COLLEGE OF HEALTH SCIENCE

SCHOOL OF MEDICINE

DEPARTMENT OF ANESTHESIA

ASSESSMENT OF PAIN SEVERITY AND ASSOCIATED FACTORS OF POST OPERATIVE PAIN AMONG ADULT PATIENTS IN PUBLIC HOSPITALS OF ADDIS ABABA, ETHIOPIA, 2021.

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Title of the Research project	Pain severity and associated factors among post-operative adult patients in public hospitals of Addis Ababa, Ethiopia, 2021.A cross sectional study.
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Abbreviations and acronyms

ASA: American Society of Anesthesiologist

AOR: Adjusted Odds Ratio

CI: Confidence Interval

ENT: Ear Nose Throat

HICs: High-Income Countries

IASP: International Association for the Study of Pain

LMICs: Low- and Middle-Income countries

NRS: Numerical Rating Scale

NSAID: Non-Steroidal Anti Inflammatory Drugs

ORIF: Open Reduction and Internal Fixation

PACU: post anesthesia care unit

SPSS: Statistical Package for Social Science

USA: United States of America

VAS: Visual Analogue Scale

VRS: Verbal Rating Scale

WHO: World Health Organization

Abstract

Background: Post-operative pain management is one of the key responsibilities of health professionals. Failure to manage post-operative pain effectively will lead to increase morbidity and mortality, long hospital stay, increase health care cost, and patient dissatisfaction. Despite improved understanding of pain mechanism, advances in pain management approach, and other focused initiatives large proportion of post-operative patient's reports pain after surgery. Therefore the major aim of this study was to assess pain severity and associated factors among post-operative adult patients in public hospitals of Addis Ababa.

Methods and materials: Facility-based cross-sectional study was conducted. The single population proportion formula was used to calculate the sample size. A total of 414 study participants were involved. Simple random sampling was used to select study participants. The data was collected by the standard questioner and checklist. The collected data were entered, cleaned, and analyzed by SPSS version 24.0 statistical software. Descriptive results were presented by tables and figures. Bi-variable analysis was employed to select independent predictors of pain severity and multivariable regression used to measure the association between independent and dependent variables. On bi-variable analysis, those variables with a value less than 0.20 were entered on multi-variable analysis. Finally, variables with a p-value < 0.05 were declared as independent predictors of the outcome variables. The model fitness test was checked by Hosmer and Lemeshow's goodness-of-fit test.

Results: a total of 406 study participants have responded to the interview giving a response rate of 98%. The overall incidence of moderate to severe pain was 85.5%. Preoperative analgesia adjusted odds ratio (confidence interval), 0.236(0.065-0.863), preoperative anxiety, 5.468(1.341-22.303), general surgery 7.627(1.901-30.602), orthopedics surgery, 7.195(1.055-49.094), size of the incision, 5.086(1.352-19.135), and post-operative analgesia; none steroidal anti-inflammatory drugs 5.611(2.000-15.737), and tramadol, 4.714(1.506-14.753) was independent predictors of postoperative moderate to severe pain.

Conclusion: - The study revealed that the overall incidence of postoperative pain was high in the study area. This reflects attention given to postoperative pain management is low. Preoperative analgesia, preoperative anxiety surgery type, incision length, and postoperative analgesia were independent predictors of postoperative pain.

Key words – pain severity, post operative pain, type of surgery

1. Introduction

1.1. Background information

Pain is defined by the International Association for the Study of Pain (IASP) as ‘‘an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage’’ (1). It is one of the commonest medical and surgical complaints in all settings of healthcare services. Pain is identified by the World Health Organization (WHO) as a problem of global proportions (2). WHO and the International Association for the Study of Pain have recognized pain relief as a human right (3). Pain is a highly personal and subjective experience, which is increasingly recognized to be shaped by life events, mood, fear, anxiety, and anticipation among other influences (4).

Controlling acute pain after surgery is important not only in the immediate postoperative phase, but also to prevent chronic postsurgical pain, which can develop in as many as 10% of patients (4). Effective postoperative pain control is an essential component of the care of surgical patients. Advances in pharmacology, techniques, and education are making major inroads into the management of postoperative pain (5). Post operation pain intensity is associated with variables like patient age, sex, type of surgery, anesthesia, duration of surgery and previous painful experience of the patient are some of the factors associated with moderate to severe postoperative pain development (6, 7).

Adequate postoperative pain management is essential to keep patients comfortable, help them to quickly recover, and prevent postoperative complications. Substantial evidence has been generated over the last decade, suggesting that severe acute pain after surgery may progress to the development of chronic pain (8, 9). The advantages of effective postoperative pain management include patient comfort and satisfaction, earlier mobilization, fewer pulmonary and cardiac complications, reduced risk of deep vein thrombosis, faster recovery with less likelihood of the development of neuropathic pain, and reduced cost of care(5).

Despite improved understanding of pain mechanisms, increased awareness of the prevalence of postsurgical pain, advances in pain-management approaches, and other focused initiatives aimed at improving pain-related outcomes in recent decades, inadequately controlled postoperative pain

continues to be a widespread, unresolved healthcare problem. Most surgical patients spend their immediate postoperative period in the PACU, where pain management, being unsatisfactory and requiring improvements, and affects further recovery.

1.2. Statement of the problem

Pain is a sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage(6). Pain occurring in the post-anesthesia care unit (PACU) is common, distressing to patients, and remains a management challenge for staff and considered an integral part of modern surgical practice (10,11) for effective postoperative pain management more effective analgesic/anesthetic measures in the perioperative period are needed to prevent the progression to persistent pain. If it is managed ineffectively it will result in tangible and intangible costs (6). Evidence showed that in the US greater than 80% of postoperative pain is not adequately managed (12).

For the effective and efficient management of post-operative pain health professionals required valid tools to assess pain to guide their pain management decisions (13). Its inadequate management will result in suffering, increased risk of morbidity and mortality, longer stay in hospital and higher cost, functional and quality-of-life impairment, delayed recovery time, prolonged duration of opioid use, and higher health care costs. In most developed and developing countries, postoperative pain is not adequately managed (12, 14). A postoperative patient who is experiencing pain cannot ambulate, therefore, may develop deep vein thrombosis. Again a patient who is experiencing chest pain may have suppressed of the cough reflex, therefore develop lung infection (15).

Despite the introduction of new standards, guidelines, and educational efforts, data from around the world suggest that postoperative pain continues to be undermanaged (6). Under the management of post-operative pain is attributed with remiss in using pain rating scores to assess analgesia needs, “absence of pain assessment and documentation practices, absence of specific written postoperative pain protocols, deficiencies in educational pain management programs, absence of effective analgesic techniques (e.g., epidural analgesia and peripheral nerve catheters) and if there are any; poor adherence to available guidelines (6, 11, 14, 16–19).

Evidence from different kinds of the literature revealed that under-treatment of acute postoperative pain is also attributed to gender difference, age difference psychosocial factors such as sex role “sex role beliefs, pain coping strategies, mood, and pain-related expectancies, surgical incision, type of anesthesia (6, 17, 20–25).

1.3. Justification

Postoperative pain is very common in almost all surgeries. Inadequate management results in suffering the increased risk of morbidity and mortality, longer stay in the hospital, and higher cost. In most developed and developing countries, postoperative pain is not adequately managed.

In a resource-limited environment with an expected high incidence of postoperative pain, it is necessary to fully utilize basic analgesic modalities and to reserve more costly advanced methods for those who need it most. For this reason, the incidence and association factors of postoperative pain need to be identified. To reduce the incidence of postoperative pain, it is necessary to expect which patient needs a more aggressive analgesic effort. Developing an appropriate postoperative pain management plan is critical based on surgical interventions and factors associated with post-operative pain.

Postoperative pain is poorly studied in developing countries and studies done in the area of pain relief and pain management practices at health facilities are scanty. In Ethiopia, Limited numbers of literature are available in the area of postoperative pain, which mainly focuses on pain management. Locally, there are no updated data on the incidence of postoperative pain and associated factors in the postoperative period.

Therefore, this study aims to identify important evidence on exploring the incidence of moderate or severe pain during the first postoperative hours and specific groups of patients who require more intensive analgesic efforts in government hospitals situated in Addis Ababa. It also recognizes the associated factors that contribute to postoperative pain. Hence, the study results used as a milestone to give some picture of postoperative pain management in Addis Ababa government hospitals. In addition, the result of this study will also serve as baseline data for further studies and investigation.

2. Literature review

2.1. Prevalence of pain severity in the post operative periods

Globally, the prevalence of postoperative pain varies among studies. A national US survey study of incidence, patient satisfaction, and perceptions of post-surgical pain of 300 adults who had undergone surgery revealed that 86% of patients experienced postsurgical pain overall, and 75% of those who reported pain described its severity as moderate–extreme during the immediate postoperative period (24).

The American Pain Society reported a prevalence of more than 80% of patients who undergo surgical procedures experience acute postoperative pain and approximately 75% of those with postoperative pain report the severity as moderate, severe, or extreme (26).

A study done for the purpose of assessing predictive factors of severe postoperative pain in the post-anesthesia care unit on 342 patients showed that 42% had severe pain in the PACU (27). Another more recent abstract showed that 49.6% of the patients had severe pain and 39.4% had moderate pain in the PACU (28).

In addition, in a Dutch study conducted on 1,490 surgical inpatients was shown that 41% of patients in the PACU reported moderate or severe pain on the day of surgery, with declining rates of 30%, 19%, 16%, and 14% seen on postoperative days 1,2,3, and 4, respectively (29).

In an observational study conducted in seven hospitals in Eastern Poland, a 4-h measurement of pain intensity showed that 39.32% of patients assessed the pain as moderate and 19.75% as severe. A sudden elevation in pain severity among patients anesthetized with the single-shot spinal technique was observed. Only 4.9% of participants received strong opioids during the first 24 h after surgery (30).

Research done in 2017 on the aim of patient satisfaction survey in postoperative pain management from the Indian subcontinent indicated that about 88.4% of patients reported postoperative pain during the first 24 h after surgery the author concludes that the result demonstrates that current standards of care in postoperative pain management remain suboptimal(23).

With the aim of assessing acute postoperative pain in Jordan university hospital, a survey was conducted by collecting data from patient interviews and chart reviews. The study found out that 72% of the patients experience moderate to severe pain postoperatively at rest while 89.3% of patients felt pain on movement. This shows that postoperative pain is not managed adequately in the hospital (10).

There are fewer studies in developing countries; most indicate a high prevalence of post-operative pain unfavorable relief. A study done in Uganda in 2010 revealed that over 90% of post-surgical patients have pain during the post operation period (31). Similarly, in 2014 research done in Tanzania also showed that the prevalence of post operation pain was 85.5% and 77.4% at 24 and 48 hours respectively (15). In another recent study conducted at Temeke Regional Referral Hospital in Dar es Salaam, Tanzania in 2015 the prevalence of pain was 100%, 83.9%, and 36% in 12, 24, and 48 hours, respectively. At 12 hours, moderate to worst pain was reported in 95.6% of cases (31).

A prospective descriptive study, which was conducted at the University of Ilorin Teaching Hospital in Nigeria, showed that postoperative pain remains a significant problem in the hospital. Most patients, 95% experienced pain during the first period of surgery. And patients report that they have experienced moderate to severe pain in the recovery room 79.6% and day one of surgery 54.6%(32).

A study done in 2012 at the Singapore General Hospital implied that 67.6% of patients reported no to mild pain while 32.3% reported moderate to severe pain; 65.4% of patients had delayed discharge and 28.3% of these were a result of uncontrolled pain (7).

A study which was conducted at St. Paul's Hospital Millennium Medical College showed that among the 416 study participants, 90.4% complained to have post-operative pain. Of these, 61.8%, 25.5%, and 3.1% reported mild, moderate, and severe pain respectively. Most of the patients that felt pain after their surgery 89.9 % had pain on the surgical site. The presence of prior chronic pain in the study participants was also assessed and it was found out that 18.8% of patients had chronic pain other than postoperative pain (33).

Study done with aim of assessment of intra-operative and immediate postoperative pain management in adult orthopedic surgical patients at the post anesthesia care unit of Tikur Anbesa Specialized Hospital showed that 49.7% had experienced moderate to severe post-operative pain in 2017 and the author was concluding that postoperative pain was not effectively managed (34).

Another study which was done at Mekelle, Ethiopia showed that among 154 patients that underwent surgery were assessed out of whom 98.7 % had the pain of different degrees. Accordingly, mild pain 68.2%, moderate pain 26.6 %, severe pain 3.9 % were reported by the patients. The most frequently used medication to manage postoperative pain was tramadol 42.2 %. The prevalence of moderate to severe postoperative pain in this hospital was found to be 30.5 %. Postoperative pain was insufficiently managed in this hospital (14).

A study done in Jimma, Ethiopia revealed that the incidence of postoperative pain was reported to be 91.4% and 80.1% of the patients were underrated indicating no progress in the area of pain treatment. The author concluded, treatment provided to patients was inadequate and not in line with international recommendations and standards (11).

The study done on the Northeast part of Ethiopia on the assessment of severity and risk factors of postoperative pain at the University of Gondar Hospital showed that moderate to severe pain was reported in 57% of patients in the immediate postoperative period and 78% in the 1st 12 hours (6).

2.2. Factors associated with post operative surgical pain

The prevalence of severity of postoperative pain was associated with different factors or independent variables; socio-demographic, surgical related, anesthesia technique and use of analgesic drugs are among such factors.

2.2.1. Socio-demographic factors.

Females had a higher incidence of severe pain than males (28) more females 58.7%, than males 29.7% suffered moderate to severe pain in the immediate postoperative period in the current study (35). In a study that explores the incidence of moderate or severe pain during the first postoperative 24 hours in a large referral hospital situated in a developing country, younger age has shown to be associated with moderate or severe postoperative pain(36).

Another study done state hospital, Turkish showed variables such as marital status and education has a significant association with moderate to severe post-operation pain (18).

Research conducted in Tanzania in 2015 assessed the correlation between severe to worst pain and patients' demographic characteristics revealed that patients who were widowed or divorced (as a group) were less likely to get severe to worst pain at 12 hours, the same association was not observed at 24 hours. The finding was also observed in females than males and a similar observation was made among college/university education, peasants/farmers (31).

A study done at the University of Gondar on post-operative moderate to severe pain assessment and risk factors identified that ASA I and II, age less than 60, and female gender were identified as independent risk factors for postoperative pain severity (6).

A study was done on the pattern of postoperative pain and association factor for a 10-year prospective survey showed that ASA physical status I-III patients had a higher incidence of severe pain than those with ASA IV-V and patients with severe pain were younger (28).

2.2.2. Surgery related factors

A study done in the developing country showed that emergency surgery and same-day admissions have shown to be associated with moderate or severe postoperative pain. Type of surgery is also another factor; open abdominal, orthopedic especially ORIF of the lower limbs, upper limb and spine surgeries, duration of the operation, and burns surgery were associated with the most pain (7,18,31,36). Incision length >10cm were also identified as factors associated with post-operation moderate to severe pain (6).

2.2.3. Anesthesia and analgesia drug related factors

A study done in Singapore implied that the use of general anesthesia has associated with moderate to severe pain (7). Another study was done in Tanzania in 2015 to assess the correlation between severe to worst pain and type of anesthesia the result showed that those operated under general anesthesia were associated to post operation pain (31). Similarly, a study done at Gonder, Ethiopia was identified that patients operated under general anesthesia technique have associated with postoperation pain severity (6).

Conceptual frame work

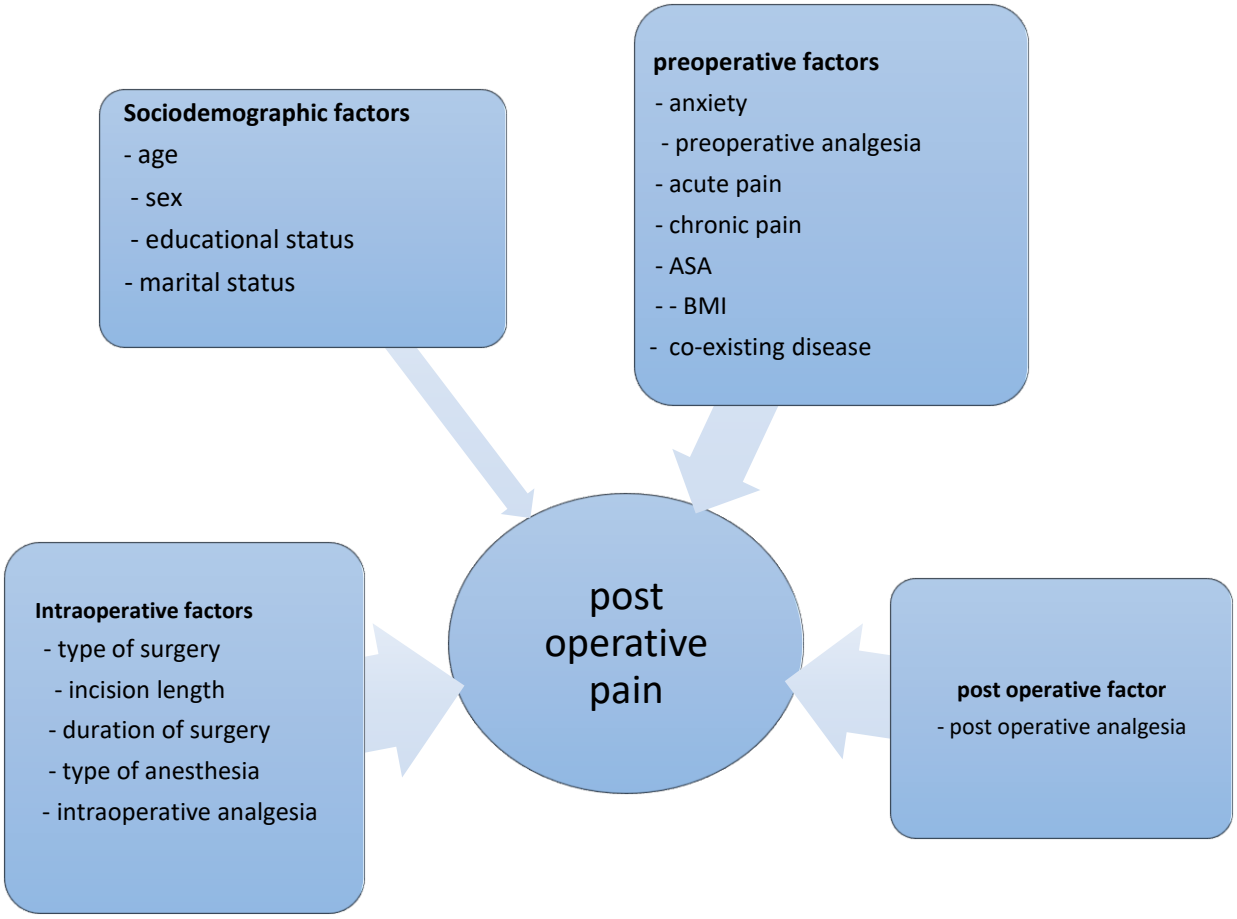

Figure- conceptual framework for possible predictors of post operative pain

3. Objectives

3.1. General objective

- To assess pain severity and associated factor among post operative adult patients in public hospitals of Addis Ababa 2021.

3.2. Specific objectives

- To assess pain severity among post operative adult patients in public hospitals of Addis Ababa.
- To identify factors associated to pain severity among post operative adult patients in public hospitals of Addis Ababa.

4. Method and materials

4.1. Study setting

The study was conducted in Addis Ababa government hospitals. Addis Ababa is the capital city of Ethiopia. Administratively Addis Ababa is divided into 11 sub-cities and it has a total of 12 government hospitals and 96 health centers. The total population of the city is estimated to be 3,689,000 (37). Among the 12 public hospitals in Addis Ababa, three hospitals (Tikur Anbessa Specialized Hospital, Menelik II referral hospital, and Zeweditu Memorial Hospital) are selected by simple random sampling as a sampling unit.

4.2. Study design

Institutional Cross sectional study design was employed.

4.3. Study period

The study period was from February – April 2021.

4.4. Population

4.4.1. Source population

All adult patients' undergone surgical procedures and admitted to public hospitals of Addis Ababa.

4.4.2. Study population

The study population was all adult patients admitted to the selected hospital to undergo major surgical procedures during the study period.

4.4.3. Sampling unit

The sampling unit was randomly selected from adult patients scheduled to undergone major surgical procedures in the selected hospitals during study periods.

4.5. Sampling Method and procedure

A simple random sampling method was used to select health facilities. First, the public hospitals were listed. Finally, by simple random sampling, three hospitals were selected for the sampling units. The calculated sample size was proportionally allocated to each hospital based on the previous three-month performance which was 1217(Tikur Anbessa 562, Menelik II memorial

hospital 347, and Zeweditu memorial hospital 308). A simple random sampling technique was employed for the selection of sample units.

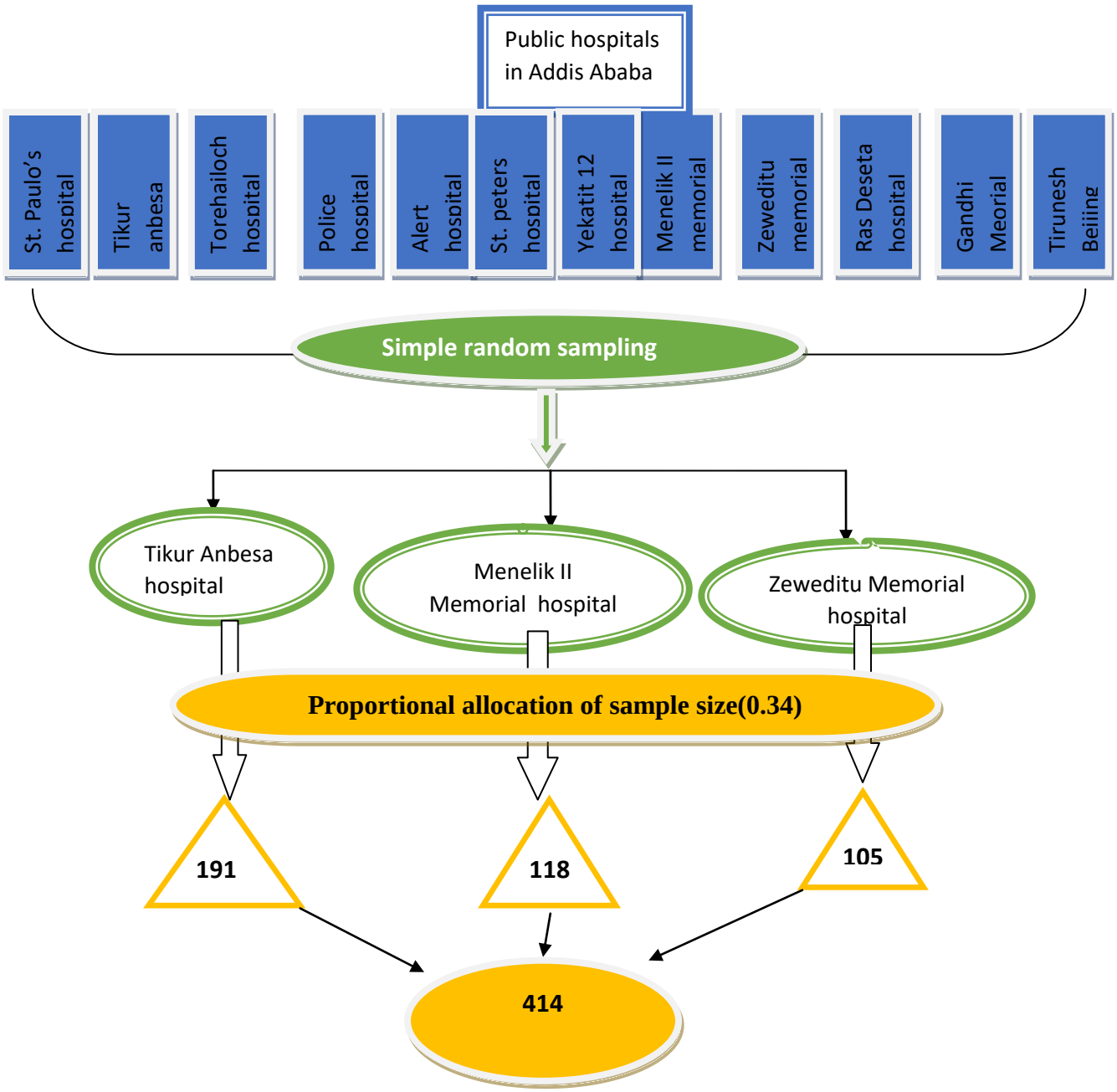

Figure 2: Schematic presentation of sampling technique and procedure

4.6. Eligibility criteria

Inclusion criteria

All adult surgical inpatients aged 18 years or older and underwent major surgical procedures during the study period.

Exclusion criteria

Patient with evidence of cognitive and mental illness, patients who are not admitted for recovery or direct transfer to an intensive care unit, cardiac surgery, cesarean section, patient refusal, patient continuous epidural analgesia, unconscious and emergency surgery during the data collection time.

4.7. Sample size determination and procedure

Sample size was determined using a single population proportion formula:

$n=z\alpha^2/2\ p\ (1-p)/w^2$ plus 10% non-response rate

Where:

n=the final sample size

Zα/2 = critical value for 95% confidence level which is equals to 1.96 (z value at α =0.05)

p=proportion/prevalence

W =maximum allowable error in this cases 0.05(5%)

Prevalence of moderate – severe of pain was taken from study done at Gonder 57%(6).

Accordingly, the sample size for this study:

$n = [(1.96)^2 * 0.57(1- 0.57)/ (0.05^{2})]$ +10% (non respondent).

n=3.8416*0.2451/0.0025=377 Plus 10% non-response =377*0.10= 37

n = 377+37

= 414

4.8. Study variables

Dependent variable

Pain (yes/no)

Independent variables

Socio-demographic variables (sex, age, marital status, educational status, occupation, residence), BMI, type of drug used for pain management, intraoperative analgesia, postoperative analgesia, type of surgery, type of anesthesia, ASA physical status, and duration of surgery and anesthesia.

4.9. Data collection tool and procedure

Data was collected by the adopted a standard questioner and checklist. The numeric rating scale was used to assess the level of pain. The numeric rating scale was translated into the Amharic language. The checklist was used to extract data on the type of surgery, anesthesia, a drug used for intraoperative and postoperative pain management, and duration of surgery and anesthesia from the patients' charts and anesthetic record sheets.

4.10. Data quality assurance

To assure the data quality a one-day standardized training was given to three supervisors and six data collectors, who are health professionals working other than the recovery room. Appropriate information and instruction were given to the objective, relevance of the study, confidentiality of information, respondent's rights, informed consent, and technique of data collection. A pre-test was conducted in another hospital with 10% of the total sample size and the questions were checked for clarity, completeness, consistency, and questions that were create difficulty or unclear were rephrased and corrected. Some unnecessary questions were excluded and missing questions were incorporated. The quality of the data collected was checked on a daily basis by supervisors and principal investigators.

4.11. Data analysis

The collected data were entered, cleaned, and analyzed by SPSS version 24. Descriptive statistics like frequency distribution table, graph, and summary measures were computed. Furthermore, to identify a statistically significant association between the independent and dependent variable bi-variable and multivariable analyses were employed. To select independent predictors of pain controls bi-variable logistic regression analysis was applied and multivariable regression was

used to measure the association between independent and dependent variables. On a bi-variable analysis, those variables with a value less than 0.2 were entered on multivariable analysis. Finally, variables with p-value 0.05 were declared as independent predictors/ statistically significant / the outcome variables, and presented with 95% CI and AOR.

4.12. Operational definition

Postoperative pain: The presence of pain in the postoperative period was defined as a patient having pain and any pain score other than zero starting immediately after surgery and recovery room.

Numerical pain rating scale (NRS): is a valid method of pain assessment where patients are asked to score their pain ratings on a scale of 0–10, corresponding to current, best, and worst pain experienced over the 12 hours (38).

Figure 3: The Numeric Rating Scale (NRS)

Severe post-operative pain: a pain rating of 7-10 in 11 point numerical pain rating scale.

Moderate post-operative pain: a pain rating of 4-6 in 11 point numerical pain rating scale.

Mild post-operative pain: a pain rating of 1-3 in 11 point numerical pain rating scale.

No pain: a pain rating of 0 (Zero) in 11 point numerical pain rating scale.

Recovery room: is a space a patient is taken to after surgery to safely regain consciousness from anesthesia and receive appropriate postoperative care.

Moderate to severe pain: numeric rating score of moderate to severe post-operative pain.

Pain: patient having moderate or severe pain during the first 12 hrs of post operative period.

4.13. Ethical considerations

Ethical approval was obtained from the ethics review committee of Addis Ababa University. In addition, permission to conduct the research was obtained from the administrative office of the respective hospital. Before the data collection, verbal consent was obtained from each postoperative surgical patient. The study participants were informed about the purpose of the

study, why and how they were selected. Moreover, patients were told that they were free to withdraw from the study at any time during the research. Any specific patient identifiers were not included in the data collection tool and this was assured by using code numbers to each data and by analyzing the data in aggregate.

4.14. Dissemination of findings

The result will be submitted to Addis Ababa University, the department of anesthesia, the institutions involved in the study, and other concerned bodies. The presentation will be at professional, local, national, and international meetings and scientific conferences. Publication in peer-reviewed national and international journals will be attempted.

5. Results

5.1. Socio-demographics

From the total 414, respondent 406 respondents complete the interview with a response rate of 98%. The mean age of the participants was 43.72 +/- 15.76 with the range of 18-86 years; the majority of the respondents 237 (58.4%) were found between the age range 18-45 years. One hundred sixteen (28.6%) of the respondents was completed college and above. Two hundred eleven (52%) were male and two hundred seventy-five (67.7%) were in urban residency. Nearly half of the study participants were unemployed. The great majority of the study participants were within BMI of 18.5 and 24.9 kg/m2 (Table 1).

Table-1 Socio-demographic characteristics of study participants who underwent surgical intervention in public Hospitals of Addis Ababa 2021 (n=406)

Variables	Response	Frequency	Percent
Age	18- 45 years	237	58.4
	45-59 years	75	18.5
	>= 60 years	94	23.2
Sex	Male	211	52
	Female	195	48
Educational status	Can't read and write	53	13.1
	Can read and write	54	13.3
	Primary	84	20.7
	Secondary	99	24.4
	College and above	116	28.6
Marital status	Married	296	72.9
	Single	85	20.9
	Divorced	25	6.2
Residence	Urban	275	67.7
	Rural	131	32.3
Occupational status	Daily laborer	38	9.4
	Farmer	36	8.9
	Employed	142	35
	Unemployed	190	46.8
Religion	Orthodox Christian	248	61.1
	Muslim	87	21.4
	Protestant	68	16.7
	Catholic	3	
BMI	18.5-24.9	346	85.2
	>=25	60	14.8

5.2. Pre-operative and patient related factors

Of the total 406 study participants, 360 (88.7%) of the participants has no history of surgery in the past month. The majority of the study participants (79.1%) didn't take any pain medication in the preoperative periods. Two hundred twelve (52.2%) of the study participants were in ASA physical status stage I. Three hundred twenty-eight (80.8%) of the study participants had no acute pain during preoperative pain. For those who had a history of pain before surgery 60 (76.9%) of them score their pain severity at a mild level. From 406 study participants, 57 (14%) had chronic pain and 84 (20.6%) had coexisting diseases before surgery (Table2).

Table-2: preoperative anesthesia and patient-related characteristics of the study participants who underwent surgical intervention in public hospitals of Addis Ababa 2021 (n=406)

Variable	Response	Frequency	Percent
Have you had surgery in the past month?	Yes	46	11.3
	No	360	88.7
Did you take pain medications in preoperative period?	Yes	84	20.7
	No	322	79.1
ASA stage	ASA I	212	52.2
	ASAII	121	29.8
	ASAIII	73	18.0
Did the patient was anxious during preoperative period	Yes	115	28.3
	No	291	71.7
Did the patient had acute pain during preoperative period	Yes	78	19.2
	No	328	80.8
If yes for the above question, how was the severity N=78	Mild	60	76.9
	Moderate	14	17.9
	Sever	4	
Do have previous chronic pain experience?	Yes	57	14
	No	349	86
Did you receive information about pain treatment options?	Yes	86	21.2
	No	320	78.8
Did the patient have any coexisting disease?	Yes	84	20.7
	No	322	79.3

5.3. Intra operative anesthesia related factors

Of the total participants about two hundred fifty-six (63.1%) of the participant's surgery was done with general anesthesia and almost one-third with spinal and nerve block, 17 (4.2%) by the combination of general anesthesia and epidural. (Fig: 5.1).

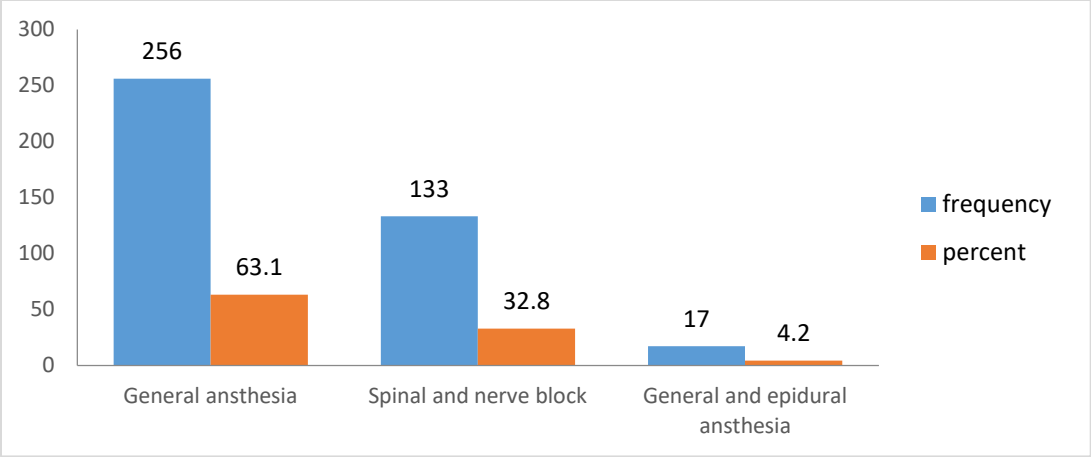

Figure 2: Types of anesthesia given for the study participants who underwent surgical intervention in public hospitals of Addis Ababa 2021 (n=406)

From the study, participants participated in the study about 65.1% of participants were taken analgesics during induction of general anesthesia. Among the total patient 164 (59.7%) induced by Theopentane and the majority of participants 207 (75.3%) maintenances of anesthesia were maintained by Isoflurane (Table3).

Table 3: intraoperative anesthesia-related characteristics of study participants who underwent surgical intervention in public hospitals of Addis Ababa 2021 (n=406)

Variable	Response	Frequency	Percent
Did the patient take analgesic during induction?	Yes	275	65.1
	No	131	34.9
Type of drug for Patient induction(n=275)	Propofol	82	29.8
	Theopentane	164	59.7
	Ketamine	5	1.8
	Ketamine and propofol	24	8.7
Type of drug for Patient Maintenance(n=275)	TIVA with Ketamine and propofol	10	3.6
	Halothane	58	21.1
	Isoflurane	207	75.3
Did the patient take intraoperative analgesic?	Yes	276	68
	No	130	32

Excluding analgesics given during induction of anesthesia, a total of 182 patients took additional analgesics during the intraoperative period and at the completion of the surgery. Among this 152 (82.6%) patients were provided with analgesia at the intraoperative period and the remaining 30 (17.4%) took analgesia at the completion of surgery. Of these patients, 53 (29%) took diclofenac, 52 (28%) morphine, and the least minority was given fentanyl (Fig.5.2 and 5.3).

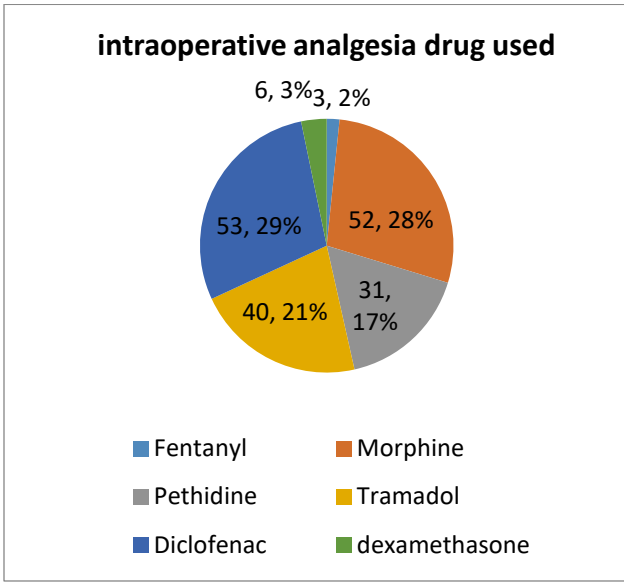

Figure 5.2: Type of intraoperative analgesia used among post-operative surgical patients in public hospitals of Addis Ababa 2021 (n=182)

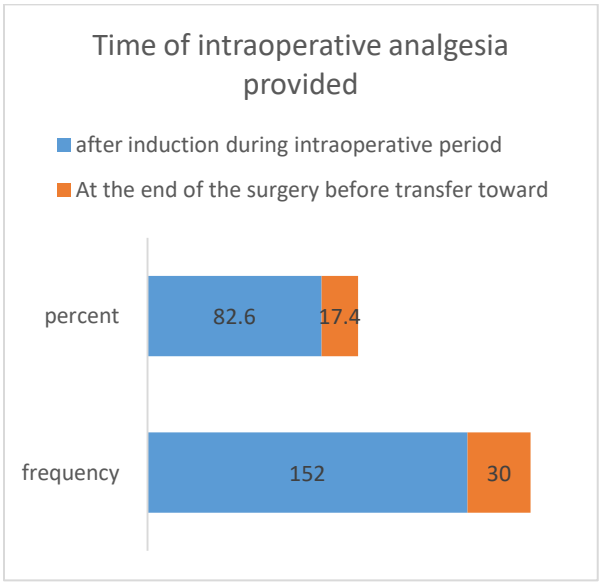

Figure 5.3: Time at intraoperative analgesia given among post-operative surgical patients in public hospitals of Addis Ababa 2021(n=182)

5.4. Intra-operative surgical and post operative pain management related factors

From 406 participants 154 (37.9%) undergone general surgery and the list majority 23 (5.7%) were undergone Cardiothoracic surgery. The majority of surgical procedures were accomplished within 1-2 hrs 156 (38.4%). One hundred eighty (44.3%) of the surgical procedure were an incision length of 5-10cm. And almost one-third of the participants 146 (36%) was an intra operative blood loss of between 250-500ml. In the immediate postoperative period from the total participants' postoperative pain was managed by diclofenac injection 182 (44.8%) followed by nerve block 106 (26.1%) provided to alleviate pain. (Table 4)

Table 4: Surgery and postoperative analgesia related characteristics of study participants who underwent surgical intervention in public hospitals of Addis Ababa 2021 (n=406)

Variables	Response	Frequency	Percent
Type of surgery	General	154	37.9
	Urology	111	27.3
	Gynecology	20	4.9
	ENT and maxillofacial	26	6.4
	Orthopedics	47	11.6
	Cardiothoracic	23	5.7
	Neurology	25	6.2
Incision length	<5cm	53	13.1
	5-10 cm	180	44.3
	>10 cm	173	42.6
Duration of anesthesia	<1 hrs	60	14.8
	1-2 hours	156	38.4
	2-3 hours	96	23.6
	>3 hours	94	23.2
Duration of surgery	<1 hrs	75	18.5
	1-2 hours	162	39.9
	2-3 hours	87	21.4
	>3 hours	82	20.2
Estimated intraoperative blood loss	<100ml	66	16.3
	100-250 ml	105	25.9
	250-500 ml	146	36.0
	500-1000ml	77	19.0
	>1000ml	12	3
Type of postoperative pain management	Nerve block	106	26.1
	Systemic opioids	28	6.9
	NSAID without opioids	182	44.8
	Tramadol	90	22.2
Drugs given in the recovery room to relive pain	Pethidine	2	1.3
	Morphine	4	2.6
	Diclofenac	62	40.2
	Tramadol	73	47.4
	Epidural Anesthesia	9	5.8
	Nerve block	4	2.6
Was any pain documented	Yes	25	6.2
	No	381	93.8

5.5. Post operative pain severity assessment

5.5.1. Severity of post-operative pain at different point in time (Statics)

Evidence from this study revealed that 213 (52.5%) of the study participants report they had no post-operative pain at one hour of surgery. At two hours of surgery 152 (37.5%) of the study, participants had moderate pain. At the sixth hour and twelfth hours of surgery 182 (44.8%) and 148 (36.5%) of the respondents were reported mild pain respectively (Figure 5.4).

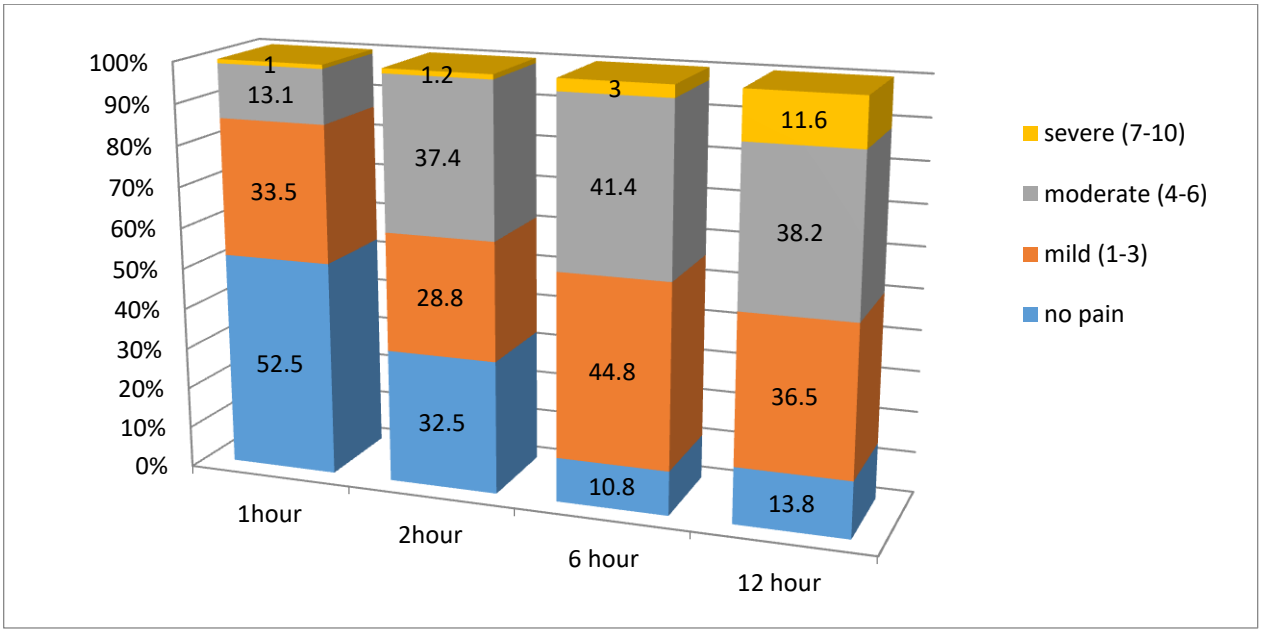

Figure 5.4 :- Pain severity (statics) NRS at one hour, two hours , six hours and twelve hours among postoperative adult patients in public hospitals of Addis Ababa **2021.**

5.5.2. Severity of post-operative pain at different point in time (Dynamics)

Evidence from this study revealed that 188 (46.3%) of the study participants reported they had no post-operative pain during movement at one hour after surgery. At two hours of surgery 177 (43.6%) of the study, participants had moderate pain. At six hours and twelve hours of surgery 234 (57.6%) and 187 (46.1%) of the respondents were reported moderate pain respectively (Figure 5.5).

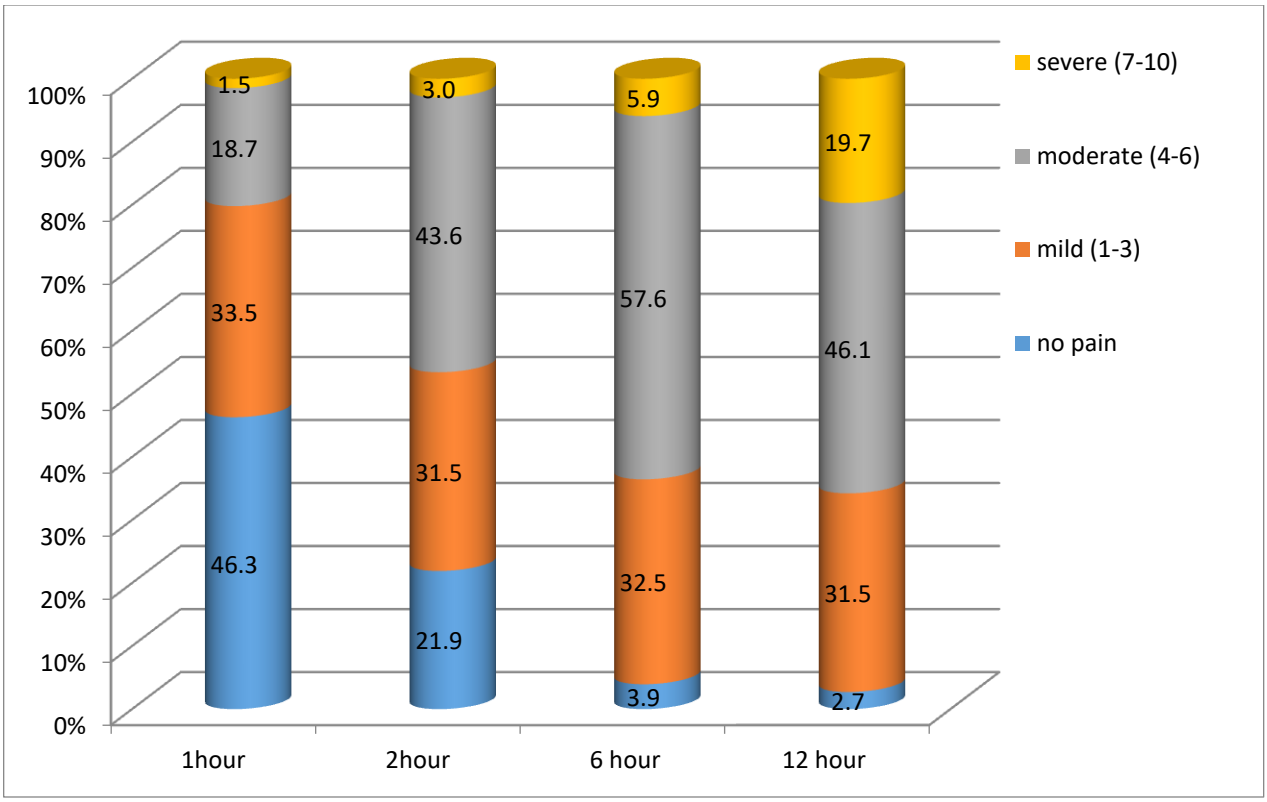

Figure 5.5 **:-** Pain severity (dynamic) NRS at one hour, two hours , six hours and twelve hours among postoperative patients in public hospitals of Addis Ababa 2021

5.5.3. Over all moderate to severe pain incidence

The overall incidence of moderate to severe pain within the first 12 hours of the postoperative period between the total participants 347 (85.5%, (CI=81.8-88.9)) and no pain to mild pain were 59 (14.5%). (Fig 5.6)

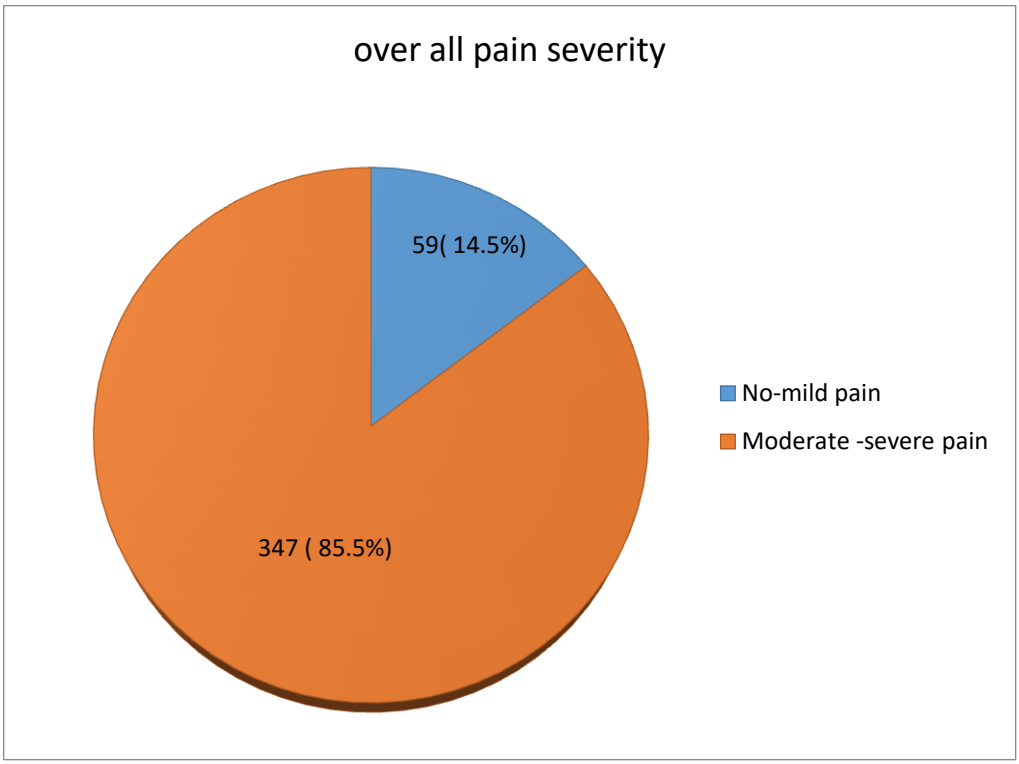

Figure 5.6**:** Overall pain severity among postoperative adult patients in public hospitals of Addis Ababa 2021

5.6. Factors affecting severity of pain among post operative patients

All independent variables were entered in the bi-variable logistic regression model in order to see the association with the outcome variables. On the bi-variable logistic regression model, those variables with a p-value less than 0.2 were selected as a candidate variable and entered in the multivariable regression model. Finally, variables with a p-value less than 0.05 were declared as significantly associated with the outcome variable and presented with 95% CI and AOR. (Table 5.6.1,5.6.2 and 5.6.3).

Preoperative analgesia was significantly associated with the severity of postoperative pain. Patients who didn't take preoperative analgesia were 74.6% more likely to develop postoperative pain compared to those who took (0.236 (0.065-0.863). Preoperative anxiety was significantly associated with the severity of pain. Patients who experience preoperative anxiety were 5.468 times more likely to develop moderate to severe pain compared with those who didn't experience it (5.468 (1.341-22.303). (Table 5.6.1)

Table 5.6.1 independent variables associated with pain severity(moderate to severe pain) in study participants underwent surgical intervention in public Hospitals of Addis Ababa 2021 (n=406)

Variables	Pain severity		COR(95%CI)	AOR(95%CI)	P-value
	No-mild pain	Moderate – severe pain			
Age					
<45 years	35(14.8)	202(85.2)	0.693(0.355-1.354)	0.986(0.342-2.845)	0.979
45-59 years	15(20)	60(80)	1.1.636(0.754-3.552)	0.529(0.165-1.700)	0.285
>= 60years	9(9.6)	85(90.4)	1	1	
Sex					
Male	28(13.3)	183(86.7)	1	1	
Female	31(15.9)	164(84.1)	0.809(0.466-1.407)	0.646(0.278-1.502)	0.310
Educational status					
Can't read and write	6(11.3)	47(88.7)	1.163(0.435-3.188)	0.887(0.252-3.121)	0.852
Can read and write	7(13)	47(87)	0.997(0.381-2.608)	0.789(0.231-2.699)	0.706
Primary school	10(11.9)	74(88.1)	1.099(0.468-2.583)	0.924(0.324-2.632)	0.882
Secondary school	21(21.2)	78(78.8)	0.552(0.267-1.139)	0.555(0.215-1.430)	0.223
College and above	15(12.9)	101(87.1)	1	1	
BMI					
18.5-24.9	50(14.5)	296(85.5)	0.957(0.0.443-2.066)	0..965(0.347-2.682)	0.945
>25	9(15)	51(85)	1	1	
Did the patient take preoperative analgesia					
Yes	5(5.9)	80(94.1)	1	1	
No	54(16.8)	267(83.2)	0.309(0.120-0.799)	0.236(0.065-0.863)	0.029**
ASA					
ASA I	44(20.8)	168(79.2)	0.108(0.025-0.456)	1.192(0.085-16.683)	0.896
ASA II	13(10.7)	108(89.3)	0.234(0.051-1.068)	1.741(0.136-22.346)	0.670
ASA III	2(2.7)	71(97.3)	1	1	
Patient preoperative anxiety					
Yes	4(3.5)	111(96.5)	6.467(2.286-18.293)	5.468(1.341-22.303)	0.018**
No	55(18.9)	236(81.1)	1	1	
Patient taken anxieolysis agent preoperatively					
Yes	2(3.8)	50(96.2)	1	1	
No	57(16.1)	297(83.9)	0.208(0.049-0.881)	0.935(0.145-6.024)	0.943

Key- where AOR=adjusted odds ratio, CI=confidence interval, COR=crude odds ratio,** =statistically significant.

The type of surgery was statically significant with moderate to severe postoperative pain. Patients with general and orthopedic surgeries were 5.855 and 6.482 times more likely to develop moderate to severe postoperative pain compared with neurological surgery (5.855 (1.601-21.418), (6.482 (1.055-49.094)) respectively. (Table 5.6.2)

Table 5.6.2 independent variables associated with pain severity(moderate to severe pain) in study participants underwent surgical intervention in public hospitals of Addis Ababa 2021 (n=406)

Variables	Pain		COR(95%CI)	AOR(95%CI)	P-value
	No-mild pain	Moderate – severe pain			
Type of surgery					
General	16(10.4)	138(89.6)	3.354(1.216-9.255)	7.627(1.901-30.602)	0.004**
Urology	13(11.7)	98(83.3)	2.932(1.029-8.355)	3.705(0.685-20.046)	0.128
Gynecology	2(10)	18(90)	3.500(0.638-19.195)	3.895(.388-39.065)	0.248
ENT and Maxillofacial	12(46.2)	14(53.8)	0.454(0.142-1.454)	0.646(0.149-2.790)	0.558
Orthopedics	8(17)	39(83)	1.896(0.596-6.035)	7.195(1.055-49.094)	0.044**
Cardiothoracic	1(4.3)	22(95.7)	8.556(0.961-76.135)	11.902(0.660-214.53)	0.093
Neurology	7(28)	18(72)	1	1	
Patient co existing disease					
Yes	3(3.6)	81(96.4)	5.684(1.733-18.644)	2.756(0.317-23.990)	0.358
No	56(17.4)	266(82.6)	1	1	
Types of anesthesia					
General anesthesia	37(14.5)	219(85.5)	0.370(0.048-2.874)	0.616(0.040-9.443)	0.728
Spinal anesthesia or nerve block	21(15.8)	112(84.2)	0.333(0.042-2.650)	0.068(0.003-1.754)	0.105
General anesthesia and epidural	1(5.9)	16(94.1)	1	1	

Key- where AOR=adjusted odds ratio, CI=confidence interval, COR=crude odds ratio, ** =statistically significant.

Length of incision was significantly associated with postoperative pain. Patients with incision size greater than 10 cm were 4.788 times more likely to develop moderate to severe pain compared with incision length less than 5 cm (4.788 (1.322-17.348). Patients whose pain was managed with NSAID and tramadol were 4.577 and 3.323 times more likely to develop moderate to severe postoperative pain compared with those whose pain was managed with a nerve block (4.577(1.764-11.876), 3.323(1.187-9.301) respectively. (Table 5.6.3)

Table 5.6.3 independent variables associated with pain severity(moderate to severe pain) in study participants underwent surgical intervention in public Hospitals of Addis Ababa 2021 (n=406)

Variables	Pain		COR(95%CI)	AOR(95%CI)	P-value
	No-mild pain	Moderate – severe pain			
Patient taken analgesia during induction of anesthesia					
Yes	33(13.5)	211(86.5)	1	1	
No	13(24.1)	41(75.9)	0.496(0.239-1.017)	1.712(0.092-32.013)	0.719
Not used at all	13(12)	95(88)	1.143(0.576-1.350)	10.905(0.435-273.364)	0.146
Patient taken intra operative analgesia					
Yes	37(13.4)	239(86.6)	1	1	
No	22(16.9)	108(83.1)	0.760(0.428-1.350)	1.366(0.323-5.772)	0.671
Incision length					
< 5cm	12(22.6)	41(77.4)	1	1	
Incision length 5-10	40(22.2)	140(77.8)	1.024(0.492-2.132)	1.162(0.418-3.229)	0.773
Incision length > 10 cm	7(4)	166(96)	6.941(2.572-18.732)	5.086(1.352-19.135)	0.016**
Post operative pain management					
Nerve block	17(16.2)	88(83.8)	1	1	
Systemic opioid	6(21.4)	22(78.6)	0.708(0.250-2.007)	3.504(0.803-15.290)	0.095
NSAIDs	22(12)	161(88)	1.414(0.713-2.802)	5.611(2.000-15.737)	0.001**
Tramadol	14(15.6)	76(84.4)	1.049(0.485-2.267)	4.714(1.506-14.753)	0.008**

Key- where AOR=adjusted odds ratio, CI=confidence interval, COR=crude odds ratio,** =statistically significant.

6. Discussion

The study revealed that an overall prevalence of moderate to severe pain was 85.5% in the first 12 hours of the postoperative period. Preoperative analgesia, Preoperative anxiety, types of surgery, incision size greater than 10 cm, and post-operative pain was management was independent predictors of moderate to severe postoperative pain.

The Prevalence of postoperative moderate to severe pain was found to be 85.5%. This reflects that there was poor postoperative pain management. But, it is comparable with other studies done in Jimma 88.2%, Tanzania 85.5%, and Nigeria 79.6% (11,13,14), and higher than the studies conducted in Gondar 57% postoperative pain at recovery stage (6). This lower prevalence from Gondar can be explained as the reported incidence only included patients in the recovery room (within 2 hr of post-surgery) and our study reported an overall pain severity in the first 12 hours.

Similarly, our study result was higher than the studies conducted in Singapore (32.2%), Eastern Poland (59%), Dutch (41%), South Africa 62 %, and Mekelle (30.5%), (7, 9, 15–18). This variation may be due to differences in infrastructure, a postoperative pain management protocol, sample size, and pain assessment time. In our study, most of the patient was interviewed in the first 12 hours after surgery but other includes up to four days after surgery. The finding of the study was also lower than the study conducted in Tanzania (95.6%) (19). This variation may be due to different types of surgery in which the study includes only orthopedics and general surgery but ours include other types of surgery.

Evidence from our study revealed that preoperative analgesia was protective from moderate to severe postoperative pain. This is supported by the study conducted in Serbia (20). This can be explained as the pathophysiology of surgical pain which includes peripheral and central sensitization. Peripheral sensitization occurs when inflammatory mediators released at the wound site decrease the threshold of terminal nerve endings, leading to nociceptive pain. On the other hand, central sensitization results from an enhanced response that is provoked by hyperexcitability of the neurons in the dorsal horn of the spinal cord secondary to intense afferent impulses originated in the site of injury (21, 22). Peripheral and central sensitizations are manifested clinically as increased sensitivity to pain at the site of injury or inflammation. Central and peripheral sensitizations are the major causes of hypersensitivity to pain after an injury. Therefore blocking or interruption of the surgical noxious impulses should reduce the amplification of the

nociceptive signals, making the timing of analgesic administration an important aspect of pain management (23, 24).

Preoperative anxiety was found to be significantly associated with postoperative pain. This result is supported in the study done in Serbia (20), Turkey (25). This could be explained as anxiety is characterized by distress, fear, and activation of the autonomic nervous system; thus it is associated with the same Psychophysiological response as acute pain (25).

Patients with general and orthopedic surgery were associated with moderate to severe postoperative pain. This result is supported by a study done in Cape Town which reported a higher incidence of severe postoperative pain after orthopedic surgery (36). Another study done in Singapore showed a higher incidence of pain after orthopedic and general surgery (7). In addition, a study done in the Netherlands showed orthopedics and general surgery were significantly associated with moderate to severe postoperative pain (18).

Patient with incision size greater than 10 cm was associated to moderate to severe postoperative pain. This is supported by the studies conducted in Gonder (6). This is supported by the fact that larger incision size will increase actual tissue damage increase pain.

Type of postoperative analgesia has a significant association with moderate to severe pain in postoperative pain. Patients whose pain was managed by NSAID and tramadol only reported more moderate to severe pain compared with those managed with a nerve block and systemic opioids plus NSAIDs/Tramadol. This result is supported by a study in Jimma that reveals patients whose pain was managed by NSAID and tramadol only reported more moderate to severe postoperative pain (13). This report could be explained that the application of multimodal analgesia techniques as the standard method for the prevention of pain in surgery is one alternative to improve the recovery process.

The independent variables were significant in other studies such as the type of anesthesia, sex, Age, marital status, educational status, ASA, BMI, co-existing disease, preoperative acute and chronic pain were not significant in this study found. This may be due to differences in sample size, time of pain assessment, study area, study time, and type of surgery in this study. The limitation of this study includes the study is cross-sectional; it doesn't show the cause and effect relationship.

Limitation of the study

- ✓ Since the study is cross-sectional, it doesn't show the cause and effect relationship.

Strength of the study

- ✓ The study includes major surgical disciplines and multi-centered, which can generalize the findings.

Conclusion

Evidence from the study revealed that the overall incidence of postoperative pain was high in the study area. This reflects attention given to postoperative pain management is low. It is also revealed that pre-operative analgesia was negatively associated with post-operative moderate to severe pain, whereas preoperative anxiety, type of surgery, incision size, and postoperative analgesia had a positive association with moderate to severe post operative pain.

Recommendation

Based on the findings above the researcher would like recommend the following points to the concerned body.

- Preemptive analgesia should be practiced by anesthetists and other health professionals as it helps to reduce the severity of post operative pain.
- Multimodal analgesia in post operative pain management expected to practice at recovery room and surgical ward.
- Health professionals are expected to give emphasis preoperative and post operative anxiety relieving measures such as cognitive-behavioral therapies, relaxation techniques, mindfulness-based interventions, hypnosis, and coping strategies on surgical pain and/or anxiety in adult patients scheduled for elective surgery intervention.
- Since patients with nerve block after surgery had better pain tolerance anesthetists practice nerve block if indicated as it decrease the incidence of moderate to severe pain.
- In view of the fact that patient undergone orthopedics and general surgery had moderate to severe pain in post operative period compare to other surgeries in this study finding so health professionals are expected to give great attention in the perioperative periods.

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Annex

Annex I: INFORMATION SHEET

Title of the Research Project: Pain severity and associated factors among post-operative adult patients admitted in recovery room in public hospitals of Addis Ababa, Ethiopia, 2021: A cross sectional study.

Name of Principal Investigator: Abinet Besufekad (BSc)

Name of the Organization: Addis Ababa University

Topic: Assessment of pain severity and associated factors among post-operative adult patients admitted in recovery room in public hospitals of Addis Ababa, Ethiopia.

Dear respondent my name is _____. I am working as data collector in a study conducted by the department of anesthesia, AAU.

We are interviewing and taking postoperative pain measurements of clients undergoing elective surgery regarding their level of postoperative pain and factors related to it. The aim of this study is to generate information necessary for planning appropriate pain management and support for patients admitting to Addis Ababa government hospitals. To attain this objective your honest and genuine participation by responding to the question prepared is very important and highly appreciated.

We will proceed to the interview after you understand the following points

Objective – The objective of the study is to assess pain severity and associated factor of post surgical patient at recovery room in Addis Ababa government hospitals, Ethiopia, 2021 G.C

Purpose of the Research Project: The aim of this study is to determine the Incidence and associated factors of moderate to severe acute postoperative pain at recovery room in Addis Ababa government hospital. The information gained from this research will be used to make recommendations to improve the management of pain in hospitals at Addis Ababa.

Risk and benefits: the risk of participating in this study is minimal, but only taking few minutes from respondents for the interview. There would be no direct payment for participating in this study. But the information generated from the study will help policy makers and the government to develop a direction for pain management and support to patients immediately after surgery.

Duration of the interview – The interview may take a maximum of 20 minutes.

Alternatives to participation – You do not have to take part in this research if you do not wish to do so, and refusing to participate will not affect you and your family care giving process. If you have question that is unclear you have the right to ask for clarification. If you have also a question that you don't want to answer you can skip it. You may stop participating in the research at any time.

Confidentiality: During data collection the participant name will not be recorded, instead they will be identified by number designated by the researchers. All information collected will be kept confidential and destroyed two years after the end of the project. The information abstracted will be used only for research purpose. The thesis will be submitted AAU, department of anesthesia. In addition the result will be displayed in the University Library and website. This study is also intended to be submitted for publication in scholarly journals.

Informed consent – I have read this form or it has been read to me in the language that I understand. I understand all conditions stated above. Therefore, I am willing to participate in this study.

Person to contact: If you have any further questions or would like to receive further information about the project, please contact:

Name of Principal investigator: Abinet Besufekad

Address: Phone number: +251 940847457;

E-mail: redietbeminet2017@gmail.com

Annex II: Questionnaires

Section I: Socio Demographic Data for chart review and interview

No.	**Questions**	**Response**	**Code**	**Remark**
101	Age	_____years		
102	Sex	1. Male 2. Female		
103	Residence	1. Urban 2. Rural		
104	Educational status	1. Illiterate 2. Read and write 3. Elementary (1-8) 4. Secondary (9-12) 5. certificate/level 6. Diploma 7. Degree 8. Masters and above		
105	Marital status	1. Married 2. Widowed 3. Divorced 4. Single 5. Separated		
106	Religion	1. Orthodox Christian 2. Muslim 3. Protestant 4. catholic 5. Other/specify_____		
107	Occupation	1. Daily laborer 2. Farmer 3. Merchant 4. Employed as full time 5. Employed as per time 6. Home worker/house wife 7. Unemployed 8. Other(specify)_____		
108	Weight	_____kg		
109	Height	_____cm		
110	BMI	1. 18.5–24.9 2. 25–29.9 3. 30–34.9 4. >35		

111	Have you had surgery in the past month?	1. Yes 2. No		
112	Did you take pain medications in the preoperative period?	1. Yes 2. No		

Section II: Data during pre and intraoperative period

No	Questions	Response	Code	Remark
201	ASA	1. ASA I 2. ASA II 3. ASA III 4. ASA IV		
202	Did the patient was anxious during preoperative period	1. No 2. Yes (if yes)- mild - Moderate - severe		If "no' skip to 205
203	Did the patient take anxiolysis agent?	1. Yes 2. No		
204	If yes for the above question, what was the drug?	1. Diazepam 2. Midazolam 3. Other, specify_____		
205	Did the patient have acute pain during preoperative period?	1. Yes 2. No		If "no' skip to 207
206	If yes for the above question, how was the severity?	1. Mild (1-3) 2. Moderate (4-6) 3. Severe (7-10)		
207	Do have previous chronic pain experience?	1. Yes 2. No		
208	Did you receive information about pain treatment options?	1. Yes 2. No		
209	Planned surgery:	_____		
210	Type of surgery	1. General 2. Open urology 3. Gynecology 4. ENT 5. Orthopedic 6. Cardio thoracic 7. Maxillofacial 8. Neurology 9. Others		
211	Did the patient have any coexisting disease?	1. Yes 2. No		If the answer is

				"no" Skip 212
212	If your answer is yes for the above (Q-211), specify type	_____ _____		

Section III: Question related to anesthetic and surgical interventions

No.	Questions	Response	Code	Remark
301	Local time of Induction of Anesthesia	_____		
302	Type of anesthesia(multiple answer is possible)	1. General anesthesia 2. Spinal anesthesia 3. Epidural 4. Nerve block 5. General + spinal 6. General+epidural 7. Other _____		
303	Patient induction	1. Propofol 2. Theopentone 3. ketamine 4. Etomidate 5. inhalational 6. propofol +ketamine 7. other;_____		
304	Patient Maintenance	1. TIVA with propofol 2.TIVA with ketamine 3.TIVA with ketamine + propofol 4. Halothane 5. Isoflurane 6. Sevoflurane 7. other (specify)_____		
305	What was the relaxant drug provided?	1. _____ 2. _____		
306	Did the patient receive analgesia during induction?	1. Yes 2. No		If no Skip-to 308
307	If Yes specify type, time and Dose	_____/_____/_____mg _____/_____/_____mg _____/_____/_____mg		
308	Did the patient take intraoperative analgesic?	1. Yes 2. No		If no, Skip to 312
309	If your answer was yes for the above question which one (multiple answer)	1. Fentanyl 2. Morphine 3. Pethidine 4. Tramadol 5. Diclofenac		

		6. paracetamol 7. Other (specify)_____		
310	If the patient took one of the above. When?	1. After induction during intraoperative period 2. At the end of surgery before transferred to recovery room		
311	If the patient took one of the above time and dose of the drug given	_____,_____,_____mg _____,_____,_____mg		
312	Experience of the surgeon	1. R2 2. R3 3. R4 4. Senior		
313	Experience of the anesthetist	1. Diploma 2. BSc 3. MSc student 4. MSc 5. Resident Anesthesiologist student 6. Senior anesthesiologist		
314	Operation done	_____		
315	Incision length in centimeter	1. <5 cm 2. 5-10cm 3. >10cm		
316	Duration of surgery in hours	1. < 1 hr 2. 1-2hrs 3. 2- 3hrs 4. >3 hrs		
317	Duration of anesthesia in hours	1. < 1 hr 2. 1-2hrs 3. 2- 3hrs 4. >3 hrs		
318	Estimated intraoperative blood loss	--------milliliter		
319	Intraoperative fluid balance	A. Replaced B. Depleted		
320	Type of postoperative pain Management	1. Nerve Block 2. systemic Opioids 3. NSAIDs without opioids 4. tramadol 5. paracetamol 6. Other, specify		

Section IV: Question related to post operative pain level and management.

No.	Questions	Response	Code	Remark
401	Local time of arrival to recovery room	_____		
402	Do you have pain now? (1 hrs at recovery room)	1. yes 2. no		If no skip to 408
403	If "yes" Please rate your pain b y one number that best describes your pain at its worst in the last 1 hour of post operation periods.	1. Mild (1-3) 2. Moderate (4-6) 3. Severe (7-10)		
404	Where do you feel the pain? Is it on the surgical site?	1. Yes 2. Other than surgical site		
405	Did you ask any pain medication for your pain?	1. Yes 2. No		if "no" Skip to 408
406	If yes to question No 405, after how long from your requisition did you receive the medication?	1. within 30minute 2. 30-60minute 3. More than 1 hr. 4. None		
407	Did you receive any medication for your pain?	1.yes 2. no		
408	Drug given at the recovery room for managing his/her pain.	1.Pethidine 2. Morphine 3. Fentanyl 4. Diclofenac 5. Tramadol 6. Paracetamole 7.Epidural analgesia 8. Nerve block 9. other _____		
409	Was any pain rating documented?	1. Yes 2. No		
410	What post operative pain score tools used?	1. NRS 2. VAS 3. Other(specify)		

Section V: assessment of pain severity at the 1st hr, 2ndhr, 6th hrs, and 12th hours in post-operative period

S.no	Vital Sign		Immediately at the 1st hr.	2nd hr. post op.	6th hrs post op period	12th hrs post op period
501	**Time (local)**					
502	**NRS**	**Static**	1..No pain (0)	1..No pain (0)	1..No pain (0)	1..No pain (0)
			2..Mild (1-3)	2..Mild (1-3)	2..Mild(1-3)	2..Mild (1-3)
			3..Moderate (4-6)	3..Moderate (4-6)	3..Moderate (4-6)	3..Moderate (4-6)
			4..Severe (7-10)	4..Severe (7-10)	4..Severe (7-10)	4..Severe (7-10)
		Dynamic	1..No pain (0)	1..No pain (0)	1..No pain (0)	1..No pain (0)
			2..Mild (1-3)	2..Mild (1-3)	2..Mild (1-3)	2..Mild (1-3)
			3..Moderate (4-6)	3..Moderate (4-6)	3..Moderate (4-6)	3..Moderate (4-6)
			4..Severe (7-10)	4..Severe (7-10)	4..Severe (7-10)	4..Severe (7-10)

The Numeric Rating Scale (NRS)

Annex III- ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical clearance and technical conduct of the research project and for the 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 Principal investigator: Abinet Besufekad

Date._____ Signature _____

Approval of the primary Advisor

Name of the primary advisor: _____

Date._____ Signature _____

Approval of the Co advisor

Name of the co -advisor: _____

Date: _____ Signature _____