ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES, SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF ANESTHESIA

Efficacy of Meperidine versus Tramadol as a treatment agent on post spinal anaesthesia shivering, hemodynamic stability and therapeutic side effects in parturients at Mateme Gandhi Memorial Hospital, Addis Ababa, Ethiopia, from 1-Dec-2016 to 28-Feb-2017: A Prospective Cohort Study

By: Ashenafi Seifu (BSc, MSc student)

Advisor: Adugna Aregawi (BSc, MSc) Signature_____

Research thesis prepared for partial fulfillment of the requirements for the masters of sciences degree in Advanced Clinical Anesthesia.

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CERTIFICATION

The undersigned certify that the research entitled Efficacy of Meperidine versus Tramadol as a treatment agent on post spinal anaesthesia shivering, hemodynamic stability and therapeutic side effects in parturients at Mateme Gandhi Memorial Hospital, Addis Ababa, Ethiopia, from 1-Dec-2016 to 28-Feb-2017: A Prospective Cohort Study is my original work and any literature and/or data cited in this article were listed in the reference section and any assist done during this period has been given an acknowledgement.

Author

Name _____ Signature _____ Date _____

Approval of the Board of Examiners

1. Advisor

Name _____ Signature _____ Date _____

2. Internal Examiner

Name _____ Signature _____ Date _____

3. External Examiner

Name _____ Signature _____ Date _____

ABBREVIATIONS AND ACRONYMS

ASA- *American Society of Anesthesiology*

BMI-*Body Mass Index*

C/S- *Cescerean Section*

EAA- *Ethiopian Association of Anesthetists*

ECG-*Electro Cardio Graph*

FMOH- *Federal Ministry of Health*

HR-*Heart Rate*

IQR- *Inter Quartile Range*

IRB- *Institutional Review Board*

ICP-*Intra Cranial Pressure*

IOP-*Intra Ocular Pressure*

I.V-*Intravenous*

OR-*Operating Room*

REC-*Research Ethical Committee*

MAP-*Mean Arterial Pressure*

PACU-*Post Anesthesia Care Unit*

PSAS-*Post Spinal Anesthesia Shivering*

SA- *Spinal Anesthesia*

SD- *Standard Deviation*

SPSS-*Statistical Package for social sciences*

SPO2 -*Arterial oxygen saturation*

V/S-*Vital Signs*

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ABSTRACT

Background: Spinal anesthesia is most commonly preferred anesthesia types in the clinical practice. Post Spinal Anesthesia Shivering (PSAS) is one of the frequent side effects of spinal anesthesia and results in ill patient outcome. It occurs during both general and spinal anesthesia, but it is more cumbersome during spinal anesthesia. From many approaches tried to overcome this problem; non-pharmacological one is supper effective in prevention of PSAS. But it is very costly and not applicable in all settings. The pharmacological approach is more commonly used and is accessible in almost all settings.

Objective: The objective of the study was to compare the therapeutic effect of meperidine and Tramadol in control of PSAS during elective cescerean section in parturient who gave birth under spinal anesthesia, in the quest for a drug with more efficacy and less side effects.

Methods and Materials: In this prospective cohort study 74 parturients of ASA I and II who underwent elective cescerean delivery under spinal anesthesia and developed PSAS at Gandhi Memorial Hospital from Dec 1, 2016-Feb 28, 2017 were included. Parturients were treated with either Meperidine 0.5 mg/kg (n=37) Tramadol 0.5mg/kg (n=37) depending on inclusion criteria. Time from treatment to cessation of PSAS in minutes, Hemodynamic variables before spinal anesthesia (baseline), after spinal anaesthesia, at 5,10 and 30 minutes after PSAS was treated were taken. Reoccurrence of PSAS and therapeutic side effects were recorded.

Data were entered into Epi info version 7 and exported to SPSS version 20 for analysis. Differences of Categorical data were analyzed with the Chi-Square test. Numerical data between groups were evaluated using independent samples t-test or Mann-Whitney U test. A p value of <0.05 was considered to be statistically significant.

Results: The hemodynamic changes like mean arterial pressure (MAP), Heart rate (HR), arterial saturation (Spo2) and body temperature changes were all comparable between the groups i.e. there was no statistically significant difference between the groups. Disappearance of shivering after treatment was significantly earlier in Tramadol group (3.08±1.3 minutes) than Meperidine group (4.45±3.18 minutes) ($P<0.021$). Recurrence of shivering after treatment was less in Tramadol group 6(16.2%) than Meperidine group 9(24.3%). Sedation as a side effect was higher in Meperidine group 9(24.3%) than Tramadol group 3(8.1%). Nausea and vomiting was, however, found to be higher in Tramadol group 9(24.3%) than Meperidine group 3(8.1%). These side effects, however, were not statistically significant. Dizziness and pruritus were not observed in clients of both groups.

Conclusion: Both tramadol and pethidine effectively controlled shivering in clients during cesarean section under spinal anaesthesia. But tramadol offered rapid onset, less recurrence and less sedation as a side effect when compared to meperidine.

Recommendation: we recommend responsible health professionals and authorities of health organizations to implement tramadol for the treatment of PSAS during cescerean section.

CHAPTER ONE: INTRODUCTION

1.1 Background

Practice of neuraxial anesthesia requires a detailed knowledge of potential complications, their incidence and risk factors associated with their occurrence. Spinal anesthesia, one of the most commonly preferred in the practice, is used widely, especially in obstetric, lower extremity surgery, anorectal, urologic and gynecologic and lower abdominal surgeries. It has fewer complications relative to the general anesthesia [1-3].

Regional anesthesia (extraxdural/subarachnoid) is a safe and popular anesthetic technique for cesarean section (obstetric surgery), both in elective and emergency situations. But it is not without complications; one of the most common complications of this technique is shivering which occurs in up to 85% of clients undergoing cesarean delivery under spinal anesthesia and it has deleterious metabolic and cardiovascular effects [4]. Shivering may be defined as an involuntary, repetitive activity in the skeletal muscle. It can be very unpleasant and physiologically stressful for the clients [5-7]. Mild shivering increases oxygen consumption to a level that is produced by light exercise, whereas severe shivering increases metabolic rate and oxygen consumption upto100-600% along with raised carbon dioxide production. It causes arterial hypoxemia, lactic acidosis, increased intracranial pressure, intraocular pressure; and interferes with pulse rate, blood pressure, cardiac workload and Electro Cardio Graph (ECG) monitoring [8-10]. The origin of postoperative shivering is unclear and various mechanisms been proposed [11,12].

Non-pharmacological methods using equipment to maintain normothermia are effective but may be expensive hence, are not practical in all settings. Pharmacological methods using various drugs like Pethidine, Tramadol, Clonidine, Doxapram, Ketanserine, Nefopam etc. have been tried which are simple, cost effective and easily available [13].

Different studies have reported different way of controlling shivering following anesthesia, Here, we compared 0.5 mg/kg I.V Tramadol a synthetic opioid with 0.5 mg/kg I.V Meperidine [5], the gold standard drug for the treatment of post-operative shivering, in parturient who received spinal anesthesia for elective cescerean delivery, in the quest for more safe and efficacious drug. In this study, thus we compared the efficacy, hemodynamic effects and therapeutic side effects of Meperidine with that of Tramadol for the control of shivering.

1.2 Statement of the problem

Shivering following spinal anesthesia is a common problem and is unpleasant for the patient, anesthesiologist and surgeon. Shivering obscures vital signs of monitoring and can be detrimental to patients with low cardio-respiratory reserve [5]. The origin of postoperative shivering is unclear though various mechanisms have been proposed. Shivering may happen as a thermoregulatory response to hypothermia or muscle hyperactivity with clonic or tonic patterns, and different frequencies have been reported. However, in the postoperative period, muscle activity may be increased even with normothermia suggesting that other mechanisms than heat loss and subsequent decrease in core temperature may contribute to the development of shivering. These include inhibited spinal reflexes, postoperative pain, decreased sympathetic activity, pyrogen release, adrenal suppression and respiratory alkalosis [11,12].

Mild shivering increases oxygen consumption to a level that is produced by light exercise, whereas severe shivering increases metabolic rate and oxygen consumption upto100-600% along with raised carbon dioxide production. It causes arterial hypoxemia, lactic acidosis, increased intracranial pressure (ICP), intraocular pressure(IOP); and interferes with pulse rate, blood pressure, cardiac workload (thereby predisposing for myocardial ischemia) and ECG monitoring [8-10]. It is uncomfortable to the parturient as well as to the operating room personnel especially during regional anesthesia [14]. Post spinal anesthesia shivering is a common problem accompanying regional anesthesia and occurs in about 85% of clients undergoing cescerean delivery under spinal anesthesia which has deleterious metabolic effects [15].

Comprehensive data exists for the management of Post Anesthesia Shivering (PAS) both pharmacologically (which are simple, cost effective and easily available) or non-pharmacologically (administering warm IV fluids and warmed blood, shifting to fast track surgery, forced air warming) approaches, with pharmacological approach being more effective and accessible in controlling the shivering. Therefore, PAS have an impact on clients, the community and the country's economy considering both direct and indirect cost incurred due to the morbidity and length of hospital stay.

1.3 Justification of the study

Shivering after spinal anesthesia is one of the common and cumbersome complications, that seeks attention of many scholars to overcome it using different techniques.

Reihanak,T. and Sh.Noori Meshkati, in their prospective, controlled, randomized, double-blind clinical trial for patients undergoing cesarean section under spinal anesthesia in Iran noted that Tramadol is more effective in controlling post-spinal shivering but results in more frequent nausea, vomiting and somnolence in comparison with meperidine [16].

A. Dhimar and colleagues in India observed that Tramadol and meperidine were equally efficacious, but Tramadol was more potent with respect to control of shivering and its recurrence. They concluded I.V tramadol was qualitatively superior to meperidine in control of shivering [13].

A study done in Bangladesh found that both tramadol and pethidine effectively controlled shivering in patients during cesarean section under spinal anesthesia. But tramadol offered rapid onset, less recurrence and fewer side effects when compared to meperidine [17]. A similar study found that Tramadol is a more effective agent than meperidine in the treatment of post spinal shivering, with lower early side effects in obstetric patients [18]. As far as my knowledge is concerned, there is no published data on this problem from Ethiopia.

Despite, being common, PSAS is usually not treated due to high cost, addition and restriction associated with meperidine. Tramadol is not used uniformly, evidence may be required. Thus, we compared the efficacy of Tramadol against meperidine to control PSAS in clients who received SA for elective cescerean delivery in quest for efficacious, drug with less side effects and low cost.

Therefore, knowing efficacious drug with fewer side effects in Ethiopia may help patients, anesthesia professionals, physicians and PACU nurses to use alternative approach in controlling PSAS. It may increase the quality of health care delivery to those in need through provision of alternative (relatively cheap alternative drug i.e. Tramadol) strategy to treat shivering.

It is vital for policy makers to improve health care delivery and promote evidence based clinical practice before a drug (Meperidine that requires a license) is cleared from clinical practice [19]. This study may also help as a baseline for future research activities in related topics. It may indicate which of two drugs is effective in controlling PSAS after spinal anesthesia for cescerean section.

CHAPTER TWO: LITERATURE REVIEW

2.1 Review of literature

Post anaesthesia shivering (PAS) was first described over fifty years ago with a worldwide incidence of 20-60% [20]. While patients find shivering very uncomfortable, it causes artifacts in monitors and increases postoperative pain, heart rate, cardiac output, oxygen consumption by fivefold and metabolic rate by 600% [21-23]. This may lead to myocardial ischemia, hypoxemia, hypercarbia and lactic acidosis that could complicate recovery from anaesthesia. Though meperidine is the gold standard used for its management, its use has become limited due to unavailability as a restricted drug in many sub-urban hospitals [24].

Spinal anesthesia is preferable than general anesthesia in clinical practice. Shivering is relatively common problem encountered after neuraxial (spinal and epidural) anaesthesia. An incidence of up to 55% has been reported. Neuraxial anaesthesia produces vasodilatation, which facilitates rapid heat loss and the core to peripheral redistribution of body heat, causing the core temperature to decrease. The core temperature in humans varies with the circadian rhythm (and with the menstrual cycle in females), but is normally maintained within the narrow range of 36.5–37.0 °C [25]. Therefore, the shivering threshold is reached sooner, and more shivering is required to prevent further hypothermia [26].

According to the study conducted by Kurzet et.al., neuraxial anaesthesia, either spinal or epidural, impaired the centrally mediated thermoregulatory responses. The mechanism remains unknown, but is most likely to result from altered afferent thermal input from blocked region [27]. Shivering may increase intraocular and intracranial pressures, and may also contribute to increased wound pain and impaired wound healing [28]. The possible mechanisms of shivering after spinal anesthesia in parturients result mainly from central thermoregulation disturbance; this explains the ambient room temperature has no significant effect on shivering [29].

Shivering may also be justified as a thermoregulatory response to hypothermia that occurs during operation and presents with tonic or clonic patterns [30]. Equipment to maintain normothermia are effective in preventing shivering, but may be expensive and not practical in all settings [9]. Therefore, shivering should ideally be prevented or treated pharmacologically which is the most popular approach in clinical practice.

Shivering can be very unpleasant and physiologically stressful for the patients after enjoying the comforts of modern anesthetics. Mild shivering increases oxygen consumption to a level that is produced by light exercise, whereas severe shivering increases metabolic rate and oxygen consumption up to 100-600%. It may induce arterial hypoxemia, lactic acidosis, increased IOP and ICP and interferes with ECG monitoring, pulse rate, blood pressure etc. [8,10,31].

Shivering may be detrimental to the patients with low cardio respiratory reserves [5]. It is uncomfortable to the parturients as well as to the operating room personnel, especially during regional anaesthesia [14]. In a survey on 33 clinical problems, anesthesiologists ranked postoperative shivering 8th when its frequency was considered and 21st when asked about the importance of preventing this complication [32]. This suggests that most anesthesiologists do not consider shivering to be a true medical problem.

Therefore, many scholars have been trying to overcome this ill effect of postoperative thermal discomfort using various pharmacological agents.

Meperidine, an opioid derivative, is frequently recommended for the treatment of post-neuraxial anaesthesia shivering [33]. Meperidine is a combined μ- and κ-receptor agonist. Although its mechanism of anti-shivering effect has yet to be fully established, it was indicated in a study in which naloxone was used that meperidine may act via the κ-, rather than μ-opioid, receptors. The anti-shivering action of meperidine was inhibited by high-dose naloxone, which blocked both the μ- and κ-receptors, but not by low dose naloxone which only blocked the μ-receptors [34]. Activation of the κ-opioid receptors decreased the shivering threshold twice as much as the vasoconstriction threshold [35]. However, meperidine probably acts directly on the thermoregulatory center and not only through receptor activation [33].

Disadvantages of meperidine: excessive sedation, respiratory depression and postoperative nausea and vomiting, which may be stimulated with previously administered opioids or anesthetics [36].

Tramadol hydrochloride, a centrally acting opioid, is effective in the treatment of post-anaesthetic shivering after general and neuraxial anaesthesia. It inhibits the neuronal reuptake of Noradrenalin and 5-hydroxytryptamine (5-HT), facilitates 5-HT release and activates the μ-opioid receptors. Each of these actions is likely to influence thermoregulatory control [33]. However, tramadol had only slight thermoregulatory effect thus, it is unlikely to provoke hypothermia [37].

The main opioid effect of tramadol is mediated via the μ receptor [38]. Moreover, the antinociceptive effects of tramadol significantly decreased by α2-adrenoceptor antagonists [39]. Also, it was identified that tramadol is similar to clonidine, a partial α2-adrenoceptor agonist and could be useful in the treatment of postoperative shivering [40]. Tramadol may induce its anti-shivering effects via both-opioid receptor and α2-adrenergic agonist mechanisms. Recent studies have investigated the efficacy of tramadol in the management of perioperative of shivering [41].

Tramadol produces weak sedation effect and present low respiratory depression; thus, it can be used safely in parturients [36]. Some of the studies have shown that tramadol was better than meperidine for treatment of perioperative shivering [8,42]. The study by De Witte et al. showed that tramadol reduced the sweating, vasoconstriction and shivering threshold [37]. In the study by Chan et al., intravenous tramadol effectively controlled shivering during Caesarean delivery under neuraxial anaesthesia with minimal side-effects [14].

Therefore, this study compared the anti-shivering effects (how fast to control PSAS and hemodynamic changes) and the accompanying early side effects of tramadol and meperidine after spinal anesthesia in parturients.

2.2 Conceptual framework

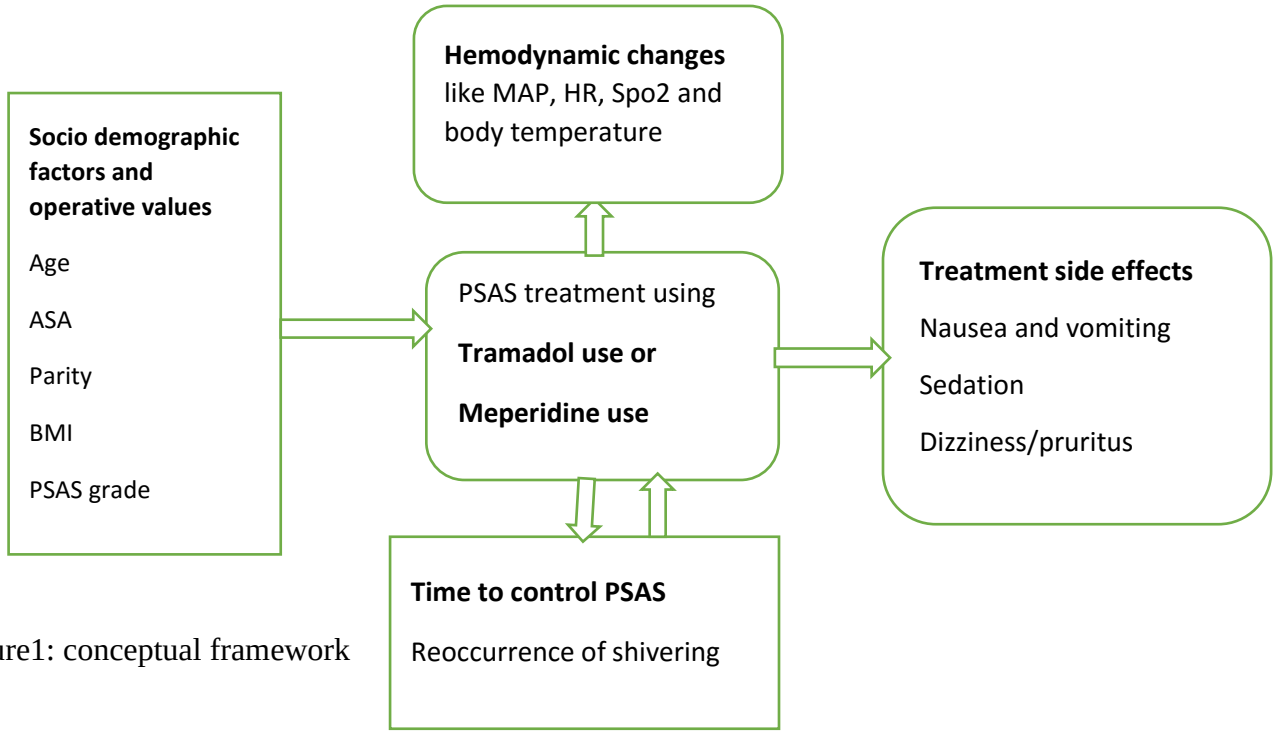


Figure1: conceptual framework

CHAPTER THREE: OBJECTIVES

3.1 General Objective

To compare the efficacy, hemodynamic stability and side effects of Tramadol Versus Meperidine in the treatment of post-spinal anesthesia shivering for elective cescerean section in Mateme Gandhi Memorial Hospital, Addis Ababa, Ethiopia 2016/2017.

3.2 Specific objectives:

1. To compare time, it takes for each drug (Meperidine or Tramadol) to control post spinal anesthesia shivering.
2. To compare the hemodynamic changes at 5, 10 and 30 minutes after administration of tramadol or meperidine for treatment of post spinal anaesthesia shivering.
3. To compare the reoccurrence of PSAS and early side effects after tramadol and meperidine treatment.

CHAPTER FOUR: METHODS AND MATERIALS

4.1 Study Design and Period

An institutional based prospective cohort study was conducted at Gandhi Memorial Hospita, Addis Ababa, Ethiopia in the Operating room (OR) and recovery room from December 1, 2016 to February 28, 2017.

4.2 Study Area

Addis Ababa is the capital city of Ethiopia with a population of 3,475,952 according to the 2007 population census with annual growth rate of 2.7%. The city has ten administrative sub cities and 99 Kebeles. Addis Ababa has 39 Hospitals (11 public and 28 Non-Governmental Organization (NGO) and private), 29 health centers, 122 health stations, 37 health posts and 382 modern private clinics.

Mateme Gandhi Memorial Hospital the biggest public hospital under the Addis Ababa health bureau in kirkos sub city, established to provide obstetric and Gynecologic services. It provides obstetrics and Gynecologic services for over 2000 women annually besides other Health services.

4.3 Source and study Population

4.3.1 Source population

All clients who came for delivery in Mateme Gandhi Memorial Hospital under spinal anesthesia.

4.3.2 Study population

All clients who underwent their cescerean delivery under spinal anesthesia in Mateme Gandhi memorial hospital from December 1, 2016 to February 28, 2017.

4.3.3 Study units

All sampled clients who underwent their cescerean delivery under spinal anesthesia and developed PSAS in Mateme Gandhi memorial hospital from December 1, 2016 to February 28, 2017.

4.4 Eligibility Criteria

4.4.1 Inclusion criteria

- Clients who develop shivering following spinal anaesthesia
- Shivering of grade one to four lasting for a minimum period of one minute.
- ASA, I and II

4.4.2 Exclusion criteria

- Surgeries lasting more than one and half hour.
- Clients who develop shivering even before administering spinal anaesthesia.
- Clients requiring supplementation with general anaesthesia.
- Clients with recent history of nausea and vomiting prior to anesthesia.
- Clients treated with either of the two drugs before spinal for labor pain.
- Patients suffering with fevers, drug allergy, thyroid disease and neuromuscular diseases.

4.5 Variables

4.5.1 Dependent variable:

- Time of controlling post spinal shivering between Meperidine and Tramadol
- Hemodynamic changes
- Reoccurrence of PSAS and therapeutic side effects

4.5.2 Independent variables:

- Socio-demographic and operative values like age, ASA physical status, body mass index, Parity, shivering grade.
- The main independent (exposure) variable Meperidine or Tramadol use to treat PSAS.

4.6 Operational definition

Shivering is graded using a scale similar to that validated by Tsai and Chu, (34).

Grade 0: no shivering,

Grade 1: piloerection or peripheral vasoconstriction but no visible shivering,

Grade 2: muscular activity in only one muscle group,

Grade 3: muscular activity in more than one muscle group but not generalized and

Grade 4: shivering involving the whole body or bed shaking

Grade 1 is considered as mild, 2 as moderate, with grades 3 and 4 as severe shivering

Ramsay sedation score is used to assess sedation as side effects of the drugs under study

0. Alert
1. Arouse to voice gentle tactile stimulation
2. Arouse to gentle tactile stimulation
3. Arouse to vigorous tactile stimulation
4. No awareness

Nausea and vomiting score was used to assess nausea and vomiting as a side effects of drugs under study.

0. No nausea or vomiting
1. Nausea but no vomiting
2. Vomiting once
3. Two or more episodes of vomiting

4.7 Sample size and sampling technique

4.7.1. Sample size

The sample size was determined for the study based on 80% power of the study, the effectiveness of Meperidine and Tramadol in the treatment of post spinal anesthesia shivering following cescerean section is found to be 85% and 55% respectively [43]. From the three outcomes variables, this was found to be bigger sample size. A double population proportion formula was used to calculate sample size using the following formula:

$$n1=n2=f(\alpha,\beta)\times\frac{p1(1-p1)+p2(1-p2)}{(P1-p2)^2}=33$$

Where; n1= number of clients taken Meperidine

n2 = number of clients taken Tramadol

Z= 95% confidence interval =1.96

F (α, β) = the power function at 80%= 0.84

P1=Efficacy in percentage for meperidine (85%), Q1 is 1-P1 (15%)

P2= Efficacy in percentage for Tramadol (55%), Q2 is 1-P2 (45%)

Adding 10% of loss to follow up; (i.e. 10% of 33= 4);

Therefore, a total sample size (n) of 2*(33+4) = 74 parturients who develop shivering following spinal anesthesia were participated in the study.

4.7.2. Sampling technique

From situational analysis Gandhi memorial hospital gives approximately 850 obstetric services annually. The hospital provided over 210 cescerean deliveries over three months i.e. four clients in average had an elective cescerean section under spinal anesthesia daily. Three clients out of

four were followed using systematic random sampling for 60 minutes. If a client had developed PSAS, the responsible anesthetist decided which drug to give. Using this opportunity, study units were observed into either of the group based on what drug they had received and followed for 60 minutes each, until the required number of study units is reached during data collection period.

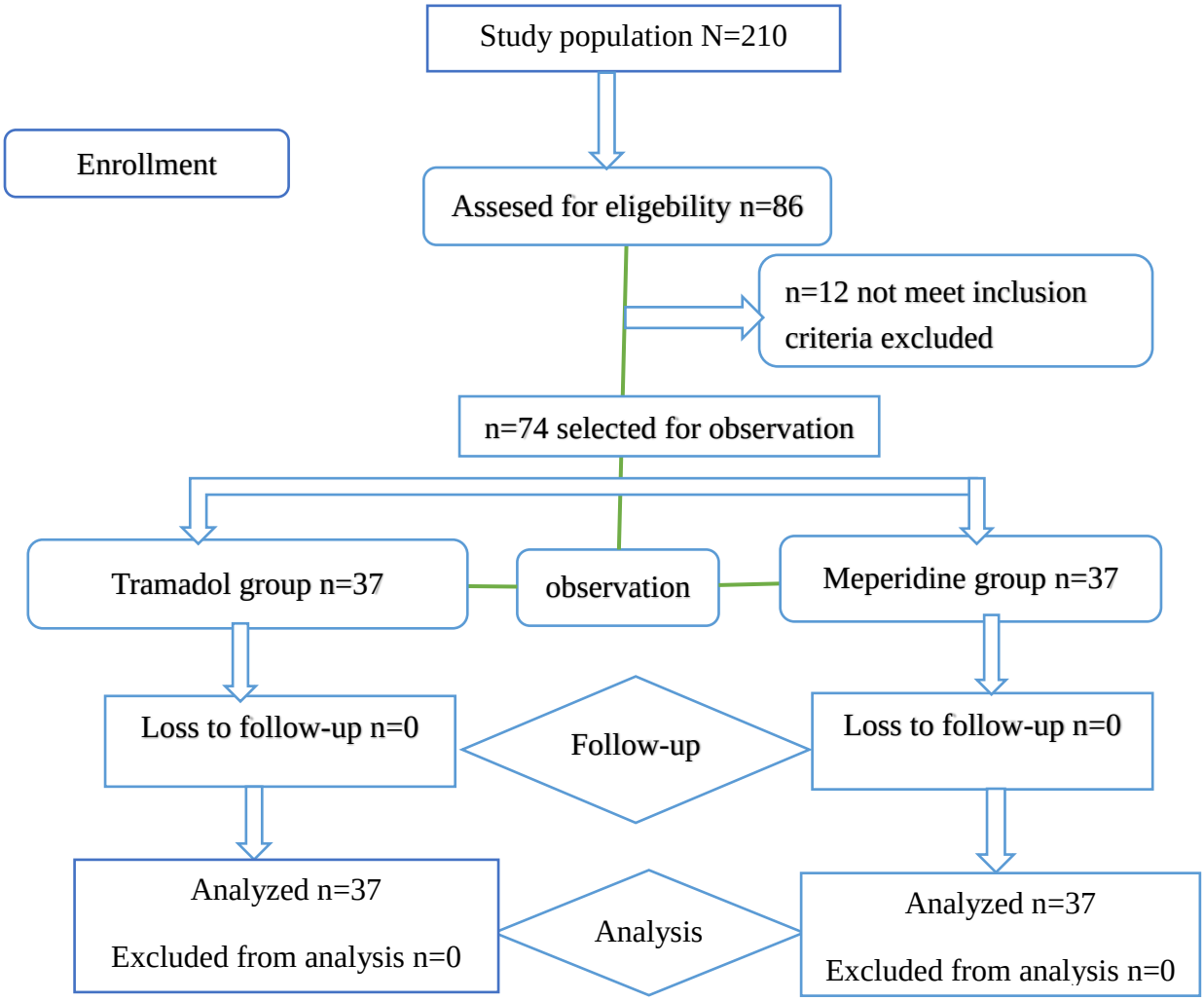


Figure 2: Enrolment procedure for parturients who had PSAS treated for the two groups.

4.8 Implementation of observation and measurement variable

This prospective comparative cohort study analyzed different outcomes of treatment of shivering using tramadol or meperidine after spinal anesthesia for elective cesarean delivery. 74 singleton pregnancy ASA I and II clients who developed PSAS and fulfill the inclusion criteria were observed in group M (n=37) or T (n=37) and followed for 60 minutes each in three months period.

In the study hospital (from observation) clients who are eligible for spinal anesthesia were asked for their consent to perform the block and for general anesthesia in case the block fails. Before they had spinal all of the participants were pretreated with ampicillin antibiotics 500mg IV, plasil 10mg IV, otherwise none of the participants were treated with sedatives, opioids, opioids antagonists, adrenergic receptor antagonists, 5H2 receptor blockers, etc. They are preloaded with 10 ml/kg of crystalloid solutions and 2000-3000ml of normal saline or ringer lactate or mixture of the two afterwards perioperatively. After they are taken to the operation room, standard monitoring such as noninvasive blood pressure, pulse oximetry and Electrocardiography (ECG) were applied and baseline Vital signs (V/S) were recorded. The axillary body temperature was computed for core body temperature by adding 0.5 degree centigrade [44].

Following client positioning to sitting position and skin preparation, spinal anesthesia of 5% 75-100mg (1.5-2ml) lidocaine calculated dose per kilogram was administered intrathecally between L3 and L4 or L4 and L5 with 22gauge quincke spinal needle with general anesthesia backups. Following administration of spinal, the clients are repositioned supine with pillow under right hip and the level of block were adequate for cescerean delivery. Apart from draping the clients body and head, it was uncommon to use active warming mechanisms like air conditioning or active rewarming. Socio demographic data like the client's age, ASA physical status, BMI, parity was recorded from the chart. After the block has fixed the vital signs were taken after spinal but before treatment for shivering, obstetricians operate (all operations were cescerean delivery lasting from 25 to 40 minutes) and soon after the baby is out Pitocin 20 IU was infused for all.

For clients who had PSAS, either Tramadol 0.5 mg/kg I.V or Meperidine 0.5 mg/kg I.V was given in preference of attending anesthetist. The primary outcome measure is the efficacy (duration from treatment of PSAS to cessation of PSAS). Hemodynamic changes are used to assess efficacy of drugs as secondary outcome measures. Additionally, untoward effects of the drugs are compared to evaluate efficacy of the drugs to control shivering. The vital signs were recorded for baseline, after spinal but before PSAS occurred and at 5, 10 and 30 minutes after PSAS was treated. The time to control PSAS in minutes, hemodynamic changes and side effects (sedation with Ramsey sedation score, Nausea and Vomiting score and pruritus) of these drugs were compared. For the clients with reoccurred shivering, despite the treatment, 1mg/kg of meperidine was given and this was recorded.

4.9 Data collection technique and instrument

Training was given for three data collectors and one supervisor who are all practicing anesthesia with minimum of three years' experience. The three data collectors were BSc holders and the supervisor was MSc holder. The data collectors were trained and oriented about the objective and process of data collection by principal investigator. The questionnaire used for data collection were pretested structured questionnaire. The data were collected using this structured questionnaire both from observation and client's clinical response status follow up. They were also instructed to declare loss to follow up when PSAS was not ceased within 30 minutes despite treatments. The data collection process was supervised by the principal investigator.

4.10 Data quality assurance

To ensure quality of data, pre-test of the questionnaire was performed on different population at Empress Zeweditu Memorial Hospital, Addis Ababa, Ethiopia. The completed questionnaire submitted and reviewed daily to avoid loss of data. Close supervision and daily information exchange were used as a means to correct problems during the course of data collection. Consent for the study was obtained and confidentiality assured to improve the quality of data. Data consistency and completeness were made throughout the data collection, data entry and analysis. The internal consistency of the measurement scales was also checked for reliability using Cronbach's alpha which was above 0.76 for all measured outcome variable scales.

4.11. Data processing and analysis

Data were checked manually for completeness and then coded and entered into epi info version 7 computer program for cleaning. Descriptive statistics was used to summarize data, tables and figures. Data entry and cleaning was performed by principal investigator. Ten percent of the questionnaires were also cross checked with the already entered data to maintain its validity. All data were analyzed by SPSS statistical package for social sciences® software (Version 20). Within the groups, Shapiro-Wilk test and Leven's test for equality of variance are used to see normality and homogeneity of variance of the data respectively. Data were analyzed with independent sample t-test, Chi-square and Mann-Whitney U-test or Fishers exact test when appropriate. Two-tailed $P < 0.05$ was considered statistically significant.

4.12 Ethical consideration

The research was conducted after obtaining Ethical clearance and approval from Addis Ababa University Review Board (REC, Research Ethics Committee,). Official support letter was written to the selected Hospital and permission for data collection was obtained from the hospital authorities. The purposes and the importance of the study was explained and verbal informed consent was obtained from each participant. Confidentiality was maintained at all levels of the study by using nameless questionnaire and locking the questionnaires securely. In addition, all the responses were kept confidential and used only for the purpose of the study.

4.13 Presentation and dissemination of Results

The final research paper will be given to Addis Ababa University department of anaesthesia, Research office, Mateme Gandhi Memorial hospital and Federal ministry of health. The result may be presented on prevailing workshops, seminars and conference like Ethiopian Association of Anesthetists so that the stakeholders, anesthetist, will be aware of the relative efficacy and side effects of the drugs under study in treating post spinal shivering in cescerean delivery. Maximum effort will be made to publish the study on national and international journal article.

CHAPTER FIVE: RESULTS

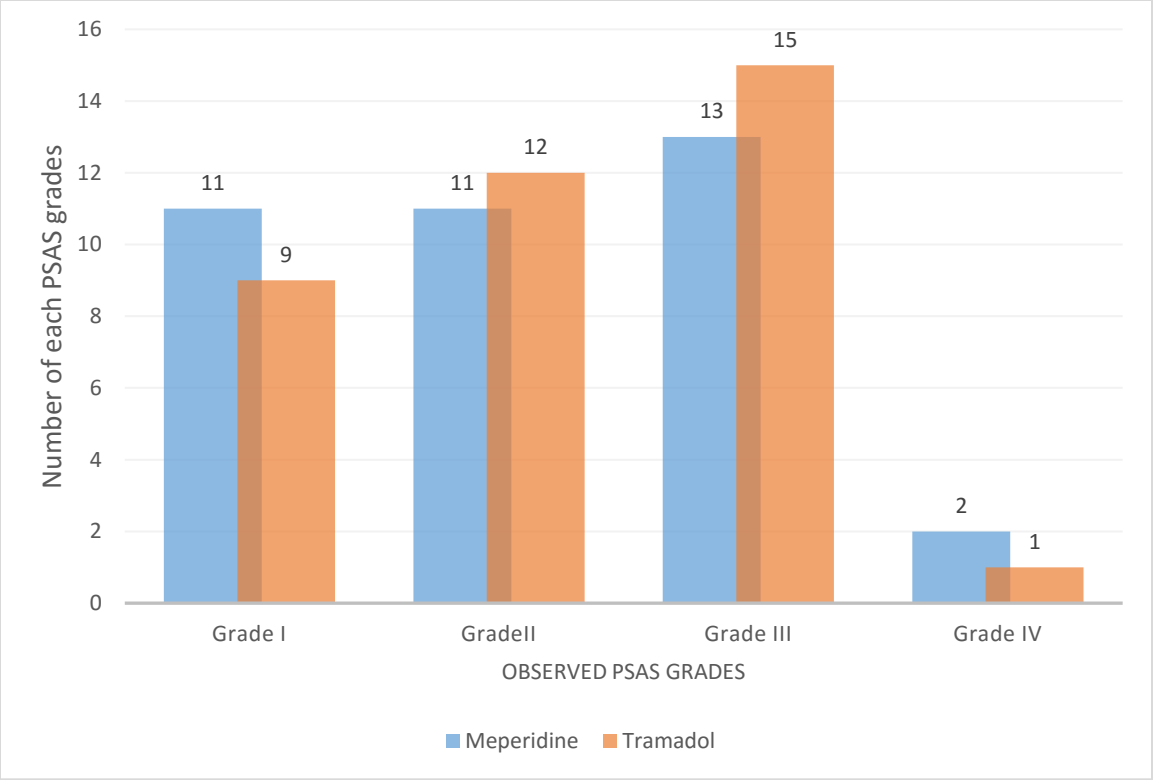
Seventy-four ASAI and II female clients were studied, 37 clients in each Group to compare the efficacy (in terms of time from treatment to cessation of PSAS, hemodynamic changes, reoccurrence of PSAS and therapeutic side effects) of Meperidine and Tramadol in the treatment of PSAS after elective cescerean delivery. The outcome measures were analyzed using chi-square test, Fisher exact test, Mann-Whitney U test and Independent samples t-test whichever is appropriate for the data available. The p- value of < 0.05 was considered to be statistically significant observation.

5.1 Socio-demographic and operative values

The distribution of socio-demographic values like Age and BMI was compared between Meperidine and Tramadol, the result has shown non-significant difference in distribution among the groups. The Operative values such as ASA and Parity distribution among meperidine and tramadol were compared to be similar. The last and important observation of this section was distribution of PSAS grade between meperidine and tramadol groups before treatment for PSAS. There was no statistically significant difference found in shivering grade distribution before PSAS treatment between the groups [Table I].

Table-I Socio-demographic and operative values of parturients who had PSAS at Gandhi Memorial Hospital, Addis Ababa Ethiopia, from 1-Dec -2016 to 28-Feb-2017 between Meperidine and Tramadol groups**.**

Variable	**Meperidine(n=37)**	**Tramadol(n=37)**	**P-value**
Age (median, IQR*)	28.9(27-31)	27.9(25-30)	.294
BMI (mean, SD#)	26.88 ±3.17	25.75± 3.03	.122
ASA, I: II	30:7	28:9	.778
Parity/0/1/≥2/	1/23/13	3/18/16	.124
Shivering grades/1/2/3/4/	/11/11/13/2/	/9/12/15/1/	.869



#SD= Standard deviation, *IQR= Inter Quartile Range for the table I above

Figure 3: PSAS grade distribution between tramadol and meperidine before PSAS was treated was the same.

5.2 Hemodynamic changes

The study had compared the difference in hemodynamic measures baseline, pretreatment of PSAS (after spinal), at 5, 10 and 30 minutes after treatment of PSAS for MAP, HR, arterial saturation (Spo2) and body temperature in Celsius degree. These hemodynamic parameters are comparable. The distribution of socio-demographic and operative values showed similarity, so the exposure independent variable could have an effect between Tramadol group and Meperidine group.

The MAP baseline, before treatment of PSAS and at 5 minutes,10 minutes and 30 minutes after PSAS treated was compared between Meperidine and Tramadol. The result has shown non-significant difference between the groups [Table II.1].

Table II.1: MAP baseline, pretreatment (after spinal), at 5,10 and 30 minutes after treatment of PSAS in parturients who had PSAS at Gandhi Memorial Hospital, Addis Ababa Ethiopia, from 1-Dec -2016 to 28-Feb-2017 between Meperidine and Tramadol groups.

Variable	**Meperidine(n=37) (Mean, SD)**	**Tramadol(n=37) (Mean, SD)**	**P-value**
Base MAP	98.65±12.3	94.95±10.9	.175
MAP before PSAS	76.62±11.82	72.57±10.42	.122
MAP at t5min after PSAS T_X	80.57±10.5	77.14±10.8	.169
MAP at t10min after PSAS T_X	79.62±5.82	78± 9.9	.392
MAP at t30min after PSAS T_X	82.08±6.83	78.8± 9.3	.092

T_X = Treatment

The heart rate between meperidine and tramadol was compared for baseline, before treatment of PSAS and 5 minutes, 10 minutes and 30 minutes after PSAS treated. The baseline heart rate was comparable between meperidine and tramadol, but heart rate before PSAS treatment, at five, ten and thirty minutes after PSAS treatment were observed to be non-significantly higher for tramadol than for meperidine groups [Table II.2].

Table II.2: Heart rate baseline, pretreatment (after spinal), at 5,10 and 30 minutes after treatment of PSAS in parturients who had PSAS at Gandhi Memorial Hospital, Addis Ababa Ethiopia, from 1-Dec -2016 to 28-Feb-2017 between Meperidine and Tramadol groups.

Variable	**Meperidine(n=37) (Mean, SD)**	**Tramadol(n=37) (Mean, SD)**	**P-value**
Baseline HR	93.2± 18.3	89.9± 15.1	.404
HR before PSAS	99.4±18.5	102.2± 17.1	.166
HR 5min after Tx	93.4±17.7	98.7± 15.3	.173
HR 10min after Tx	89.6±15.3	90.3±9.8	.814
HR 30 min after Tx	87.8±14.7	87.9± 9.4	.792

Tx = Treatment

The arterial oxygen saturation was compared between meperidine and tramadol for baseline, before PSAS treatment and 5 minutes, 10 minutes and 30 minutes after PSAS was treated, there was non-significant difference between the groups in this regard [Table II.3].

Table II.3: Spo2 baseline, pretreatment PSAS (after spinal), at 5,10 and 30 minutes after treatment of PSAS in parturients who had PSAS at Gandhi Memorial Hospital, Addis Ababa Ethiopia, from 1-Dec -2016 to 28-Feb-2017 between Meperidine and Tramadol groups.

Variable	**Meperidine**	**Tramadol**	**p-value**
Baseline Spo_2	97.4±1.8	97.4±1.5	.888
Spo_2 before PSAS	96.3±1.9	95.7±2.4	.221
Spo_2 5min after PSAS T_X	96.9±2.7	97.4±1.4	.356
Spo_2 10 min after PSAS T_X	96.6±2.8	96.7±2.1	.816
Spo_2 30 min after PSAS T_X	96.8±2.7	97.1±1.8	.588

The data had revealed that the body temperature had declined from baseline values in both groups. Though the decline from baseline values was observed in both groups, there was no sufficient evidence that supports the difference to be statistically significant [Table II.4].

Table II.4: Body Temperature baseline, pretreatment of PSAS, at 5,10 and 30 minutes after treatment of PSAS in parturients who had PSAS at Gandhi memorial hospital, Addis Ababa Ethiopia, from 1-Dec -2016 to 28-Feb-2017 between Meperidine and Tramadol groups.

Variable	Meperidine	Tramadol	p-value
Baseline temp	34.9± 0.9	35.3±1.01	.148
Temp before PSAS	34.9± 0.8	35.1±0.98	.533
Temp 5min after PSAS T_X	34.9± 1.2	34.4±0.82	.056
Temp10min after PSAS T_X	35±1	34.9± 1.9	.710
Temp30min after PSAS T_X	34.6±1.02	34.3±0.95	.187

5.3 Reoccurrence of PSAS, duration to stop PSAS and therapeutic side effects

The reoccurrence of PSAS, duration of cessation of PSAS and therapeutic side effects were compared. Though not statistically significant, it was observed that shivering reoccurred more in Meperidine group (9 (24.3%) Vs 6(16.2%)), sedation was also high in Meperidine group (9 (24.3%) Vs 3(8.1%)), while nausea and vomiting was high in the Tramadol group (9(24.3%) Vs 5(13.5%)) and only one client in Tramadol group had two or more episodes of vomit. Despite their statistically non-significant result, these effects seem to be clinically significant.

The most important observation of this study is the mean time it takes in minutes for each drug to overcome PSAS, with this regard the data had showed statistically significant result for tramadol to be more potent than meperidine i.e. Meperidine (M =4.45, SD =3.18) and Tramadol (M =3.08, SD =1.30; t = 2.396, $p < 0.021$ two-tailed). The magnitude of the differences in the means (mean difference =1.351, 95% CI: .217 to 2.486) was medium (Cohens d=.56) [Table III].

Table III- Post spinal shivering treatment response time, reoccurrence of PSAS and therapeutic complications in parturients who had PSAS at Gandhi memorial hospital, Addis Ababa Ethiopia, from 1-Dec -2016 to 28-Feb-2017 between Meperidine and Tramadol groups.

Variable	**Meperidine**	**Tramadol**	**t-value**	**P-value**
Time for drug to Cease PSAS in minutes	4.45± 3.18	3.08±1.30	2.396	**.021, d=.56**
Reoccurrence of shivering (n, %)	9(24.3%)	6(16.2%)		.563
*Grade of shivering /1/2/3/4/	/7/2/0/0/	/2/4/0/0/		.119
Sedation /1/2/3/4/	/6/3/0/0/	/2/1/0/0/		.764
Nausea and vomiting/1/2/3/	/3/2/0/	/6/2/1/		.627

Note * on Grade of shivering shows grade of shivering that reoccurred after PSAS treatment.

CHAPTER SIX: DISCUSSION

6.1 Discussion

Post-operative shivering is one of the unwanted and common complications during both general and spinal anaesthesia. The exact mechanism of shivering under spinal anesthesia has not been fully established. The possible mechanisms of shivering during spinal anaesthesia in parturients result from central thermoregulation. Pharmacologic methods remain the most popular agents for treatment and prevention of shivering.

Meperidine is a combined μ- and κ-receptor agonist. However, meperidine probably acts directly on the thermoregulatory center and not only through receptor activation [33].

Tramadol's main opioid action preferably mediated via mu receptor. The anti-shivering action of tramadol is probably via its opioid or serotonergic and noradrenergic activity or both [33,38,40].

The socio-demographic and operative data like age, ASA, BMI, parity and PSAS distributions before PSAS was treated were all the same between the groups with each ($p > 0.05$).

In our study efficacy of tramadol 0.5mg/kg I.V and meperidine 0.5mg/kg I.V were compared on treatment of PSAS in clients who underwent elective cescerean section and developed PSAS.

The baseline, pretreatment of PSAS (after spinal anesthesia) and at 5,10 and 30 minutes after PSAS was treated for MAP, HR, Spo2, and body temperature were compared between the groups and the data had showed that there was no statistically significant difference among the groups with this regard. The baseline heart rate was comparable between meperidine and tramadol, but heart rate before PSAS treatment, at 5,10 and 30 minutes after PSAS was treated were observed to be relatively higher for tramadol group than for meperidine group though it is not statistically significant. This may be due to α2-adrenergic agonist or nor adrenaline reuptake inhibition mechanisms of tramadol [39]. This effect of Tramadol is desired effect from spinal anesthesia point of view indeed.

Similarly, Delaunay L, Bonnet F, Liu N, Beydon L, Catoire P, [39]. Found that the hemodynamic variables were similar which may be due to the same dose of drugs and relatively similar sample size of study participants they used with that of ours.

The study by Dhimar AA, Patel MG, Swadia VN. [13]. found that the differences before and after injection of meperidine for the heart rate and arterial oxygen saturation were significant ($p<0.001$).

In our study, however, was not observed in our study may be due to different drugs used for spinal (they used bupivacaine while we used lidocaine) or higher dose of meperidine they had used (1mg/kg of meperidine to treat PSAS).

The result of our study indicated that tramadol and meperidine were equally efficacious, but Tramadol was more potent with respect to control of shivering and its recurrence. This is in condolence with the study by Dhimar AA, Patel MG, Swadia VN conducted in India [13].

It was observed that shivering disappeared rapidly in tramadol (3.08±1.30 minutes) than meperidine (4.45±3.18 minutes) which was statistically significant ($p<0.021$). This was in line with the study done by R. Talakoub, Sh. Noori Meshkati. The time elapsed from treatment to ceased shivering was significantly less ($P < 0.05$) in tramadol group than meperidine group [16].

With regard to reoccurrence of shivering insufficient evidence shows frequent reoccurrence of PSAS in meperidine group 9 (24.3%) than tramadol group 6 (16.2%) which was similar with the study by Maruf AA, Islam MS, Hoq N. [17].

There was a significantly more frequent incidence of sedation in tramadol group according to R. Talakoub, Sh. Noori Meshkati [16]. In our study, however, sedation was higher in meperidine group 6(16.2%) than tramadol group 3(8.1%) despite lack of statistical significance. This may be due to difference in study design, the former study's use of epinephrinized 5% lidocaine for spinal block or population difference [45].

The result of our study shown that nausea and vomiting occurred more frequently in Tramadol group 9(24.3%) than meperidine group 3(8.1%), but the difference was not significant ($p>0.05$). This is harmonious with a study by Wrench I J. et al. [41]. But, according to a study by Manouchehrian N. et al. nausea and vomiting occurred more significantly in the meperidine group compared to the tramadol group ($p<0.001$) [18]. The difference may be due 1mg/kg of meperidine or tramadol they used. It may also be due to study design difference or population difference [45].

6.2 Strength of the study

The study subjects were homogeneous so, the results were due to exposure variables.

6.3 Limitations of the study

Inability to conduct controlled study due to time constraints, so that some variables not controlled.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

Post spinal anesthesia shivering can effectively be treated either using tramadol or meperidine. These drugs had shown similar effect with regard to hemodynamic changes at different times. Both tramadol and pethidine can effectively control shivering in parturients during cesarean section under spinal anaesthesia. But tramadol offered rapid onset, less recurrence and fewer sedation as side effect when compared to meperidine. Therefore 0.5mg/kg IV tramadol is qualitatively superior to 0.5mg/kg of meperidine.

7.2 Recommendations

The results of the study have shown that tramadol and meperidine to be equally effective in controlling PSAS. But tramadol is more potent, has less reoccurrence of shivering and sedation than meperidine in overcoming this ill and common post spinal anesthesia problem, but was found to have more nausea and vomiting than meperidine, which can be diminished by slow injection of the drug over three minutes [16].

We can recommend to:

- Mateme Gandhi Memorial Hospital administrative authorities, Federal ministry of health, Responsible anesthetists and concerned health professionals to implement the effective drug (Tramadol) in treating the post-spinal anesthesia shivering during cescerean delivery.
- The Ethiopian Association of Anesthetists to help us in presenting it on annual conference.
- To treat PSAS it is relatively cost effective to use tramadol than meperidine (Tramadol costs 2.331Birr/client on average while Meperidine costs 18.304 Birr/client on average).
- The researchers in the future can use it as a baseline and may conduct stronger randomized controlled study.

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9.ANNEXES

Annex I. Consent and questionnaire.

Addis Ababa University College of health Sciences, School of graduate studies, department of anesthesia

Questionnaire prepared to compare the therapeutic efficacy of meperidine and tramadol in the treatment of shivering after elective cescerean delivery under spinal anesthesia.

This questionnaire was used as a guide to collect information for the data collectors.

Hello! My name is ----------I am one of the members of the research team. The purpose of this questionnaire is to gather information on how much the treatment of shivering is effective between Tramadol and Meperidine. I have identified you as a study participant hoping that you would be willing to help me by providing with some information. I have some questions which I would like to ask you, if you have the time and are willing. The interview will take about 5 minutes of your time. All information you provide will be kept confidential. I will not include such as your name or exact address. Only honest answers would contribute to improvement of health planning. Your role in the success of the research is important and I appreciate your contribution to the research.

First of all, I would like to thank for your cooperation and willingness!!!

Would this be okay with you?

I understood about the advantage of the research and the roles I will have in the research. I have agreed to participate in the research.

A. Agree ☐ B. disagree ☐

If Respondent agrees to be interviewed, the interview will be started.

Questionnaire Code _____ Starting time_____

በአድስ አበባ ዩኒቨርሲቲ ጤና ሳይንስ ኮሌጅ፣ ህክምና ትምህርት ቤት፣በድህረ-ምረቃ ፕሮግራም

የአንስቴሽያ ትምህርት ክፍል

የመጠይቅ ፈቃደኛነት ቅጽ

እንደምንነዎት! ስሜ_____ይባላል፡፡እኔ በአዲስ አበባ ዩኒቨርሲቲ በአንስቴዝያ ትምህርት ክፍል የምርምር ቡድን ዉስጥ አንድ አባል ነኝ፡፡ የዚህ መጠይቅ አላማ በኦፐራሲዎን ወቅት ሊሰጧችሁ ዬሚችሉትን ትራማዶል ና ሜፒሪዲን ዬተሰገኙትን መደሓኒቶች ዉጤታማነት ለመለካት መረጃ ለመሰብሰብ ዬሚያገለግል ነው፡፡

እርስዎን አንድ የጥናቱ ክፍል አድርጌ ስመርጠዎ አስፈላጊ የሆኑ መረጃዎችን እንደሚሰጡኝ በማሰብ ነዉ፡፡ በጥናቱ ለመሳተፍ ስለ ፍቃደኛነትዎ ከወዲሁ እያመሰገንኩ 5 ደቂቃዎችን ብቻ እንዲሰጡገኝ እጠይቃለሁ፡፡ ከእርስዎ የሚገኙ ማንኛውም መረጃዎች በሚስጥር ይጠበቃሉ፡፡ ለዚህም ሲባል የእርስዎ ሥምም ሆነ አድራሻ አይገለጽም፡፡ ለመመለስ ፈቃደኛ ያልሆኑትን ማንኛውን ምጥያቄ አለመለስ ይችላሉ፡፡ በማነኛውም ሰዓት የጥያቄ እና መልሱን ሂደት ማቋረጥ ይችላሉ፡፡ ነገር ግን ቀደምሲል እንደተገለጸው እርስዎ የሚሰጡት እውነተኛ ምላሽ በኦፐራሲዮን ጊዜ ሊሰጧችሁ ዬሚችሉትን ትራማዶል ና ሜፐሪዲን ዬተሰኙትን መድሃኒቶች ዉጤታማነት ለመለካት ለሚደረገው ጥናት/ምርምር በከፍተኛ ሁኔታ ያግዛል፡፡ እንድሁም ከጥናቱ በኋላ ኦፐራሲዎን ለሚደረግላቸዉ ታካሚዎች ዉጤታማ ዬሆነውን መድሃኒት በተገቢዉ ጊዜ በመስጠት ተገቢ የሆነዉን እርምጃ ለመዉሰድ ይረዳል፡፡

የቃል ሥምምነት

የዚህ ጥናት ዓላማው ገብቶኝ በጥናቱ ለመሣተፍ

ሀ. ፈቃደኛ ሆኛለሁ ☐ ለ. ፈቃደኛ አይደለሁም ☐

በጥናቱ ለመሳተፍ ፈቃደኛ ከሆኑ ቃለመጠይቁን መቀጠል ይቻላል፡፡

ፈቃደኛ ከሆኑ

የመጠይቁ መለያ ቁጥር----------መጠይቁ የተካሄደበት ቀን ---------- የተጀመረበት ሰአት------

የጠያቂው ሥምና ፊርማ----------

የሱፐርቫይዘር ስምና ፈርማ----------

ጥናቱን በተመለከተ ማንኛዉም አይነት ጥያቄ ካላችሁ የሚከተለዉን አድራሻ ተጠቀሙ::

በዋናነት ምርምሩን የሚያካሂዉ ሰዉ ስም ፡አሸናፊ ሰይፉ

ስ.ቁ.፡ 0920177925 ኢሜል፡ seifuashenafi@gmail.com

Instructions: For each of the following questions, please fill or circle the number of alternative(s) that fit the response.

Section I: Socio-demographic and operative characteristics of the clients

Code	Variables	Response	If not skip to
101	MRN		
102	Client age (in years)		
103	ASA physical status	1. ☐ 2. ☐	
104	Height (in meters)		
105	Weight (in Kg)		
106	BMI (in kg/m2)		
107	Parity	Null ☐ Prim ☐ Multi ☐	

Section II: Anesthesia techniques

Code	Variables	Response	If no skip
201	Any methods used to keep the client warm?	Yes ☐ No ☐	205
202	Body and head covered	Yes ☐ No ☐	
203	AC is used	Yes ☐ No ☐	
204	IV and irrigation fluids warmed	Yes ☐ No ☐	
205	Lidocaine for skin infiltration (in mg)	Mg	
206	Lidocaine used for spinal anesthesia (in mg)	Mg	
207	Atropine (in mg)	Mg	
208	Adrenaline (in mg)	Mg	

Section III: Post spinal shivering, shivering grades and time it takes for drugs to control it.

Code	Variable	Response	If no skip to
301	PSAS	Yes ☐ No ☐	401
302	Shivering grades	1☐ 2 ☐ 3 ☐ 4 ☐	
303	PSAS treated	Yes ☐ No ☐	
304	Time for drug to control shivering (in minutes)	1☐2☐ 3☐ 5☐ 10 ☐ 20 ☐ 30 ☐	

N.B Shivering is graded using a scale similar to that validated by Tsai and Chu, (34).

Grade 0: no shivering,

Grade 1: piloerection or peripheral vasoconstriction but no visible shivering,

Grade 2: muscular activity in only one muscle group,

Grade 3: muscular activity in more than one muscle group but not generalized and

Grade 4: shivering involving the whole body or bed shaking

Section IV: Hemodynamic changes baseline, pretreatment and treatment at 5,10 and 30 minutes

Changes in blood pressure measurement (in mmhg)		
401	baseline Mean Blood Pressure	
402	MAP before treatment of shivering	
403	MAP after treatment of shivering	5min_____10min_____ 30min_____
	Changes in heart rate measurement (in beat/min)	
404	Baseline Heart rate in beats/minute	
405	Heart rate before treatment of shivering in beats/minute	
406	Heart rate after treatment of shivering	5min_____10min_____ 30min_____
Changes in Arterial Oxygen saturation (in %)		

407	Baseline Arterial Oxygen saturation in %	
408	Arterial Oxygen Saturation Before treatment of shivering in %	
409	Arterial Oxygen Saturation After treatment of shivering in %	5min_____10min_____ 30min_____
	Body temperature in Celsius degree	
410	Baseline body temperature in Celsius degree	
411	Body temperature before treatment of PSAS	
412	Body temperature after treatment of shivering in %	5min_____10min_____ 30min_____

Section V: Reoccurrence of shivering and side effects of drugs used for treatment of shivering

Code	Variable	Response	If no skip to
501	Reoccurrence of shivering	Yes ☐ No ☐	503
502	Grade of shivering	1☐ 2☐ 3☐ 4☐	
503	Sedation	Yes ☐ No ☐	505
504	Ramsay sedation(score)	0☐ 1☐ 2☐ 3☐ 4☐	
505	Nausea and vomiting	Yes ☐ No ☐	507
506	Nausea and vomiting (score)	0☐ 1☐ 2☐ 3☐	
507	Pruritus	Yes ☐ No ☐	

N.B Ramsay sedation score

0. Alert
1. Arouse to voice
2. Arouse to gentle tactile stimulation
3. Arouse to vigorous tactile stimulation
4. No awareness

N.B Nausea and vomiting score

0. No nausea or vomiting
1. Nausea but no vomiting
2. Vomiting once
3. Two or more episodes of vomiting

Name of the data collector_____signature_____

Name of the supervisor_____signature_____ ***Thanks a lot!!!***

Annex II.1-: Dummy table

Table 1: Socio-demographic and physical characteristics of the study Participants in Gandhi Memorial, Addis Ababa governmental hospital, from 1-Dec -2016 to 28-Feb-2017.

Variable	**Tramadol**	**Meperidine**	**Frequency %**
ASA			
I			
II			
Parity			
Nulliparous Primiparous multiparous			
BMI			
18-24.9 kg/m2 25-29.9 kg/m2 30-34.9 kg/m2			

Table 2: Post spinal shivering grades and time it takes for drugs to control it in the study participants in MGMH, Addis Ababa, Ethiopia, from December 1- 2016 – February 28 -2017.

Variables			Frequency: n (%)
Shivering grades	Tramadol	Meperidine	
1. 2. 3. 4. Time (minutes)			
1. 2. 3. 5. 10. 30.			
Reoccurrence of shivering			
Sedation			

0. Alert 1. Arouse to voice 2. Arouse to gentle tactile stimulation 3. Arouse to vigorous tactile stimulation 4. No awareness			
Nausea and vomiting			
0. No nausea or vomiting 1. Nausea but no vomiting 2. Vomiting once 3. Two or more episodes of vomiting			

Annex II.2-: Information sheet

Title of the Research Project

Efficacy of Meperidine versus Tramadol as a treatment agent on post spinal anaesthesia shivering in parturients who underwent cescerean section by spinal anesthesia at Mateme Gandhi Memorial Hospital, Addis Ababa, Ethiopia.

Name of Principal Investigator: Ashenafi Seifu

Name of advisor: Mr. Adugna Aregawi

Name of the Organization: Addis Ababa University, College of medicine, Anesthesia program

Name of the Sponsor: Addis Ababa University

Introduction

This information sheet is prepared with the aim of compare the therapeutic effect of Tramadol Versus Meperidine in the treatment of PSAS after spinal Anesthesia for elective cescerean section in Mateme Gandhi Memorial Hospital, Addis Ababa, Ethiopia 2016/2017. The research group includes the principal investigator, three data collectors, and one advisor from Addis Ababa University.

Purpose of the Research Project

The aim of this study is to compare the therapeutic efficacy between meperidine and tramadol in the treatment of PSAS in obstetric clients following spinal anesthesia. Determining more

efficacious drug is important for the clients, the practitioners and other stakeholders to have an alternative mode of treatment for PSAS. The results of this study will be used to design appropriate intervention programs to treat PSAS of parturients in Mateme Gandhi Memorial Hospital, as well as in other health institutions in Ethiopia.

Procedure

This study will involve clients who come for cescerean delivery under spinal anesthesia and had developed post spinal anaesthesia shivering at Mateme Gandhi Memorial Hospital from 1-Dec-2016 to 28-Feb-2017. They will be selected to be one of the study participants if they are willing to participate in this study and ready to give oral consent.

Benefits, Risk or Discomfort

We inform that by participating in this research project they may feel some discomfort in wasted their time (a maximum of 5 minute). However, their participation is definitely important to determine the efficacy of meperidine and tramadol and establish wide option in the treatment of PSAS following spinal anesthesia. There is no risk to the participants in participating in this research project.

Confidentiality

The information collected from study subjects will be kept confidential and stored in a file, without your name by assigning a code number to it. Hence, no report of the study will ever identify the participants.

Right to Refusal or Withdraw

They will have full right to refuse from participating in this research. They have also the full right to withdraw from this study at any time they wish.

Person to contact

For any questions or concerns you can contact the principal investigator using the following addresses: **Name:** Ashenafi Seifu

Telephone: +251 920177925/+251 39857701 E-mail: seifuashenafi@gmail.com