



## **COLLEGE OF HEALTH SCIENCES**

### **SCHOOL OF MEDICINE**

#### **DEPARTMENT OF ANESTHESIA**

INCIDENCE AND ASSOCIATED FACTORS OF POSTOPERATIVE PAIN AFTER  
CESAREAN SECTION UNDER SPINAL ANESTHESIA AT GANDHI WOMEN AND  
CHILD CARE MEMORIAL HOSPITAL 2020/21, ADDIS ABABA, ETHIOPIA.  
LONGITUDINAL CROSS SECTIONAL STUDY

BY: MINDA ABEBE

ADVISERS: MR. SILESHI ABIY (BSC, MSC IN ANESTHESIA, LECTURER OF  
ANESTHESIA)

: Mrs. SELAMAWIT (BSC, MSC IN ANESTHESIA, LECTURER OF  
ANESTHESIA)

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 COLLEGE OF HEALTH SCIENCE  
 DEPARTMENT OF ANESTHESIA



Name of investigator	Minda Abebe (MSc. In Anesthesia student)
Name of Advisors	Silesh Abiy ((Bsc, MSc in anesthesia, lecturer of anesthesia) <b>Selamawit ((Bsc, MSc in anesthesia, lecturer of anesthesia)</b>
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Address of investigator	Tel: +251914465540 e-mail : mindaabebe21@gmail.com

## ABSTRACT

**Background:** Currently, cesarean delivery is dramatically increased obstetric procedure world widely, but it associated with postoperative pain. “Postoperative pain is a sensory and emotional experience associated with actual or potential tissue damage”. Understanding risk factors of pain reduce social, economic, health, and psychological impact on mothers and family.

**Objective:** To assess the incidence and risk factors of postoperative pain after cesareans section within the first zero, six, and 12 postoperative hours among the pregnant mothers taking spinal anesthesia at Gandhi women and child care memorial hospital, Addis Ababa, Ethiopia 2020/21.

**Methods:** After ethical committee approval, a cross-sectional study was conducted on 384 parturients who undergo cesarean section under spinal anesthesia in GMH in 2020/21 G.C. Sample size was calculated by single population proportion formula by taking 39% of the previous study done from Uganda 2015. Data were collected by a structured questionnaire. SPSS version 24 was used for data entry and analysis. Binary logistic regression was applied for analysis. A p-value of  $< 0.05$  was considered statistically significant.

**Result:** The incidence of postoperative moderate to severe pain after cesarean section under spinal anesthesia was 47.4%. Duration of surgery, length of skin incision, and adjuvant added in bupivacaine, preoperative patient pain, preoperative anxiety, nerve block done at end of the surgery, and type of incision had a strong association with moderate to severe pain.

**Conclusion:** Postoperative pain after spinal anesthesia at Gandhi women and child care memorial hospital was high and needs pain management practice improvement. The practice of adding adjuvant to a spinal local anesthetic agent and performing nerve block at the end of the procedure were significantly reduced the experience of postoperative pain.

**Keyword:** Postoperative pain, Numerical pain score scale, cesarean section, spinal anesthesia

## Certification

The undersigned certify that the research permitted incidence and associated factors of moderate to severe acute postoperative pain after cesarean section under spinal anesthesia at Gandhi women and child care memorial hospital, Addis Ababa, Ethiopia. Articles and books that were used for my discussion and literature were listed in the reference section.

## Investigators

Name \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_ Approval of the  
Board of Examiners

## Advisor

1. Name \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

2. Name -- \_\_\_\_\_ signature \_\_\_\_\_ Date \_\_\_\_\_

## Internal Examiner

Name \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

## External Examiner

Name \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

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## Acronyms

AOR: Adjusted odds ratio

ASA: American society of anesthesiology

CD: Cesarean delivery

COR: Crude odd ratio

CPSP:Chronic post-surgical pain

CI: Confidence interval

ETB: Ethiopian Birr

G.C: Gorgorean calander

GMH: Gandhi memorial hospital

IASP: International Association for the study of pain

NRS: Numerical rate scaling

PACU: Postanesthesia care unite

POP: Postoperative pain

SA: Spinal anesthesia

SPSS: Statistical package for the social sciences

## List of table

Table 1: Socio-demographic characteristic mothers underwent cesarean section under spinal anesthesia at Gandhi women and child care memorial hospital, Addis Ababa, Ethiopia 2020/21.....18

Table 2: obstetric and preoperative related factors of mothers who underwent cesarean section under spinal anesthesia at Gandhi women and child care memorial hospital.....19

Table 3: Factors associated with postoperative moderate to severe pain after cesarean section under spinal anesthesia at Gandhi women and child care memorial hospital, Ethiopia 2020/21.....25

## List of figure

Figure 1: conceptual framework.....9

Figure 2: Intraoperative anesthesia and surgery-related characteristic in mothers underwent cesarean section under spinal anesthesia at Gandhi women and child care memorial hospital, Ethiopia 2020/21.....20

Figure 3: distribution of pain percentage at 0, 6, and 12 hours of c/s at rest among 384 mothers underwent c/s under spinal anesthesia.....21

Figure 4: Percentage of pain at 0, 6 and 12 hours during movement after c/s under spinal anaesthesia among mothers (n=384).....22

Figure 5: Overall incidence of pain distribution among mothers who underwent cesarean section under spinal anesthesia at Gandhi women and child care memorial hospital 2020/21 .....23

# Table of Content

ABSTRACT.....	II
Certification.....	III
ACKNOWLEDGMENT.....	IV
Acronyms .....	V
List of table.....	VI
List of figure .....	VI
CHAPTER ONE: INTRODUCTION.....	3
1.1 Background .....	3
1.2 Statement of problem.....	4
1.3 Justification of the study.....	5
CHAPTER TWO: LITERATURE REVIEW .....	6
2.1 Cesarean section rate .....	6
2.2 Incidence of postoperative pain .....	6
2.3 Associated factors of postoperative pain .....	7
2.4 Conceptual frame work.....	9
CHAPTER THREE: OBJECTIVE.....	10
3.1 General objective .....	10
3.2 Specific objectives.....	10
CHAPTER FOUR: METHODOLOGY .....	11
4.1 Study area and period.....	11
4.2 Study design.....	11
4.3 Populations .....	11
4.3.1 Source population.....	11
4.3.2 Study population.....	11
4.4 Eligibility criteria.....	11
4.4.1 Inclusion criteria.....	11
4.4.2 Exclusion criteria .....	12
4.5 Sample size determination and sampling techniques .....	12
4.5.1 Sample size determination .....	12

4.5.2 Sampling technique.....	13
4.6 Study variable.....	13
4.6.1 Independent variables .....	13
4.6.2 Dependent variables .....	14
4.7 Data collection procedure and tool .....	14
4.8 Data quality Assurance .....	14
4.9 Data analysis .....	14
4.10 Operational definitions .....	15
4.11 Ethical considerations .....	16
4.12 Dissemination plan.....	16
CHAPTER FIVE: RESULT .....	17
CHAPTER SIX: DISCUSSION.....	24
6.1: Limitation study .....	26
6.2 Strength of the study .....	26
CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION .....	27
7.1 Conclusion.....	27
7.2 Recommendation.....	27
REFERENCE.....	28
Annex .....	32
Annex 1: conceptual frame work.....	32
Annex II: Title .....	33
Annex III: Questionnaire .....	34

# CHAPTER ONE: INTRODUCTION

## 1.1 Background

Pain is a symptom of sensory and emotional experience that occurs as a result of definite or possible tissue damage which may be influenced by physiological, psychological, and situational factors. Postoperative pain usually has nociceptive characteristics due to the release of chemical mediators like prostaglandin, histamine, bradykinin that stimulate and sensitize pain receptors from tissue lesion, but it may have neuropathic pain if lesions directly on nerves(1–3).

According to study conducted in different parts of the world postoperative pain was high at different study times. In the Third World the incidence of pain varies in the range from 39%-57% at two hours and 29%-53% one day after procedure(3).

The degree of post-caesarean sections acute pain varies from individual to individual because of the psychological (emotional) characteristics of the patients, socio-demographics, and anesthesia and surgery-related factors difference like age, preoperative pain, preoperative anxiety, parity, Ethnicity and type of incision(4).

Post-operative pain management practice is weak and challenging in developing countries as a result of an imbalance patient to health care ratio, patient-level of education towards pain (expectation), availability of analgesia and infrastructure access when compared with developed countries(5,6). To assure avoidance and handling of pain indicating the burden of the problem via research may alarm them to emphasize pain management practice

Poorly managed postoperative pain (POP) can result in physiological, psychological, economic, and social impact to the victim as well as their family like delayed wound healing, vulnerability for hospital-acquired infection, maternal dissatisfaction, maternal depression, decrease maternal ability to care for their babies and effectively breastfeed(1,3,5,7). Pain is individual and subjective, but the numeric rating scale of pain is easy to specify pain intensity and less complicated to understand(8).

## 1.2 Statement of problem

Cesarean section is the dramatically increased obstetrics invasive procedure for the delivery of fetuses worldwide with a rate range between 18.3%-35.5% globally(9). But it is associated with post-cesarean section pain.

Many studies show that postoperative pain following cesarean section under spinal anesthesia is the major problem worldwide it ranges between 6-92.5%. These figures indicate that how pain is significantly the problem of health quality care service(10,11).

Currently, the interest in the practice of spinal anesthesia for obstetric procedures increases globally because of its advantage. Despite its advantage, spinal anesthesia and surgery may have unwanted effects on the mothers and fetus. Postoperative pain is one of a major health care problem which has an impact on both health professional and patient. Especially it has a greater effect on patients' experience and outcome(12). It results in social, economic, physiological, clinical and psychological impacts on the mother and family. The impacts include increased cost, decrease satisfaction, increase hospital stay, increase morbidity and mortality also decreasing quality of life(1,13)

Data on incidence and associated factors of postoperative pain following spinal anesthesia for CS come from developed countries. The difference inpatient residents and anesthesia performance of different countries result in the challenges of generalizations. So, finding the incidence and associated factors of postoperative pain next to spinal anesthesia is essential to put evidence for Ethiopia.

In Ethiopia, most health professionals believe that spinal anesthesia is considered as the sole of analgesia in post-operative periods, and not give emphasis pain management as patients who take general anesthesia. Therefore, knowing the incidence and risk factors of acute postoperative pain is important for proper utilization and allocation of resource as well as an analgesic modality for prevention and intervention of pain

### 1.3 Justification of the study

The poor practice of post-operative acute pain management after cesarean section is common globally, especially in developing country as our country Ethiopia. It may have an undesirable impact on patients' health, economics, psychology and increase the risk of developing chronic pain.

The highest extent of post-operative pain problem more likely because of no enough information on incidence, associated factors and barriers to facilitate quality of pain management in Ethiopia. As a result of this, addressing full information about postoperative pain via research will play a vital role in the practice of pain management.

Even if there is published research on the incidence and risk factors of post-operative acute pain after cesarean section under spinal anesthesia in different countries, there is no enough information in Ethiopia about the incidence and associated factors. In addition to this, there is a difference in genetic, social, cultural, economic, pain intensity and pain management strategy among Ethiopia and other countries. They may make this study result different from the previous one. No published research was done with similar topics in Ethiopia as well as Gandhi women and child care memorial hospital, the outcome of this study will serve as the source of information for other researchers, curriculum developers and policymakers on the drafting of pain management strategy.

## CHAPTER TWO: LITERATURE REVIEW

### 2.1 Cesarean section rate

Cesarean section is a dramatically increase surgical procedure worldwide for delivery of fetus, placenta and membrane via the incision of abdominal and uterine when life-threatening conditions to the mother or fetus occur. It should be used as needed or appropriate to avoid potential risk for both mother and fetus(9,14,15). According to a study was done at Debre Birhan Ethiopia by Tsegahun Asfaw and Alemnesh Tesema in 2015/16 the rate of cesarean section in Ethiopia is 18.3 %. Currently, the percentage of cesarean section swinging between 10 and 80% throughout the world(8,14).

### 2.2 Incidence of postoperative pain

A hospital-based quantitative cross-sectional study conducted at Gondar, Ethiopia in 2016 on 150 patients who underwent both emergency and elective surgery, reported that a higher rate of postoperative pain recorded at 12 hours of postoperative period (78%) and the pattern of postoperative pain was 57%, 78% and 53% at 2, 12 and one days postoperatively(3).

A prospective descriptive study conducted at Kampala, Uganda in 2014/15, on 333 women who underwent CD under spinal anesthesia, most of the mothers had no or mild pain T0 hours 77% T6 hours 61% and T24 h 71% but highest pain score also recorded at 6 hours postoperatively. The principal investigator of this study used visual analogue scale to assess the severity of pain. They also found that the incidence of severe pain range from 6-14% (11% at T0, 14% at T6 and 6% at T24 hours)(5).

In the cross-sectional study carried out by Uziele M Makoko et.al in South Africa Tembisa hospital on 82 mothers in 2014, 45.1 % of mothers were experienced pain within 2 hours after operations(16). According to Samina Ismail et.al study done in Pakistan, the incidence of moderate to severe pain at movement was 39.9%, which 3.87 times greater than that of at rest(10.3%)(17).

Prospective observational cohort study was done in China, 2016 on 527 women undergoing cesarean section the incidence of chronic post-surgical pain (CPSP) at 3, 6, and 12 months was 18.3 %, 11.3 %, and 6.8 %, respectively(18). A prospective cohort study conducted by Guiying

Yang et al in China on postoperative pain between patients who underwent primary and repeated cesarean section in 2019 found that mothers with Age<30 and had repeated cesarean section had more visceral pain than that of had primary cesarean section 22.7% and 6.% respectively. They also gated that the incidence of incisional pain was higher in primary cesarean section (38.3%) than repeated (18.2%)(19).

A prospective cohort study done by Chan et al. at Singapore in 2019 on 217 women who underwent elective cesarean delivery under spinal anesthesia, found that the incidence of moderate to severe acute post-cesarean section at 24 hours was 21%(4). A longitudinal cross-sectional study done in Sweden in 2015,incidence of persistent pain if acute pain did not manage properly was 40%, 27%, and 22% at 3, 6, and 12 months respectively(20).

A prospective longitudinal study done in Brazil by Natalia de Carvalho Borges et al. on 1,062 women undergoing cesarean section under spinal anesthesia by using the numerical pain score method (intensity  $\geq 5$ ) found that the incidence of moderate to severe postoperative pain was 78.4%(1).

### 2.3 Associated factors of postoperative pain

Research done in 2016 Ethiopia by Admassu et al. reported that incision > 10 cm and location of surgery has significant associations were as BMI, previous surgery and anesthesia, duration of surgery and maintenance have no association for post-operative acute pain(3).

A prospective double-blind RCT research done in Thailand, in 2017 on 580 mothers with 276 vertical cesarean incisions and 304 transverse cesarean incision groups reported that BMI, parity previous cesarean section have no statistical significance on pain score wheel VAS of the vertical in the primary cesarean section was higher than transverse at the time of 3, 12 and 24 hours postoperatively but VAS of transverse cesarean incision higher than the vertical group at 6 and 12 hours(21).

Post-cesarean acute pain significantly affects the maternal life condition. Pain in association with lack of adequate staffing, education and poor pain management practice results in post-operative maternal dissatisfaction, affecting baby care, postpartum depression, development of persistent pain and increase mortality and morbidity(6,10).

Study done by Chan et al. found that preoperative upcoming surgery anxiety, preoperative pain both accounting 20% and ethnicity had a significant association with acute postoperative pain were as blood loss, duration of surgery, pain score upon LA injection, intraoperative and postoperative analgesia used had no significant association for acute pain at 24 hours(4). In contrast of this finding Orbach-Zinger et al. showed that pain upon LA injection for spinal anesthesia was associated with acute postoperative pain scores(14).

A prospective study was done in Korea, on 400 patients, 36.25% were in junior school, 37.5% patients of in high school and 25.25 % of the university found that junior schools had more than university holders postoperatively. They also identified that there was no difference in the type and quantity of the analgesia used(22). Cross-sectional study done in German in 2011, show that the presence of preoperative pain was highly associated with postoperatively higher pain scores compared to patients without preoperative pain. They also found that patients with higher Hospital Anxiety and Depression Scale scores reported higher pain scores for the first 7 days after the operation(23).

A study done in Sweden in 2015, showed that a psychological (maternal request), primary cesarean section and severe acute postoperative pain were the major independent risk factors for the development of persistent pain at 3 and 6 months respectively(20).

Borges et al. found that preoperative anxiety and the addition of opioids (morphine) adjuvant to spinal bupivacaine have a significant impact on the occurrence of postoperative pain incidence(1). Research conducted in Brazil shows that movement increases the numerical pain score with main pain intensity of 6.6 and weakest pain of 3.3 and among all studied participants 22.5% had mild or no pain(11).

A prospective randomized study conducted in Brazil, 2012 found that a lower dose of bupivacaine use has a high incidence of postoperative acute pain at rest and in movement. They also studied that the higher acute post-operative pain score have higher incidence of chronic pain incidence of G1 = 20%; G2 = 13%; G3 = 7.1%; G4 = 2.2%, and G5 = 20.3% with  $p < 0.05$ (24).

A systematic review and meta-analysis were done in 2015 from Nine RCT of 500 participants on pain scores at rest and on movement at 1, 8 and 24 hours postoperatively after TAP block and wound infiltration mothers undergo CD under spinal anesthesia show that TAP block was

significantly associated with lower rest and dynamic pain scores at 8 hours postoperatively than wound infiltration. They also found that TAP block significantly reduced 24-hour overall morphine consumption as compared to wound infiltration(25).

## 2.4 Conceptual frame work

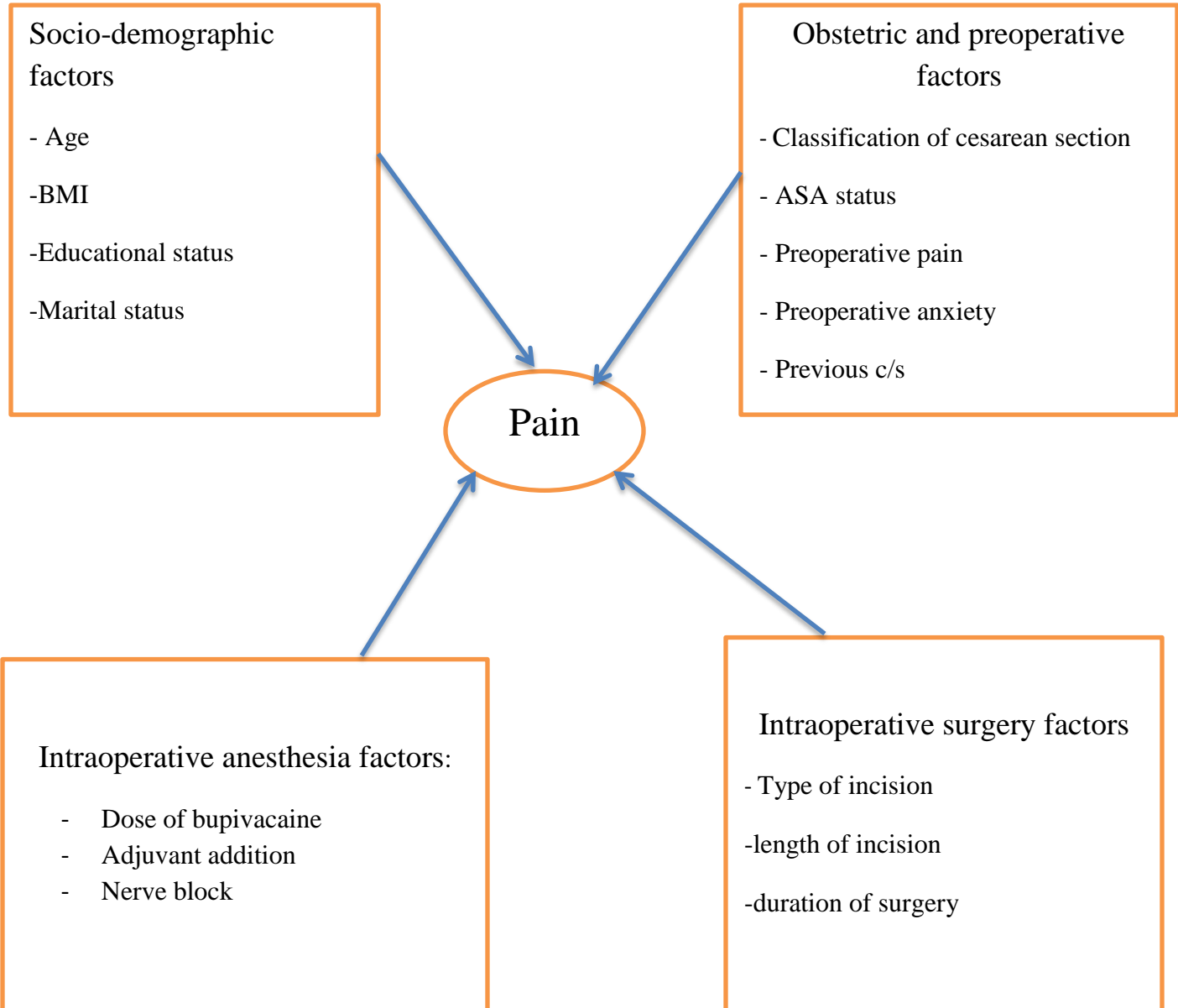


Figure 1: conceptual framework

## CHAPTER THREE: OBJECTIVE

### 3.1 General objective

To assess the incidence and associated factors of postoperative acute moderate to severe pain after cesarean section under spinal anesthesia at Gandhi women and child care memorial hospital 2020/21, Addis Ababa, Ethiopia.

### 3.2 Specific objectives

- To determine the incidence of postoperative pain after cesarean section under spinal anesthesia in Gandhi women and child care memorial hospital, Addis Ababa, Ethiopia.
- To identify risk factors of postoperative pain in parturient undergone cesarean section under SA.

## CHAPTER FOUR: METHODOLOGY

### 4.1 Study area and period

The study was conducted at Gandhi women and child care memorial hospitals which is one of the largest maternal and child care hospitals found at the center of Addis Ababa, the capital city of Ethiopia. Addis Ababa has 11 sub city and total of 12 governmental hospital and 96 health centers. The total population of the city is estimated to be 3,689, 000(26). GMH hospital was established early in 1958 and the building of this hospital was completed and opened its doors to public service in 1959. It was named after the well-respected Mohandas Karamch Gandhi. It has 120 beds, four Operation Theater, and governed by the ministry of health. On average 10 to 18 cesarean deliveries were done per day from these more than half were elective CS. Currently, it served as a teaching hospital for the obstetrics and gynecology department in collaboration with Addis Ababa University College of health science. This study was carried out from December 2020-March 2021 G.C.

### 6 4.2 Study design

A longitudinal cross section study was applied at Gandhi memorial women and child care hospital.

### 4.3 Populations

#### 4.3.1 Source population

All mothers who underwent elective and emergency cesarean section at Gandhi women and child care memorial hospital.

#### 4.3.2 Study population

All mothers who underwent elective and emergency cesarean section under spinal anesthesia that fulfilled inclusion criteria at Gandhi women and child care memorial hospital 2020/21

### 4.4 Eligibility criteria

#### 4.4.1 Inclusion criteria

- ✓ All Patients age > 18 years old
- ✓ Voluntary and given informed consent to participate/involved in the study

- ✓ ASA II and III mothers underwent elective and emergency CD

#### 4.4.2 Exclusion criteria

- chronic use of opioids and known psychiatric patient
- mother with hearing, or speech impairment
- Partial or complete failed spinal and mothers who take general anesthesia
- newborn death(maternal psychology)

### 4.5 Sample size determination and sampling techniques

#### 4.5.1 Sample size determination

The Sample size was estimated based on a previous study proportion of postoperative pain incidence after cesarean section under spinal anesthesia 39 % in 2015 Uganda(10). Single proportion formula with the proportion of postoperative acute pain after cesarean section under spinal anesthesia of 39 %, 95% confidence level and  $\alpha=5\%$ . Therefore, the total sample size would be

$$\begin{aligned}
 n &= (Z \ a/2)^2 \times p \times q / d^2 \\
 &= (1.96)^2 \times 0.39 \times 0.61 / (0.05)^2 \\
 &= 365.6, 5\% \text{ for loss of follow up added} \\
 &= 365.6 + 5(365.6)/100 = 365.6 + 18.278 \\
 &= 384
 \end{aligned}$$

Where: n= sample size, Z= desired 95% confidence, Z=1.96.

$p$  = proportion moderate to severe postoperative pain assuming 0.39

$$q = 1 - p = 1 - 0.39 = 0.61$$

$d$  = Margin error (5%)

#### 4.5.2 Sampling technique

Situational analysis of the logbook has been estimated 750 (N), elective and emergency cesarean section under spinal anesthesia was done in the previous three months. The participants were recruited with a probability of about 51%.

$K_{th} = 750/384, 1.95 = 2$  interval. Patients were sorted based on a time sequence of OR admission after grouping based on whether they received spinal anesthesia or not. Eligible and voluntary patients were selected with an interval of two till the required sample size is reached.

### 4.6 Study variable

#### 4.6.1 Independent variables

##### **Maternal socio-demographical condition**

- Age
- BMI
- Educational status
- Marital status
- ASA status of the patient

##### **Preoperative obstetric characteristic and condition**

- Preoperative anxiety and pain
- parity
- Previous cesarean section

##### **Intraoperative anesthesia and surgery-related condition**

- Duration of surgery
- Intraoperative analgesic use
- Use of spinal adjuvant and nerve block
- Incision type and length of the incision
- Type of surgery
- Dose of local anesthetic

#### 4.6.2 Dependent variables

- ❖ postoperative pain

#### 4.7 Data collection procedure and tool

The data were collected via chart review and interview based on the questionnaire by the assigned data collectors, two ward nurses and two anesthetists. On preoperative visit, data collectors discussed the study purpose, risks, benefits, how to score pain using NRS, and confidentiality with mothers who met the inclusion criteria and given informed consent.

After taken the informed consent, the data collectors reviewed patients' medical records for all independent variables except educational level, marital status, anxiety, and BMI. Finally, data collectors used the numerical rating scale (NRS, 0-10) to assess the patient's pain severity at 0, 6, and 12 hours postoperatively. Each data collection quality, clarity and completeness was closely checked by the supervisor.

After completely documented intraoperative important data based on the questionnaire, the mother's bed number and ward were recorded by the data collector before the mothers transferred from the PACU.

#### 4.8 Data quality Assurance

Questionnaires were pretested on 5 % of the calculated sample size at Zewditu memorial hospital. Orientation was given to data collectors briefly about the general significance of the study, the study tool to be used, and the mothers' voluntary basis by the principal investigator. After giving the orientation for those data collectors, data were collected based on the structured questionnaire. The completeness, clarity, and accuracy of the collected data were evaluated by the supervisor and principal investigator every two days. Incomplete data were not entered into SPSS. Before analysis, data cleanup and crosschecking were done.

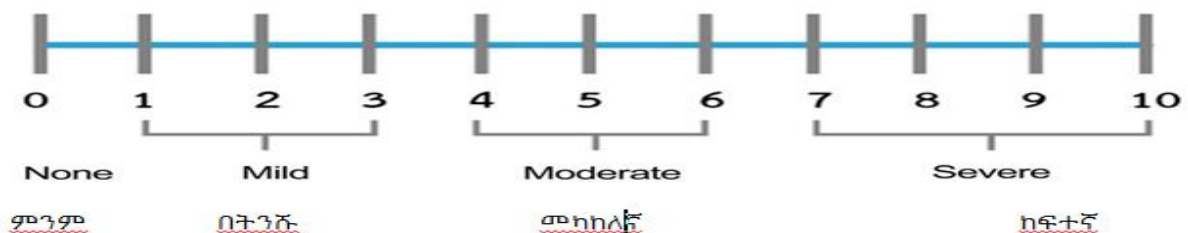
#### 4.9 Data analysis

The completed data were entered and analyzed on SPSS version 24. Socio-demographic data and pain severity were summarized using descriptive statistics. Each independent variable with dependent variables was analyzed by binary logistic regression. Odd ratio, 95% confidence interval, a p-value was computed to determine the strength of association between the dependent

and independent variable. Those variables with a p-value less than 0.2 on bi-variable logistic analysis were entered into multivariable logistic regression analysis. Hosmer and Lemeshow test was applied to check good fitness test of the data. The result p-value of less than 0.05 is considered statistically significant.

#### 4.10 Operational definitions

- ✓ NRS  $\geq 4$  is moderate to severe pain (NRS of 4-10 score) considered as pain and NRS of  $\leq 3$  well-controlled pain or no pain.
- ✓ Age of the mothers' classification based on the American college of obstetricians and gynecologists. Skin incision length and duration of surgery are grouped based on research done by Mustafa et al. in 2016, American society of anesthesiologist 2017, and Dimitrov et al. 1999 respectively.
- ✓ **Partial failed spinal anesthesia:** Is defined as there is partial sensory and motor block but need additional systemic analgesia to complete surgery
- ✓ **Complete failed spinal anesthesia:** no sensory block that requires repeating of spinal anesthesia or conversion of general anesthesia to precede surgery.
- ✓ **Numerical pain score:** is the method of pain assessment that is easy and less complicated way to understand



**ASA status** (adopted from Morgan and Mikhail 5th edition)

ASA I- healthy patient come for the specific procedure only

ASAII- Patient with mild systemic disease (no functional limitations)

ASAIII- Patient with severe systemic disease (some functional limitations)

ASAIIV- Patient with severe systemic disease that is a constant threat to life (functionality incapacitated)

ASAV- Moribund patient who is not expected to survive without the operation

ASAVI- 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”

#### 4.11 Ethical considerations

Ethical clearance was obtained from the department ethical clearance committee before the start of the study and an official support letter was written to responsible personnel to Gandhi women and child care memorial hospital to get permission for data collection. The informed written consent was obtained from each voluntary participant in the study after giving full information about the use and importance of conducting the study i.e. involvement in the study was the voluntary basis. Confidentiality was preserved at all levels of the study by avoiding personal identifiers and using codes to identify patients.

#### 4.12 Dissemination plan

The result of the study will be present for the entire department of anesthesia staff. The result also will send to journals for publication. The research will recommend to policymakers or curriculum revisers to allocate resource utilization for prevention and intervention of pain. It will also be present at the annual anesthesia association conference.

## CHAPTER FIVE: RESULT

### 5.1 Socio-demographic characteristic

In this study, 384 mothers were included for analysis. The mean age was  $26.96 \pm 4.37$ . Of the participant, 360(93.8%) were married and 24(6.2%) were single. A total of 127(33.1%) mothers were the educational status of secondary school and the minority of them 1(0.3%) and 8(1.35) were Ph.D. and master holder respectively.

Table 1: Socio-demographic characteristic 384 mothers underwent cesarean section under spinal anesthesia at Gandhi women and child care memorial hospital, Addis Ababa, Ethiopia 2020/21(n=384)

Variable		Frequency	Percentage (%)
Age	18-34	358	93.2
	$\geq 35$	26	6.8
ASA	II	353	91.9
	III	31	8.1
BMI	18.5-24.9	186	48.4
	25-34.9	195	50.8
	$>35$	3	0.8
Marital status	Single	24	6.2
	Married	360	93.8
Educational status	Illiterate	24	6.3
	Read and write	107	27.9
	Primary school	14	3.6
	Secondary school	127	33.1
	Above 2 <sup>nd</sup> school	112	29.2

### 5.2 Obstetric characteristics and preoperative factors

Majority of the participant 251(65.7%) and 353(92%) were multiparous and have no preoperative pain respectively.

Table 2: Obstetric and preoperative related factors of mothers who underwent cesarean section under spinal anesthesia at Gandhi women and child care memorial hospital (n=384)

Variable		Frequency(n)	Percentage (%)
Classification of c/s	Elective	223	58.1
	Emergency	161	41.9
Preoperative anxiety	No	321	83.6
	Yes	63	16.4
Preoperative pain	No	353	92
	Yes	31	8
Previous c/s	Yes	168	43.8
	No	216	56.3
Preoperative analgesia	Yes	44	11.5
	No	340	88.5
Parity	Nulliparous	132	34.4
	Multiparous	251	65.7
Number of previous c/s	I	99	58.9
	II and above	69	40.8

### 5.3 Intraoperative anesthesia and surgery related characteristic

Higher percentage of cesarean section takes less than forty five minutes (74%) and small numbers of the study participants were take nerve block at the end of the procedure(c/s).

Table 3: Intraoperative anesthesia and surgery-related characteristic in mothers who underwent cesarean section under spinal anesthesia at Gandhi women and child care memorial hospital, Ethiopia 2020/21(n=384)

Variable		Frequency (n)	Percentage (%)
Adjuvant added	Yes	28	7.3
	No	356	92.7
Type of adjuvant added	Pethidine	13	44.8
	Morphine	15	51.7
	fentanyl	1	3.4
Type of incision	Midline	27	7.0
	Transverse	357	93.0
Length of incision (cm)	<15 cm	299	77.9
	≥15 cm	85	22.1
Duration of surgery	≤45minute	284	74.0
	>45 minute	100	26.0
Nerve block done	Yes	25	6.5
	No	359	93.5

#### **5.4 Percentage of pain in at 0, 6 and 12 hours during rest and movement after cesarean section**

In our study the overall incidence of postoperative pain in mothers who underwent cesarean section under spinal anesthesia was 47.4% (182/384). The highest and lowest number of the participant experienced moderate to severe pain were at 6 hours at movement 31.2% (120/384) and 0 hours at rest 1%(4/384) respectively.

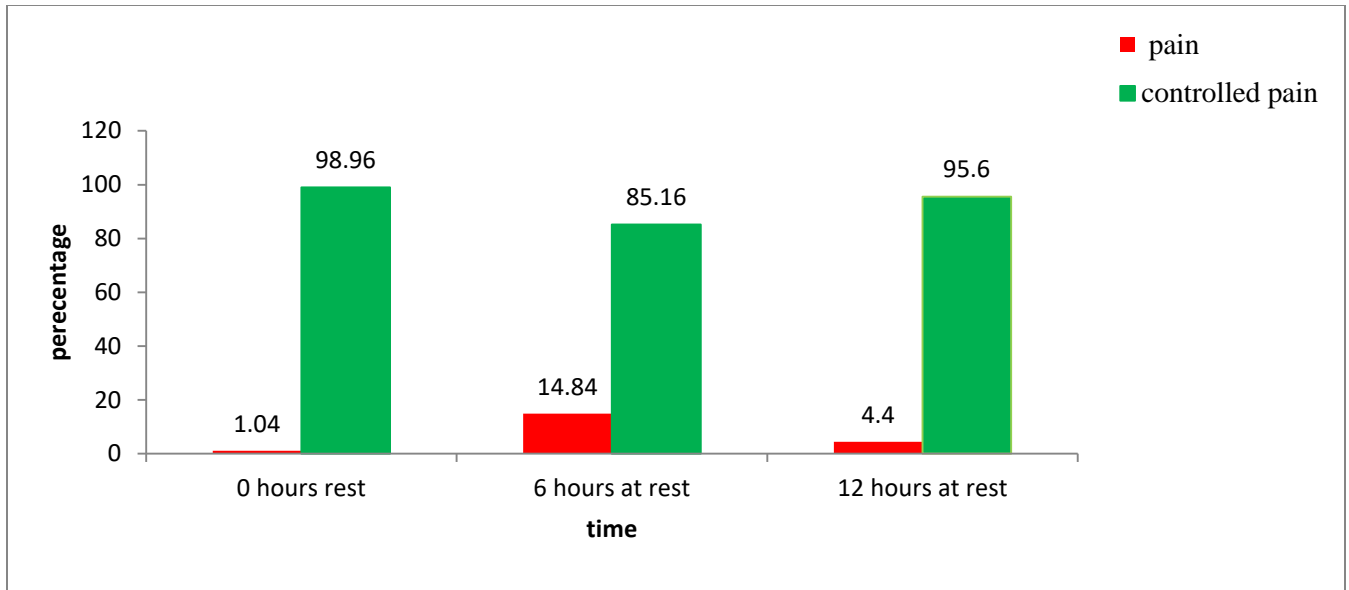


Figure 3: distribution of pain percentage at 0, 6 and 12 hours of c/s at rest among 384 mothers who underwent c/s under spinal anaesthesia

At 6 hours postoperative period, numeric pain scoring scale indicated that 104(27.1%), 223(58.1%), 57(14.84%) of patients had no, mild and moderate to severe pain at rest respectively. This result was quite different when the patient move at the same time, which was 47(12.2%), 217(56.5%), and 120(31.25%) of the patient filled no, mild and moderate to severe pain. (See Fig 3and 4)

At 12 hours of cesarean section 190(49.5%), 177(46.1%), and 17(4.4%) patient were had no, mild and moderate pain consecutively at rest, whereas 128(33.3%), 180(46.9%), and 76(19.8%) were experienced no, mild and moderate to severe pain on movement at the same time (12 hours).

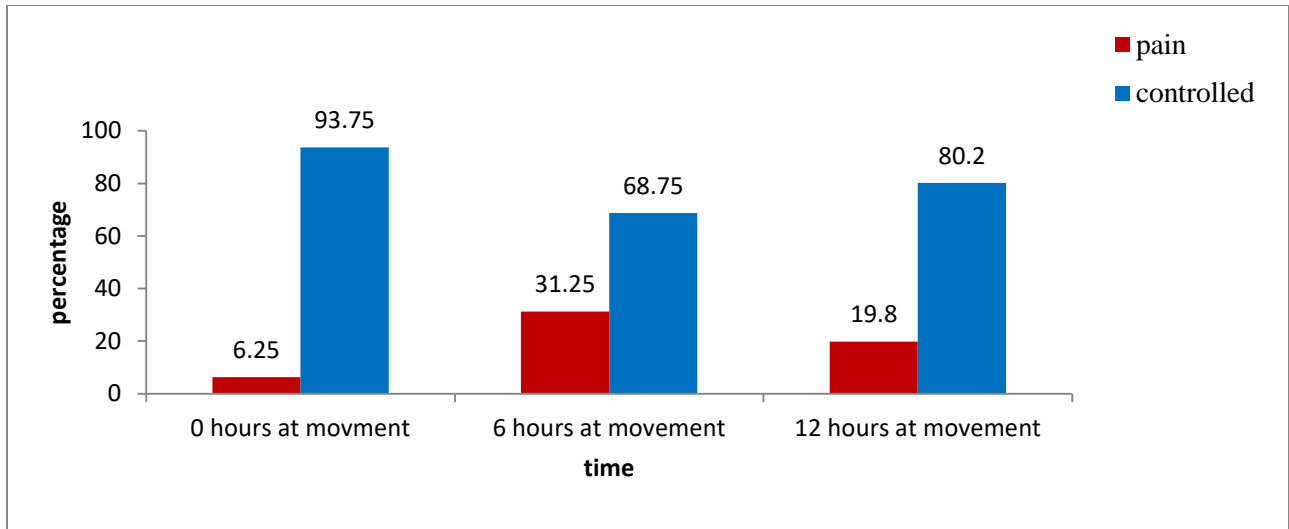


Figure 4: Percentage of pain at 0, 6 and 12 hours during movement after c/s under spinal anaesthesia among 384 mothers

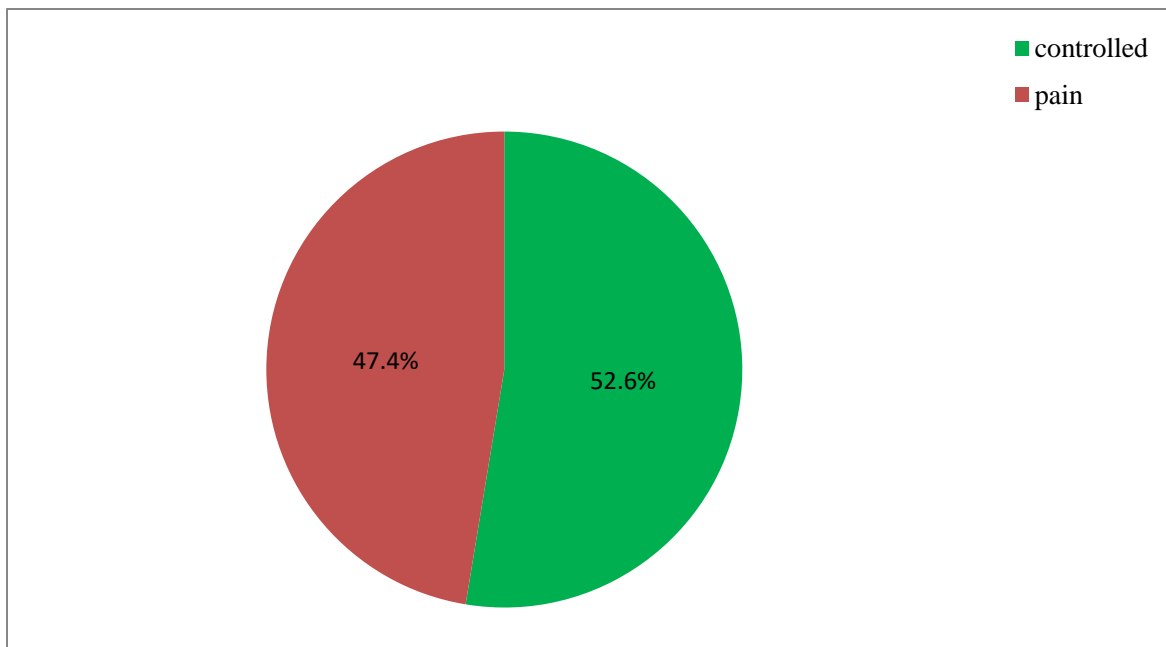


Figure 5: Overall incidence of pain distribution among 384 mothers who underwent cesarean section under spinal anaesthesia at Gandhi women and child care memorial hospital 2020/21

**5.3 Factors associated with postoperative pain among mothers underwent cesarean section under spinal anaesthesia at Gandhi women and child care memorial hospital, 2020/21.**

We used SPSS version 24 of the multivariable analyses to investigate the association between an independent variable with the dependent variable. In addition, binary logistic regression analyses were applied to select variable. P-value <0.2 bi-variable was transferred to multivariable analyses.

Of the independent variables analyzed by multivariable logistic regression; duration of surgery, length of the skin incision, adjuvant added in bupivacaine, preoperative patient pain, preoperative anxiety, nerve block done at the end of surgery, and type of incision were statistically significant with moderate to severe pain.

Of the participants in this study, those who had preoperative pain and preoperative anxiety were > 11 and > 2 times risky for postoperative pain as compared to those mothers with no pain and anxiety preoperatively (AOR=11.312, 95%CI 2.502-51.176 and AOR=2.119, 95 %CI=1.068-4.206) respectively.

The surgical, skin incision length > 15 cm has increased the incidence of pain by more than two times as compared to the skin incision length ≤ 15 cm (AOR= 2.295, 95% CI 1.248-4.220). In addition, surgery which takes greater than 45 minutes was riskier for pain almost; 2 times than takes ≤ 45 minutes (AOR=1.810, 95% CI= 1.024-3.201).

This study reveals that giving bupivacaine without adjuvant for SA and nerve block done at the end of surgery increased postoperative pain by >12 and >2 times than added adjuvant and nerve block (AOR=12.190, 95% CI=3.102-47.899) and AOR= 2.729, 95%CI=1.030-7.544) respectively.

Marital status of mothers were have no relation with postoperative moderate to severe pain (AOR =1.626, 95% CI=0.597-4.431). With regards, the educational status has no relation with the experience of moderate to severe pain compared with literate (p-value 0.145).

Table 3: Factors associated with postoperative pain after cesarean section under spinal anesthesia at Gandhi women and child care memorial hospital, Ethiopia 2020/21(n=384)

Variable		Moderate to severe pain		COR(95%CI)	AOR(95%CI)	P-value
		Yes (n)	No (n)			
Preoperative anxiety	No	139(36.2%)	182(47.4%)	1	1	0.032
	Yes	43(11.2%)	20(5.2%)	3.071(1.717-5.496)	2.119(1.068-4.206)	
Preoperative pain	No	153(39.9%)	200(52.1%)	1	1	0.002
	Yes	29(7.6%)	2(0.5%)	18.954(4.454-80.665)	11.312(2.502-51.176)	
Adjuvant added	No	179(46.6%)	177(46.1%)	8.427(2.499-28.416)	12.190(3.102-47.899)	<0.001
	Yes	3(0.8%)	25(6.5%)	1	1	
Length of incision	≤15 cm	128(33.3%)	171(44.5%)	1	1	0.008
	>15 cm	54(14.1%)	31(8.1%)	2.327(1.415-3.827)	2.245(1.243-4.055)	
Type of incision	Midline	23(6.0%)	4(1.0%)	1	1	0.002
	Transverse	159(41.4%)	198(51.6%)	0.140(0.047-0.412)	0.132(0.038-0.461)	
Duration of surgery	≤45minute	121(31.5%)	163(42.4%)	1	1	0.041
	>45 minute	61(15.9%)	39(10.2%)	2.107(1.323-3.356)	1.810(1.024-3.201)	
Nerve block done	No	176(45.8%)	183(47.7%)	3.046(1.189-7.803)	2.729(1.030-7.544)	0.049
	Yes	6(1.6%)	19(4.9%)	1	1	

Where 1=reference, COR= crud odd ratio, AOR=adjusted odd ratio, CI=confidence interval, n= number, %= percent

## CHAPTER SIX: DISCUSSION

In our study, the incidence of postoperative moderate to severe pain after cesarean section under spinal anesthesia was 47.4%(95% CI= 42.7%-52.1%) The risk factors analyzed from multivariate logistic regression duration of surgery, length of skin incision, adjuvant added in bupivacaine, preoperative patient pain, preoperative anxiety, nerve block done at the end of surgery and type of incision were statistically significant with postoperative pain.

The incidence of this study is in line with research done by Patel et al. in 2017, Ortener et al, in 2013 range of 40-60%, and Uziele M Makoko et al. in South Africa 2014 which was 45.1 %(27). But it was lower than the study found by Borges et al, 2016 in Brazil which was 78.4%. The variation might be as a result of postoperative pain management after cesarean section and sampling technique used difference. We used systematic random sampling, but they used convenience. In addition, the difference could be all patients who underwent the cesarean section received diclofenac and tramadol 1 hour after a procedure but did not in Brazil(1).

In our study, we found that preoperative anxiety and pain were independent risk factors of postoperative moderate to severe pain following a cesarean section under spinal anesthesia with a p-value of 0.032 and 0.002 respectively. This result was in line with research done in Brazil by Natalia de Carvalho Borges et al. (2016), Ozgür E, et al. in German in 2011, and Chan et.al. in Singapore between May 2018 and April 2019(23,28).

Our finding shows that; a dose of bupivacaine was having no relation with the existence of moderate to severe pain. This result is inconsistent with study done by Thais Orrico de Brito Cançado et al in 2012(24). The possible reason for this difference could be patient ethnicity, the bar city of drug that we used between Brazil and Gandhi women and child care memorial hospital(29).

In this study mothers with the maternal educational status being illiterate was having no relation with experiencing postoperative pain after cesarean section under spinal anesthesia as compared to literate mothers which was unstable with Lanitis S et al. 2015 at Korea finding(22) This variation could be due to sampling techniques and study population difference; where they were used consecutive sampling but our is systemic random sampling technique.

We founded that the addition of an adjuvant to bupivacaine in spinal anesthesia and performed nerve blocks at the end of the procedure were important independent predictors to reduced postoperative pain. This finding is supported by research done by Natalia de Carvalho Borges et al. in 2016; the similarity is due to adding of opioid increase the duration of analgesia and onset of action of local anesthetics in addition nerve block avoid central nerves system sensitization (25,30).

Our study shows that surgical procedure that takes more than 45 minutes increases postoperative pain by more than 1.8 times as compared to surgery duration less than 45 which was not in line with research done at Gondar University by Admassu et al. 2016. The most likely reason for this variation could be due to study population, sampling technique difference and duration of surgery that might increase tissue damage and internal organ manipulation (inflammation)(2,3).

Length of skin incision and type of skin incision were other risk factors for postoperative pain. 54(14.1%) mothers, a p-value of 0.008 with skin incision length > 15 cm experienced pain within the first 12 hours which was supported by the research of Admassu et al. 2016. 159(41.4%) of Pfannenstiel skin incision type had postoperative pain whereas 128(33.3%) incision length  $\leq$  15 cm and 23(6.0%) of midline incision had pain which coherent with Suwannarurk K KP et al 2017 result in Thailand(3,21).

### 6.1: Limitation study

- No adequate number of previous cross-sectional research especially in Third World country and east of Africa for discussion with our result
- Measuring of pain via NRS was challenging for illiterate participants

### 6.2 Strength of the study

- Adequate number of participants found within the planed period of time.
- Homogenous city of the participants
- Use of systematic random sampling method
- As far as my search this is the first study in Gandhi memorial hospital so, it will be helpful as baseline information for other researchers.

## CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION

### 7.1 Conclusion

The incidence of moderate to severe postoperative pain after spinal anesthesia at Gandhi women and child care memorial hospital was high and needs pain management practice improvement. Factors like duration of surgery >45 minutes, skin incision >15 cm, preoperative pain and anxiety, type of incision, an adjuvant used and nerve block has done were the major predictors for postoperative pain at Gandhi women and child care memorial hospital. The practice of adding adjuvant to a spinal local anesthetic agent and performing nerve block at the end of the procedure was significantly reduced the experience of postoperative pain.

### 7.2 Recommendation

#### **For health care provider**

- ❖ Should understood and reduced or alleviate(if possible) the risk factors of postoperative pain
- ❖ Addition of adjuvant to local anesthetic and performing of nerve block should be routine practice
- ❖ Intimate(close)relation with mothers and psychological makeup should be the day to day practice to increase mothers trust and decrease preoperative anxiety which was one of the risk factors for pain

#### **For Gandhi memorial hospital administration**

- Create opportunity and give financial support for researcher on pain management service
- Give great emphasis for pain management practice and proper allocation of resources to prevent pain-related adverse effect.

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## Annex

### Annex 1: conceptual frame work

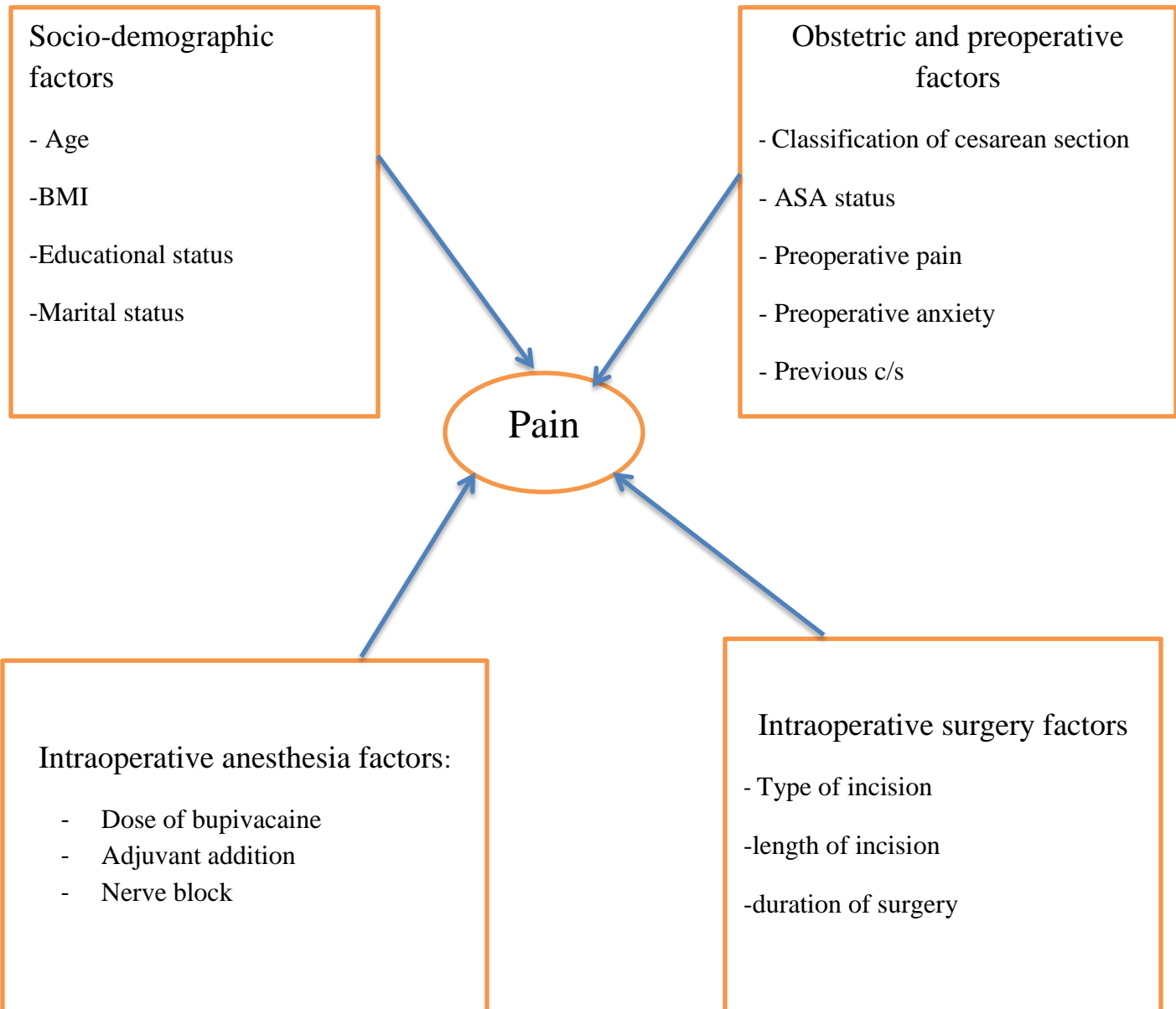


Figure 1: Conceptual framework on assessment and related risk factors of postoperative acute pain after cesarean section under spinal anesthesia.

## Annex II: Title

The incidence and associated factors of postoperative moderate to severe acute pain for mothers undergoing cesarean section under spinal anesthesia at Gandhi women and child care memorial hospital in 2020/21 Addis Ababa, Ethiopia.

Hello, my name is Minda Abebe, a second year MSC clinical anesthesia student in Addis Ababa University. Am conducting research on the incidence and association factors of postoperative moderate and severe pain on mother who undergoing cesarean section under spinal anesthesia in Gandhi women and child care memorial hospital.

You are selected for this study as you are undergoing cesarean section under spinal anesthesia on the selected operation room. Your involvement in this study is only based on your full willingness and has the right to choose not to take part; in addition to that you have the right to stop at any time if you were willingness to participate. There is no personal benefit for the participant by participating in the study but the result will aid researcher and other health professional to develop their way of management of postoperative pain.

The information you provide will kept confidentially by using code number and only the researcher asses the coded data. The data collected will only use for the purpose of this study. Your willingness to participate is paly vital role for success of this study.

Based on the above information, are you voluntary to participate?

A. Yes                      B. No

Date of data collection \_\_\_\_\_

If you have any question, you can contact me with [mindaabebe21@gmail.com](mailto:mindaabebe21@gmail.com) or 0914465540

### Annex III: Questionnaire

**Instruction:** For each question, please circle the number of alternative (s) that fit the response and fill the black space provided or choice from the given alternatives

Data code \_\_\_\_\_

#### Part I: Questionnaire on socio demographic characteristic of mothers

1	Age (years)	_____ Yr
2	Height (in meter)	_____ M
3	Weight (in Kg)	_____ Kg
4	BMI (kg/m2)	_____ kg/m2
5	Marital status	A, Single
		B, divorced/windowed
		C, married
6	Educational status	A, Illiterate
		B, Secondary school
		C, Read and write
		D, Degree
		E, Master
		F, PHD and above
		Other-----

#### Part II: Questions on obstetric characteristics and Preoperative factors

7	Gestational age(in week)	_____ week
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8	Classification of cesarean section	A, elective B, emergency	
9	ASA physical status	A, ASA I	
		B, ASA II	
10	Preoperative anxiety	No	
		Mild	
		Moderate	
		Severe	
11	Preoperative pain	No(0)	
		Mild(1-3)	
		Moderate(4-6)	
		Severe(7-10)	
12	Previous cesarean section	A, yes (I II, III, other-----) B, No	
13	Number of previous cesarean section	I, II, III, IV Others	
14	Preoperative analgesia	A, Yes	
		B, no	
If your answer is <b>yes</b> for question No <b>14</b> , answer question No 15 if not leave it			
15	Type of analgesia	A, Tramadol	
		B, diclofenac	
		C, pethidine	
		Other_____	
16	Parity	A, Nulliparous B, Multiparous	

**Part III: intra operative anesthesia and surgery related associated factors**

17	Dose of bupivacaine	A, 15mg	
		B, 10.5mg	

		C, 12.5mg other____
18	Adjuvant added	A, yes B, no

If you answer for question No 18 is NO, go directly to Q 20

19	Type of adjuvant added	A, Pethidine
		B, fentanyl
		C, Morphine
		Other-----
20	Supplemental parental analgesia given	Yes No
21	Type of parental analgesia given	A. Tramadol
		B. Diclofenac
		C. Pethidine
		Other-----
22	Type of incision	A, Classical(midline)
		B, Pfannenstiel
23	Length of incision(in cm)	_____cm
24	Duration of surgery (in min)	_____min
25	Nerve block done at the end of surgery	Yes No
26	Type of nerve block done	A, TAP B, Wound infiltration Other -----

**Part IV: Severity of pain after 0, 6 and 12 hours of recovery and participant response both at rest & on movement**

27	Numerical pain score at 0 HR at rest	A, No (0)
		B, Mild (1-3)
		C, Moderate (4-6)
		D, Sever (7-10)

28	Numerical pain score at 0 HR at movement	A, No (0)
		B, Mild (1-3)
		C, Moderate (4-6)
		D, Severe (7-10)
29	Numerical pain score at 6 hr at rest	No(0)
		Mild(1-3)
		Moderate(4-6)
		Severe(7-10)
30	NS at 6 hr at movement	No(0)
		Mild(1-3)
		Moderate (4-6)
		Severe(7-10)
31	NS at 12 hr at rest	No (0)
		Mild (1-3)
		Moderate (4-6)
		Severe (7-10)
32	NS at 12 hr at movement	No (0)
		Mild(1-3)
		Moderate(4-6)
		Severe(7-10)

Numeric pain scale

