthesia were independent predictors of post operative pain intensity after cesarean section (25).

A prospective double-blind randomized controlled trial study was conducted in Thailand, in 2017 on 276 vertical cesarean incisions and 304 transverse cesarean incision groups in relation to type of incision with post cesarean pain from a total of 580 pregnant women and reported that no statistical significant among body mass index, parity, history of prior cesarean delivery but in the first cesarean section, VAS of vertical group was higher than transverse group at 3, 12 and 24 hours after surgery whereas, In repeated cesarean incision, VAS of transverse group was higher than vertical group at 6 and 12 hours after operation. The postoperative pain after elective cesarean delivery of both vertical and transverse incision were comparable (26). A comparative study of bilateral ilioinguinal and iliohypogastric nerve block for postoperative analgesia in cesarean section was done in Nepal in 2017and concluded that bilateral ilioinguinal and iliohypogastric nerve block significantly lowers the consumption of tramadol and also provides adequate postoperative pain relief (27).

A cross-sectional study conducted in Pakistan in 2018 on 334 patients showed that 7.2–13.3% reported NRS >4 and required analgesia within the 1^{ST} hour in the PACU with 28 (8.4%) patients at time zero and 20 (6.0%) patients at 30 min in the PACU, But, no statistically significant difference between patients having NRS >4 and those having ≤4 in type of incision, ASA grading and duration of surgery. A statistically significant low pain scores in the initial 30 min in the PACU was observed in patients having surgery under regional anesthesia(RA) compared to general anesthesia (GA) and in patients receiving intraoperative intravenous morphine compared to tramadol when operated under GA (28).

A prospective descriptive hospital based survey done in Mulago, Uganda in 2019 on 333 women who underwent cesarean section under spinal anesthesia on post cesarean pain assessment and management in low-income country had shown that, only diclofenac, only pethidine, only tramadol and multiple pain medications were the Pain control medications used in the first 24 h following cesarean section but there were mothers who did not receive any analgesic medication. The highest pain scores were reported at 6 h (14%) (Median: 37; (IQR: 37.5) and on the others 11%, 6% pain severity was recorded at 0 hours and 24 hours respectively (29).

A study done in South Africa in 2016 from a total of 1231 patients 97 were cesarean section with the highest incidence of moderate to severe acute pain of 87%. Younger age, female gender and emergency surgery were associated factors of this higher incidence (13).

A prospective cohort study done in 2017 on 335 women undergoing cesarean section at Korle-Bu Teaching Hospital in Ghana, reported that post-surgical adhesions increased with history of previous cesarean section from the participants 38% had adhesions and 62% did not have adhesions, and also stated that Adhesions significantly increased operation time (30).

Another study done in South Africa in 2010 on wound infiltration with local anesthesia for post operative pain relief was stated that local anesthetic infiltration and abdominal nerve block provided additional pain relief (31).

A prospective longitudinal study conducted in Jimma University, Ethiopia during evaluation of quality of postoperative pain management in 2019 on 356 patients reported that Moderate to severe postoperative pain was present in 88.2% of patients (32).

A hospital based cross sectional study was conducted in Gondar, Ethiopia on September 2016 on 150 patients concluded that moderate –severe pain were 57%, 78% and 53% at 2hours, 12hours and 24hours respectively, and ASA I and ASA II, age <60, female gender, general anesthesia and incision length >10 cm were found to be independent risk factors for post-operative pain severity (33).

Unpublished research done in 2018 at Dagmawi menelik referral hospital, Addis Ababa, Ethiopia reported acute post operative moderate to severe pain among adult patients was found to be 28.3% at 2 hour postoperatively at after the end of surgery, 55.9% at 12 hour and 32.2% at 24 hour, type of anesthesia and incision length are significantly associated with postoperative pain (34).

2.1. Conceptual framework

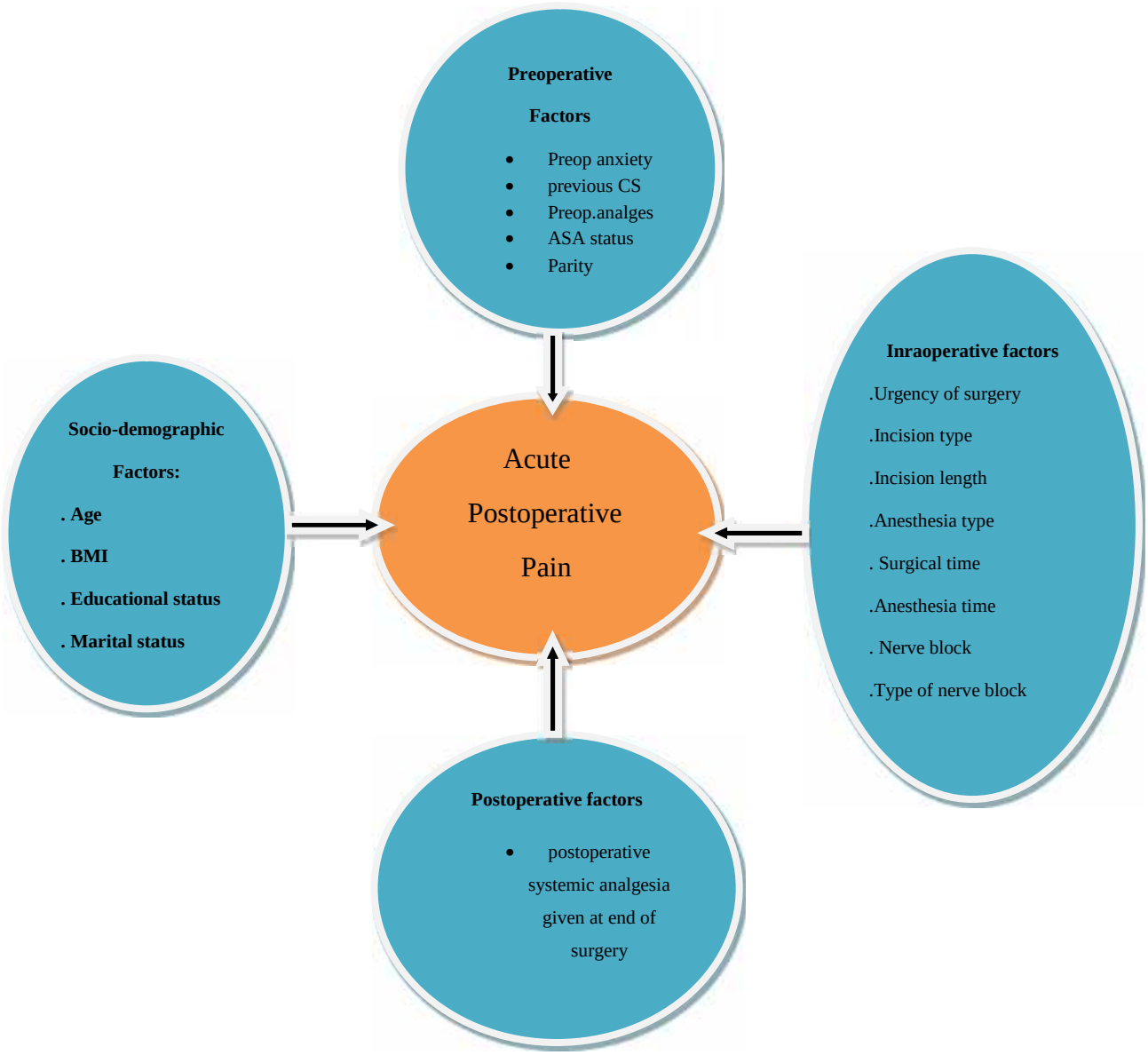

Figure 1: The relationship between acute postoperative pain and its associated factor (13, 14, 24-26, 28-30, 32, 33).

3. Objectives

3.1. General objective

To assess the incidence and associated factors of acute postoperative pain after cesarean section within the first 24 hours of postoperative period in Gandhi memorial women and child care hospital, Addis Ababa, Ethiopia, 2020.

3.2. Specific objectives

To assess the incidence of postoperative acute pain after cesarean section

To determine factors associated with postoperative acute pain after cesarean section

4. Method and materials

4.1. Study Area and period

The Study was conducted in Gandhi memorial women and child care hospital from December 1 -2019 to February 30-2020. The hospital is located in Kirkos sub city woreda 07, Addis Ababa, built in 1958. The hospital was named “Gandhi memorial hospital” for the memory of the Indian independence movement leader mahatma Gandhi. It is one of the thirteen governmental hospitals and administered by Addis Ababa city health Bureau. The hospital primarily gives services for women and children particularly gynecologic, obstetric and other reproductive health services. The hospital has 110 beds, and delivered 20 new born each day. It also has 4 operation theatres 8 to 10 cesarean deliveries done on average per day from these one-third were elective CS and around 3500 cesarean section performed annually.

4.2. Study design

An institutional based prospective follow up study was conducted.

4.3. Population

4.3.1. Source Population

The source population was all parturient who were undergoing cesarean section to Gandhi memorial women and child care hospital obstetric ward.

4.3.2. Study Population

All parturient who were undergoing cesarean section under anesthesia in Gandhi memorial women and child care hospital during the study periods that fulfilled inclusion criteria.

4.4. **Eligibility criteria**.

4.4.1. Inclusion criteria

All parturient who gave birth by CS under general or regional anesthesia

4.4.2. Exclusion Criteria

Parturient with a diagnosed cognitive dysfunction

Inability to communicate during the interview

Ongoing treatment of chronic pain

4.5. Sampling Technique and Sample Size Determination

4.5.1. Sample size determination

Sample size was determined using the finite population correction formula by assuming the proportion as 0.5 and 5% margin of error at the 95% confidence interval using the following formula:

$$n = \frac{(z\ a/2)^2\ p\ (1-p)}{d^2}$$

Where **n** = sample size, **z** = 1.96, **p** =0.5, **d** = 0.05, **CI** = 95%,

And **α** = 5%.

$$n = \frac{(1.96)^2 \times 0.5(1 - 0.5)}{(0.05)^2} = 384$$

Where **nf** = **n/ (1 + n/N)** in which **N** =873 (estimated target population in the study period).

So $nf = \frac{384}{(1 + 384/873)} = 266.7 \Rightarrow 267.$

We added 10% of **nf for the non response rate (i.e., 267+ 26 =293**). Therefore, total sample sizes of patients undergoing CS was 293.

4.5.2. Sampling technique

Every voluntary parturient fulfilling the criteria of inclusion was selected until the required sample size was achieved by consecutive sampling method undergoing cesarean section in Gandhi memorial women and child care hospital obstetric ward by signing informed consent from December 1, 2019 to February 30, 2020.

4.6. Study variables

4.6.1. Dependent Variables

- Incidence of acute post-operative pain.

4.6.2. Independent Variables

Socio-demographic characteristics:

Age

Body Mass Index

Marital status

Educational status

Preoperative factors:

History of previous cesarean section

Preoperative anxiety

Preoperative analgesics

ASA status

Parity

Intra-operative factors:

Urgency of surgery

Type of incision

Length of incision

Anesthesia type

Surgical time

Anesthesia time

Regional nerve blocks and type of nerve block.

Postoperative factors:

Postoperative systemic analgesia given at end of surgery

4.7. Data Collection

Three data collectors were assigned; two Bsc nurses, one Bsc anesthetists and on the other hand one Msc anesthetist as supervisor were trained on numeric rating scale and patient interview by the questionnaire. A detailed explanation was also given to the participants in how to point their pain intensity on numerical rating scale. Data collection procedure was including chart review and interview-based questionnaire. After the data collectors had taken informed consent, reviewed the chart and documented the pain score by using numerical rating scale at 2, 12, and 24 hours postoperatively. At the same time the given analgesics were also documented. The supervisor was controlling the data quality and its completeness at the end of data collection for a single participant.

4.8. Data collection tools

A structured and pretested questionnaire consisting of numeric rating scale was done in 24 hour first postoperatively, 2 hr after full consciousness from anesthesia, second on the 12^{th} hr and third on the 24^{th} hr.

pain-in numerical rating scale described as 0-no pain, 1-3 mild pain, 4-6 moderate pain and 7-10 sever pain. Motor and sensory senses were checked whether the parturient was free of spinal anesthesia or not. The ward and bed number of the parturient had been written by data collector before the parturient left the post anesthesia care unit (PACU). Patient's preoperative assessment, socio demographic characteristics, intra-operative status, analgesic medication and post-operative events were obtained from their Medical record.

4.9. Data Processing and Analysis

The data was entered on Epi-data software version 7 and were transferred to SPSS version 20 computer program for analysis. Descriptive statistics was used to summarize data, tables and figures for display results. The association among independent factors and the outcome variable were determined by chi-squared test, bivariable and multivariable logistic regression. The statistical significance was P <0.2 for bivariable and <0.05 for multivariable regression. Crude and Adjusted Odds Ratio were used to see the strength of the association for bivariable and multivariable logistic regression respectively. P-value of less than 0.05 was considered as statistically significant. Hosmer and lemeshow test was applied to check the goodness of fit.

4.10. Data Quality Control and Assurance

Data collectors and Supervisors were trained on each items included in the study tools, objectives, relevant of the study and right of respondents. Pretest was done on 5% of the sample size at Zewditu memorial hospital. During data collection, regular supervision and follow up was made. Investigator was cross checking for completeness, accuracy and clarity of data on daily basis.

4.11. Dissemination plan

To make this study available for researchers, experts and policy makers the completed paper will be submitted to College of Health Sciences, Department of anesthesia. In addition, a copy of this material will be given to Gandhi memorial hospital, Addis Ababa University student research office and Ethiopian Association of Anesthetists. The result will also be disseminated through publication in peer reviewed local and international journals and through presenting it in related workshops and seminars.

4.12. Operational definitions

Acute pain the pain experienced immediately after tissue injury for short duration of time with exclusion of a given length of time the tissue heals and the pain resolves, usually lasting for days (35).

Moderate-severe pain: patients having a pain score of $\geq$ 4 on numerical rating scale(33)

Anxiety: Is a fundamental phenomenon and the central problem of neurosis as well as most pervasive psychological phenomenon of our time (36)

Numerical rating scale: Is a valid pain intensity assessment tool that involves asking a patient to rate pain from 0-10 (11-point scale) with the understanding that 0 is equal to no pain and 10 equal to the worst possible pain (37). Acute pain can be reliably assessed with tools such as numerical rating scale or Visual Analog Scale, both NRS and VAS for assessment of pain intensity are equally sensitive in assessing acute pain after surgery and superior to verbal rating scale but here in our study, NRS was more applicable because ,it is uncomplicated and parturient able to understand easily (37).

American Society of Anesthesiologist status is a system for assessing the fitness of patients before surgery (38).

Parity is the number of times that the women have given birth (39).

Motor sense block free if the parturient can lift the legs up from the bed and resist the examiner (40).

Sensory sense block free if the parturient can identify light touch, warm vs. cold, and sharp vs. blunt pin (40).

4.13. Ethical Consideration

Prior to the study, ethical clearance was obtained from the Departmental Research and Ethics Review Committee (DRERC) of Department of anesthesia, School of Medicine, college of Health Sciences of Addis Ababa University and the acceptance was also obtained from the study institutions (Gandhi memorial hospital). Moreover, full clarification about the purpose of the study was made to the Authorized person of the health facility. The purpose of the study was explained to the patients who were included in the study. Verbal informed consent from the patients was asked and Confidentiality of the information was assured by using code numbers and keeping questionnaires locked and patients who were in pain during this study period were treated by their care giver, who are informed by data collector.

5. Result

5.1. Socio-demographic Characteristics of the respondents

A total of 290 parturient were recruited in the analysis with a 98% response rate. Three parturient were excluded due to incomplete data. Age, body Mass index, marital status and level of education were assessed in this character. Seventy one percent of the patients were ling between ages of 18-34 years. Majority of parturient were BMI of between 18.5 -24 (71.0%), parturient who were married were 160 (55.2%) where as parturient who were college and above were 107 (36.9%) and age groups of between 18-34years were reported moderate-severe pain of (163) (table 1).

Table 1:The frequency, percentage of parturient response and cross-tabulation of socio-demographic characteristics versus their postoperative pain after cesarean section in Gandhi memorial and child care hospital, Addis Ababa, 2020, (n= 290).

Variables	Category	N (%)	Postoperative pain in 24hours	
			None-mild(n)	Moderate-severe(n)
Age	18-34	208 (71.7)	45	163
	>=35	82 (28.3)	24	58
BMI	<18.5	8 (2.8)	1	7
	18.5-24	206 (71.0)	54	152
	24.5-30	58 (20.0)	11	47
	>30	18 (6.2)	3	15
Marital status	Single	29 (10.0)	4	25
	Married	160 (55.2)	44	116
	Divorced	91 (31.4)	20	71
	Widowed	10 (3.4)	1	9
Educational status	Illiterate	10 (3.4)	2	8
	Can read and write	51 (17.6)	11	40
	Primary school(1-8)	31 (10.7)	6	25
	Secondary school(9-12)	91 (31.4)	29	62
	College and above	107 (36.9)	21	86

5.2. Preoperative factors

Based on the report in preoperative factors, greater numbers of the respondents were kept on ASA II 250 (86.2%). Eighty six percents of the parturient did not get preoperative analgesia and those parturient who had history of previous cesarean section were 222 (76.6%). while in the contrary, parturient with preoperative anxiety were 180 (62.1%) and also those who were ASA II experienced moderate-severe pain of (194) (Table2).

Table 2: The frequency, percentage of parturient response and cross-tabulation of preoperative factors versus their postoperative pain after cesarean section in Gandhi memorial and child care hospital, Addis Ababa, 2020, (n= 290).

Variable	**Category**	**N (%)**	**Post-operative pain in 24 hours**	
			None-mild(n)	**Moderate-severe(n)**
ASA	II	250(86.2)	56	194
	>=III	40 **(** 13.8)	13	27
History of previous CS	No	68 **(** 23.4)	27	43
	Yes	222 **(** 76.6)	44	178
Preoperative anxiety	No	110 **(** 37.9)	34	76
	Yes	180 **(** 62.1)	35	145
Preoperative analgesia	No	249 **(** 85.9)	62	187
	Yes	41 **(** 14.1)	7	34
Parity	Null parity	103 **(** 35.5)	22	81
	Multiparty	187 **(** 64.5)	47	140

5.3. **Intra-operative factors**

From intra operative factor distribution, most of the participants incised transversely were 230 (79.3%), on the other hand parturient who had been done by spinal anesthesia were also 228(78.6%) whereas, parturient with an incision length of >=10 cm were 206 (71.0%) (Table 3)

Table 3:The frequency, percentage of parturient response and cross-tabulation of intra-operative factors versus their postoperative pain after cesarean section in Gandhi memorial and child care hospital, Addis Ababa, 2020, (n= 290).

Variable	**Category**	**N (%)**	**Postoperative pain in 24 hours**	
			None-mild (n)	**Moderate-severe(n)**
Urgency of surgery	Electives	98 (33.8)	24	74
	Emergency	192 (66.2)	45	147
Type of incision	Midline	60 (20.7)	24	36
	Transverse	230 (79.3)	45	185
Length of incision in cm	<10cm	84 (29.0)	27	57
	>=10 cm	206 (71.0)	42	164
Type of anesthesia	General	62 (21.4)	19	43
	Spinal	228 (78.6)	50	178
Surgical time in minute	<60 min	267 (92.1)	65	202
	>=60min	23 (7.9)	4	19
Anesthesia time in minute	<60 min	11 (3.8)	5	6
	60-180min	179 (61.7)	41	138
	>180 min	100 (34.5)	23	77
Nerve block done	No	174 (60.0)	38	136
	Yes	116 (40.0)	31	85
Type of nerve block &infiltration done postoperatively	TAP block	44(15.2)	14	30
	Infiltration	72 (24.8)	17	55
postoperative systemic analgesia at end of surgery	No	225 (77.6)	56	169
	Yes	65 (22.4)	13	52

5.4. Analgesics given postoperatively

Parturient were given different types of systemic analgesia at different times in postoperative condition. From those systemic analgesia, tramadol was frequently given (29.7%) at 2nd hour whereas 28.6% of the parturient didn't take any systemic analgesia. In the 12th hour diclofenac was given (49.0%) most commonly, and some others were not given (3.8%). At the 24th hour diclofenac was also given (37.9%) frequently, however some other parturient were not given analgesia (34.1%) (Figure 1).

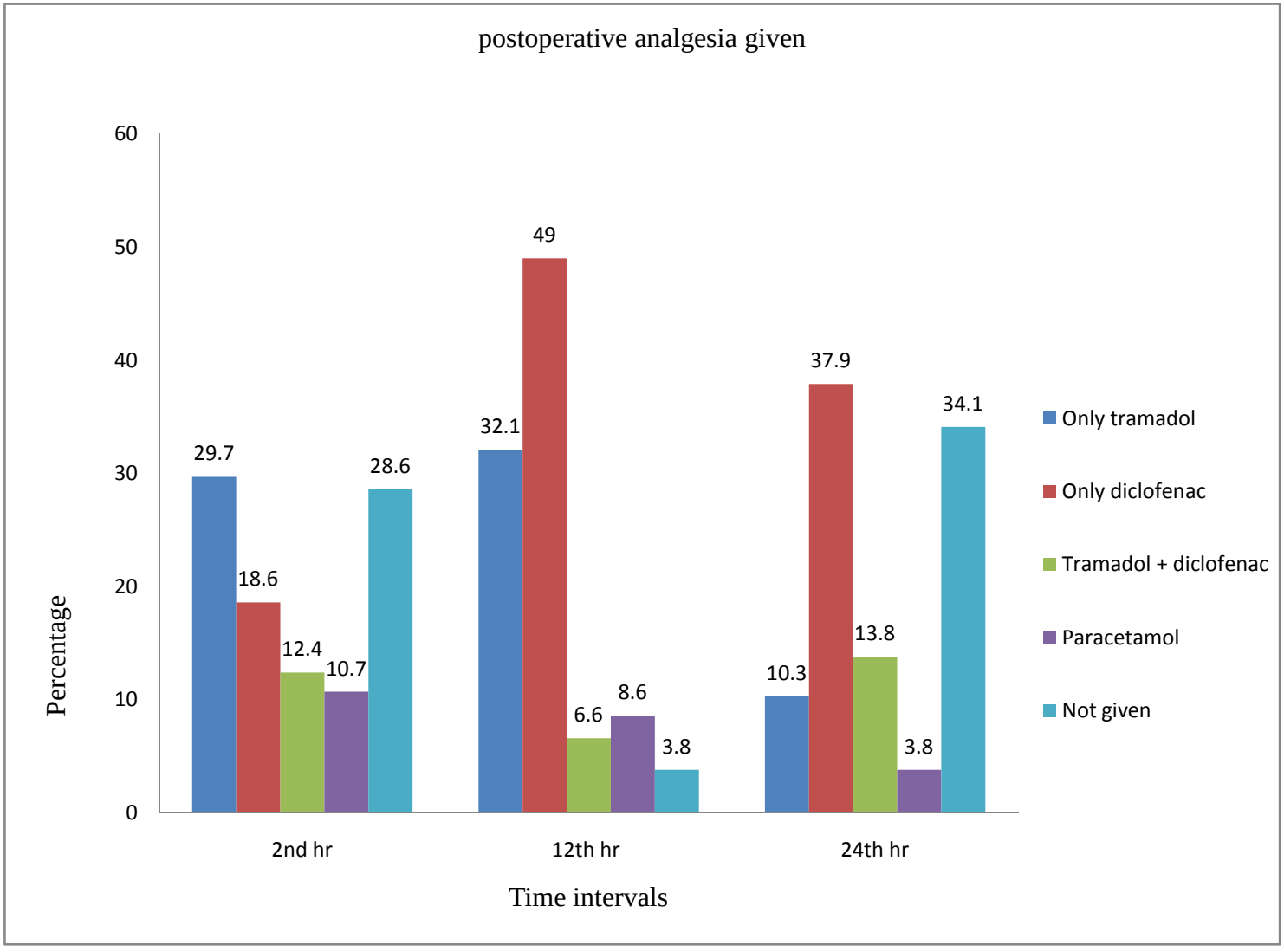

Figure 2:Systemic analgesia given in the postoperative period after cesarean section in different time intervals 2nd, 12th and 24th hours of study participants in Gandhi memorial women and child care hospital, Addis Ababa, 2020 (n=290).

5.5. Post-operative pain incidence

The incidence of moderate to severe pain after cesarean section among parturient was 53.4%, 75.9% and 52.8% at 2nd, 12th and 24th hours respectively (Figure 2). All in one, incidence of postoperative moderate-severe pain after cesarean delivery was 76.2% (95% CI: 71%, 81%) in the first 24 hours of postoperative numerical rating scale pain assessment method.

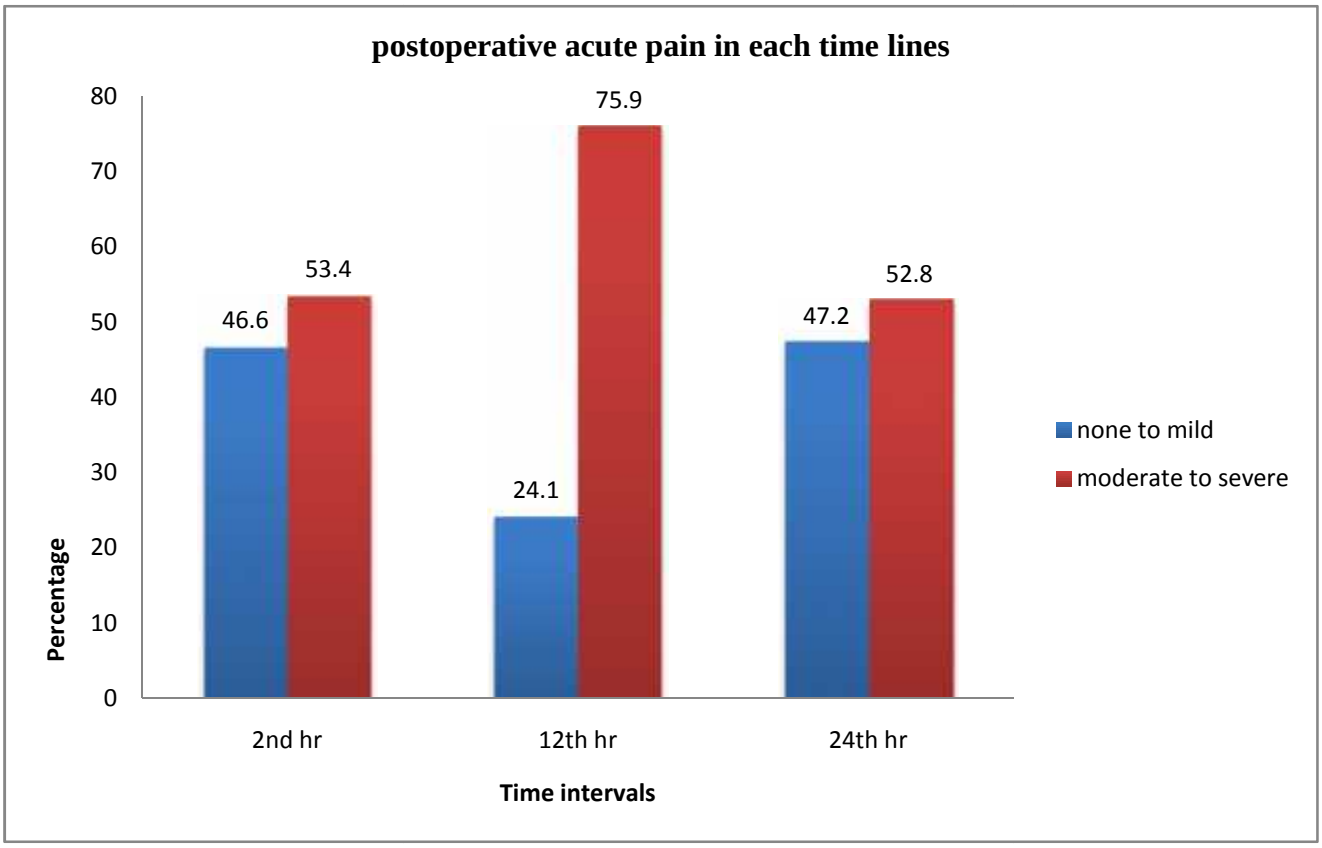

Figure 3: Acute postoperative pain reported after cesarean section in different time intervals in Gandhi memorial and child care hospital, Addis Ababa, 2020, (n= 290).

5.6. Factors associated with incidence of acute post operative pain within 24 hrs

We analyzed the variables in both bi-variable and multi-variable methods so as to control potential confounding factors and to determine the independent association between postoperative pain and factors of acute pain. On the bi-variable analysis method age, marital status, previous cesarean section, ASA status, preoperative anxiety, incision type, incision length, anesthesia type and anesthesia time were with (P-value < 0.2) (Table 4). But only the following variables were found to have association with moderate – severe pain in the post cesarean section, patients with previous cesarean section were 2.8 times to had moderate-severe

pain than those who had not history of previous cesarean section P(0.003) (AOR:2.8, 95%CI: 1.40, 5.55), patients with preoperative anxiety were also 2.70 times to experience moderate-severe pain than those who were not anxious preoperatively P(0.002) (AOR: 2.70, 95%CI: 1.45, 5.05), on the other hand patients who were incised with transverse line were 3.35 times to respond moderate-severe post operative pain than those who were incised in midline type P(0.001) (AOR:3.35, 95%CI: 1.67, 6.72), the study also showed that patients with incision length of ≥ 10 cm were also experienced 2.46 times moderate-severe post cesarean acute pain than those with incision length of < 10 cm P(0.009) (AOR:2.46, 95%CI: 1.24, 4.85).

Table 4: Factors associated with postoperative pain analyzed in both bi-variable and multi-variable logistic regression in Gandhi memorial and child care hospital, Addis Ababa, 2020.

Variables		Postoperative pain within 24 hours			Odds ratio (95% CI)	
		None-mild [N (%)]	Moderate-severe [N (%)]	P-value	COR (95% CI)	AOR(95%CI)
Age	18-34	45 (21.6)	163 (78.4)	0.15	1.00	1.00
	>=35	24 (29.3)	58 (70.7)		0.66(0.37, 1.90)+	0.61(0.31, 1.19)
Marital status	Single	4 (13.8)	25 (86.2)	0.50	1.00	1.00
	Married	44 (27.5)	116 (72.5)	0.22	0.42(0.13, 1.28)+	0.47(0.14, 1.58)
	Divorced	20 (22)	71 (78)	0.51	0.56(0.17, 1.82)	0.65(0.18, 2.34)
	Widowed	1 (10)	9 (90)	0.97	1.44(0.14, 14.65)	0.96(0.08,10.92)
Previous CS	No	25 (36.7)	43 (63)	0.003	1.00	1.00
	Yes	44 (19.8)	178 (80.2)		2.35(1.30, 4.25)+	2.80(1.40, 5.55)++
ASA status	II	56 (22.4)	194 (77.6)	0.14	1.00	1.00
	>=III	13 (32.5)	27 (65.5)		0.60(0.29, 1.23)+	0.55(0.24,1.23)
Preoperative anxiety	No	34 (30.9)	76 (60.1)	0.002	1.00	1.00
	Yes	35 (19.4)	145 (80.60)		1.85(1.07, 3.20)+	2.70(1.45, 5.05)++
Incision type	Midline	24 (40)	36 (60)	0.001	1.00	1.00
	Transverse	45 (19.6)	185 (80.4)		2.74(1.48, 5.04)+	3.35(1.67,6.72)++
Incision length in cm	<10 cm	27 (32.1)	57 (67.9)	0.009	1.00	1.00
	>=10cm	42 (20.4)	164 (79.6)		1.85(1.04, 3.27)+	2.46(1.24, 4.85)++
Anesthesia type	General	19 (30.6)	43 (69.4)	0.26	1.00	1.00
	Spinal	50 (21.9)	178 (78.1)		1.57(0.84, 2.93)+	1.48(0.74, 2.98)
Anesthesia time	<60min	5 (45.5)	6 (54.5)	0.19	1.00	1.00
	60 -180min	41 (22.9)	138 (77.1)	0.07	2.80(0.81, 9.66)+	3.69(0.87, 9.81)
	>180min	23 (23)	77 (77)	0.84	2.79(0.78, 9.98)+	3.64(0.75, 10.61)

++ . Variables significant in the multi-variable logistic regression analysis (p<0.05).

+ . Variables significant in the bi-variable logistic regression analysis (p<0.2).

1.00. Reference/indicator.

6. Discussion

The intention of this study was to find out the incidence of post cesarean section moderate-severe acute pain in the first 24 hours and to confirm whether there is an association between the demographic, pre-operative, intra-operative and post-operative factors as relevant explanatory power of post-operative acute pain incidence or not.

We assessed the incidence of postoperative pain in 290 parturient who undergone cesarean section. In this study incidence of moderate to severe pain has been found as 53.4%, 75.9% and 52.8% at 2^{nd}, 12^{th}, and 24^{th} hours respectively. The overall incidence of moderate-severe acute pain within the first 24 hours after cesarean section was 76.2% (95%CI: 71%, 81%). Although there are many different types of pain management practice standards and guidelines worldwide, this study indicates that there is inadequate treatment of postoperative pain after cesarean section. As data obtained from studies post operative acute pain after CS is undertreated and continued to be undermanaged (24, 25).

In agreement with our finding, a descriptive patient survey conducted in Sweden in women undergoing cesarean delivery reported about a 78% of moderate- severe pain with a score of $\geq$ 4 on the visual analog scale indicated pain as inadequately treated (9). Another longitudinal study in Brazil on 1062 women undergoing cesarean section reported as high incidence (78.4%) of moderate-severe acute postoperative pain which was almost agree with our finding (14). The above studies are almost consistent with our finding. There is also another study conducted in south Africa on surgical patients consisting of cesarean section, from those total procedures patients with cesarean section had reported the largest incidence(87%) of moderate-severe acute postoperative pain (13).This finding is slightly higher than ours, as parturient with cesarean section procedures in this study were not given adequate systemic analgesia in postoperative condition in relative to our cases might be the possible reason for this difference. Our study was also evidenced by another prospective longitudinal study which was conducted in Brazil on postoperative pain in women undergoing caesarean section was reporting high incidence (92.7%) of moderate-sever acute pain after cesarean section (19), the reason for this big difference from our finding was that women were having tubal sterilization procedures in addition to cesarean section this might be lead to more extensive and manipulation of surgery which in turn results more pain. Study that investigated the quality of post operative pain management in Jimma university also reported moderate-severe pain as 88.2% (32), even though both studies were done in Ethiopia, the study which was conducted in Jimma included other general surgery

procedures other than cesarean section, and thus might cause more incidence of postoperative pain than our finding. An institutional based cross sectional study on severity and risk factors of postoperative pain was conducted in university of Gondar and concluded that moderate –severe pain were 57%, 78% and 53% at 2hours,12hours and 24hours respectively, and both studies in Jimma and Gondar university implied inadequate treatment of postoperative pain in Ethiopia (33).

postoperative moderate-severe acute pain after cesarean section was also found in a sample of 1288 women investigated by a prospective follow up study in New York, where the incidence within 36 hour post delivery was 10.9% (23), which shows lower incidence than ours. This is not unexpected in New York, many factors can be considered for this inconsistent with our finding. Very good clinical practice, use of multimodal analgesia as well as regional nerve blocks as postoperative analgesia, makes lower finding than ours, whereas our study was done in a site where poor clinical practice and less standardized pain management model applied, which results high incidence of postoperative moderate-severe acute pain than that of New York.

Another prospective institutional based study done in Mulago on women who were delivered by cesarean section under spinal anesthesia had reported moderate-severe pain as 11%, 14%, and 6% at 0 hours, 6 hours and 24 hours respectively(41). But in our study the incidence was higher in different time gaps, 53.4%, 75.9% and 52.8% at 2^{nd}, 12^{th} and 24^{th} hours respectively, and the possible reason for this visible variation from our study could be, the study in Mulago was done only in spinal anesthesia which was not wearing off with 0 hours postoperative time and this could mask the incidence of pain during data collection time, in addition to this patient with general anesthesia may recover earlier than spinal which leads to the patient feels pain earlier in which our study includes and makes our finding more than Mulago.

From our finding, there was a significant association between a parturient having previous cesarean section and postoperative moderate-severe acute pain. Parturient with previous cesarean section had 2.8 times more moderate-severe pain than parturient without previous cesarean section. There was a study agreed with our finding, a randomized control trial study in Thailand found that repeated cesarean section had a marked effect on postoperative pain (26). The reason for this happening was an increased post surgical adhesions and this in turn leads to an increased operation time and more trauma, that did cause postoperative pain worse (30). In our study, there was also a significant association between parturient who were anxious preoperatively and postoperative pain, parturient who had preoperative anxiety were 2.70 times faced more moderate –severe postoperative pain than those who were not anxious, and this finding was supported by a prospective longititudinal study done in Brazil directed with our finding, as preoperative anxiety increased moderate-

severe acute postoperative pain after cesarean section was 1.6 times than those who were not anxious, this was due to psychological change that included anxiety, frustration and other emotional responses that had an influence on patient recovery which means high preoperative anxiety can result moderate-severe pain in the post operative period (14). In addition to these, type of incision had a significant association with postoperative moderate-severe acute pain after cesarean section; patients with a transverse (pfannenstiel) incision were 3.35 times experienced postoperative pain than those who had midline incision. The study that supported our finding was done in Thailand, it was a prospective double-blind randomized controlled trial tried to compare incidence of postoperative pain in both vertical (midline) and pfannenstiel (transverse) incision group, finally found that in repeated cesarean section, incidence of postoperative pain was higher in pfannenstiel (transverse) group than vertical(midline) group at 6hrs and 12hrs postoperatively but in first cesarean section the incidence of pain was higher in vertical(midline) group than pfannenstiel(transverse) group, in first cesarean section cases the length of incision was 10 cm which was optimal and may be considered as the feasible rationale for this finding (26). But in our finding most of our cases were incised with an incision length of greater than 10 cm (71%) and had previous cesarean section or repeated cesarean section (76.6%), all of these in turn made the parturient have more moderate-severe postoperative pain in our study. Incision length was also significantly associated with postoperative pain incidence during our study; parturient with an incision length of $\geq$ 10 cm were 2.46 times felt moderate-severe pain than those who had an incision length of < 10 cm. A cross sectional study done in Gondar, Ethiopia supported to our finding that parturient with incision length > 10 cm reported that they experienced postoperative moderate – severe pain when compared to those with incision length of <10 cm (33). The more increase in length of incision, the higher the tissue injury, the patient had and this in turn can leads to the patient felt more pain.

7. Conclusion and recommendation

7.1. Conclusions

The incidence of moderate to severe post-operative pain was high in the first 24 hours post-operative period. History of previous cesarean section, preoperative anxiety, transverse incision and incision length > 10 cm were factors of postoperative acute pain after cesarean section.

7.2. Recommendation

In accordance with our study findings, we proposed recommendations to the concerned body. All in one health care workers, hospital management staffs and researchers are responsible for this suggestion.

For health care providers: Consider postoperative pain intensity as a fifth vital sign by applying different types of pain rating scale, communicate with other integrative departments for a better management and organize a master plan to lessen the pain incidence problem.

For hospital management staffs: since these are the most decisive personals in the hospital**,** must produce a design or plan in how to treat this big problem of postoperative pain incidence after cesarean section.

For researchers: we recommend researchers to carry out additional study on standard of pain management system and facility after cesarean section. We also suggest them to investigate incidence of postoperative pain after cesarean section during general and spinal anesthesia in separate conditions.

7.3. Limitation and strength of the research

Limitation: The main things that we suppose as limitations from our study were parturient with both spinal and general anesthesia were studied together and single center study were some of our study limitation.

Strength: collection of results at regular time interval or follow up style.

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Annexes

Annex- I: Assurance of principal investigator

I, the undersigned, agree to accept responsibility for the scientific ethical and technical Conduct of the research project and for provision of required progress reports as per terms and conditions of the Research Publications Office in effect at the time of Grant is forwarded as the result of this Application.

Name of the principal investigator**: _____**

Date. November, 2019 Signature _____

Name of the advisor: **_____**

Date. November, 2019 Signature _____

Anne-II: Information sheet

Hello.

My name is _____. I am a member of researchers and I have been attending postgraduate program in the field of Anesthesia at Addis Ababa University. I am going to conduct research on the prevalence and associated factors of acute postoperative pain after cesarean section at Gandhi memorial hospital, Addis Ababa Ethiopia, from November 1, 2019 – March 30, 2020. The information going to be obtained will help the government and other responsible bodies to decrease in morbid adverse events during &after surgery. Your participation is very valuable for the success of this project. Also be mindful that whatever we will get here is for research purposes only and the information will not be used by any other person apart from this research and therefore, confidentiality can be guaranteed. However, your names will not be mentioned or be attached to anything that you say.

Do you want to continue yes---------- No---------- (Thank you in advance for your help!)

Name and contact address of investigators

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Cell phone +251-910475379

Annex III: Amharic information sheet

አዲስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ፣ ህክምና ትምህርት ቤት፣የአንስቴዥያ ትምህርት ክፍል

የመጠይቅ ፈቃደኛነት ቅጽ

ስሜ _____ ይባላል፡፡እኔ በአዲስ አበባ ዩኒቨርሲቲ በአንስቴዝያ ትምህርት ክፍል የምርምር ቡድን ዉስጥ አንድ አባል ነኝ፡፡የዚህ መጠይቅ አላማ ኦፕራሲዎን ተ ደረጎ ልጅ ከወለዳቹህ ከሁለት ሰአት ጀምሮ እስከ ሃያ አራት ሰአተ ድረስ የሚከሰትን የህመም መጠን እንዲሁም ምክንያቶቹነ ለማወቅ ወይም መረጃ መሰብሰበ ነው፡፡እርስዎን አንድ የጥናቱ ክፍል አድርጌ ስመርጠዎ አስፈላጊ የሆኑ መረጃዎችን እንደማገኝ በማሰብ ነዉ፡፡በጥናቱ ለመሳተፍ ፈቃደኛ ከሆኑ ከእርስዎ የሚገኘውማንኛውም መረጃበ ሚስጥር ይጠበቃል፡፡ለዚህም ሲባል የእርስዎ ሥምም ሆነ አድራሻ አይገለጽም፡፡

የእርስዎ ፈቃደኛነት ከኦፕራሲዎን በሁላ ለሚከሰተው ህመም ምን ያክል እንደሆነ ለማወቅ እና ምክንያቶቹን ለማወቅ ይረዳል ከጥናቱ በሁላም ለመከላከልይረዳል፡፡

የቃል ሥምምነት

የዚህ ጥናት ዓላማው ገብቶኝ በጥናቱ ለመሣተፍ

ሀ. ፈቃደኛ ሆኛለሁ ለ. ፈቃደኛ አይደለሁም

በጥናቱ ለመሳተፍፈ ቃደኛከሆኑ፡-

የመጠይቁ መለያ ቁጥር_____መጠይቁየተካሄደበትቀን_____

የጠያቂው ሥምና ፊርማ_____

የሱፐርቫይዘር ስምና ፈርማ_____

ጥናቱን በተመለከተ ማንኛዉም አይነት ጥያቄ ካላችሁ የሚከተለዉን አድራሻ ተጠቀሙ::

በዋናነት ምርምሩን የሚያካሂዉ ሰዉ ስም ፡

ዳግም ቢምረው

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Annex-IV: Data collection tool .

Section 1: Questionnaire

Table 1: Questions for socio- demographic factors

S.NO	Question	Possible responses	Remark
01	Age (in year)	----------	
02	Body mass index (in kg/m2)	----------	
03	Marital status	A. Single B. Married C. Divorced D. Widowed	
04	Educational status	A. Illiterate B. Can read and write C. Primary school (1-8) D. Secondary school (9-12) E. College and above	

Table 2: Questions at the preoperative period

S.NO	Questions	Possible responses	Remark
05	History of previous cesarean section?	A. Yes B. No	
06	ASA physical status	ASA ----------	

07	Parity	1. Nulli parous 2. Multi parous	
08	Was the patient anxious at the preoperative time?	A. Yes B. No	
09	Did the patient take any analgesics preoperatively?	A. Yes B. No	

Table 3: Questions during the intra operative period

S.NO	Questions	Possible responses	Remark
10	Type of surgery	A. Emergency B. Elective	
11	Type of incision	A. Midline B. Transverse	
12	Length of incision	----------cm	
13	Type of anesthesia	A. General B. Spinal	
14	Surgical time	----------mins	

15	Anesthesia time	----------mins	
16	Did nerve block was done for post-operative analgesia?	A. Yes B. No	
17	If question No-31 is yes! Which nerve block was done?	A. TAP B. Infiltration	
18	Did you give any systemic analgesics at the end of surgery?	A. Yes B. No	

Table 4: Questions on pain score after 2hours

S, No	Question	Possible answers	remark
19	Numerical pain score at 2 hours	None(0) Mild(1-3) Moderate(4-6) Sever(7-10)	
20	Which systemic analgesic was given?	A. Only tramadol B. Only diclofenac C. Tramadol + diclofenac D. Paracetamol E. not given	

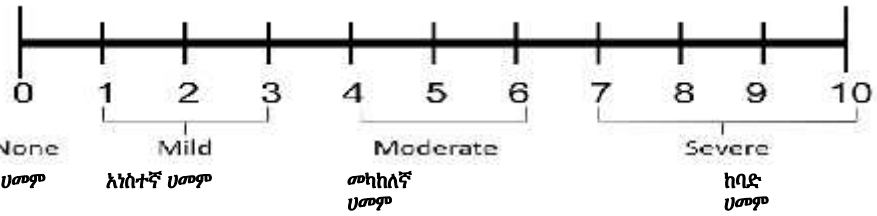
Table 5: Questions on pain score after 12hours

S, No	Question	Possible answers	Remark
21	Numerical pain score 12 hour	None(0) Mild(1-3) Moderate(4-6) Sever(7-10)	
22	Which systemic analgesic was given?	A. Only tramadol B. Only diclofenac C. Tramadol + diclofenac D. paracetamol E. not given	

Table 6: Questions on pain score after 24hours

S.No	Question	Possible answers	Remark
23	Numerical pain score at 24 hours	None(0) Mild(1-3) Moderate(4-6) Sever(7-10)	
24	Which systemic analgesic was given?	A. Only tramadol B. Only diclofenac C. Tramadol + diclofenac D. Paracetamol E. not given	

Section 2: Numerical rating scale to measure pain score



The scale was taken 3 times within the first 24 hours. The patient was asked one of the following questions:

1. What number would you give your pain right now?
2. When the explanation suggested above is not sufficient for the patient

When the explanation suggested above was not sufficient for the patient, further explanation or conceptualization of the scale was done:

0 = No Pain

1-3 = Mild Pain (nagging, annoying, interfering little Activities

4-6 = Moderate Pain (interferes significantly with ADLs)

7-10 = Severe Pain (disabling; unable to perform AD

Section -3:- State-Trait Anxiety Inventory: - A standard tool of measuring anxiety with strong Validity and reliability(36)

Negative Items

Items	not at all	some what	moderately	very much
I feel tense(ውጥረት ይሰማኛል)	1	2	3	4
I feel upset(ድብልቅልቅ ብሎብኛል)	1	2	3	4
I feel worried(ይጨንቀኛል)	1	2	3	4

Positive Items

Items	not at all	some what	moderately	very much
I feel calm (መረጋጋት ተሰመቶኛል)	4	3	2	1
I feel relaxed (እፎይ ብያለሁ)	4	3	2	1
I feel content(ሀሴት ይሰማኛል)	4	3	2	1

To calculate the total STAI score (range 20 – 80); Sum all the six scores and then multiplies the total score by 20/6. A value greater than 44 will be considered as presence of clinically significant anxiety. 20=> feel no anxiety at all, 80=> feel high level of anxiety

Classification of Obesity

BMI(kg/m2)	**Description**
<18.5	Underweight
18.5–24	Normal
24.5–30	Overweight
>30	Obesity

Adopted from Paul G. Barash clinical anesthesia 7th edition.

American Society of Anesthesiologists (ASA) physical status classification of patients**.**

Class	Definition
1	Normal healthy patient
2	Patient with mild systemic disease (no functional limitations)
3	Patient with severe systemic disease (some functional limitations)
4	Patient with severe systemic disease that is a constant threat to life (functionality incapacitated)
5	Moribund patient who is not expected to survive without the operation
6	Brain-dead patient whose organs are being removed for donor purposes
E	If the procedure is an emergency, the physical status is followed by "E" (for example, "2E")

Adopted from Morgan and Mikhail 5th edition