COLLEGE OF HEALTH SCIENCE, SCHOOL OF MEDICINE

DEPARTMENT OF ANESTHESIA

COMPARISON OF INTRAVENOUS MAGNESIUM SULPHATE AND LIDOCAINE FOR ATTENUATION OF CARDIOVASCULAR RESPONSE TO LARYNGOSCOPY AND ENDOTRACHEAL INTUBATION IN ELECTIVE SURGICAL PATIENTS AT ZEWDITU MEMORIAL HOSPITAL ADDIS ABABA, ETHIOPIA 2018/2019.

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Declaration

I, the undersigned, declare that this thesis is my original work in partial fulfillment of the requirements for the Master of Science degree in Anaesthesia. I understand that plagiarism will not be tolerated and all directly quoted material has been appropriately referenced

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Date of Submission: ________________________________

This thesis work has been submitted for examination with my/our approval as Advisors and Tutors on the Master of Science degree in Anaesthesia

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ABSTRACT

Background: Laryngoscopy and endotracheal intubation are essential components of general anesthesia. But it is always associated with side effects called reflex cardiovascular responses. Many methods have been identified to attenuate these responses like intravenous lidocaine, deep inhalational anesthesia, vasodilators, intravenous magnesium sulphate even though therapeutic superiority remains understudied

Objective: To compare the effectiveness of intravenous lidocaine and magnesium sulphate for attenuation of cardiovascular responses after laryngoscopy and endotracheal intubation in elective surgical patients at Zewditu memorial hospital.

Methods: An institutional based cohort study on 112 adult patient age between 18-60 years was applied. 37 patients in non-exposed group (Group N), 37 in lidocaine group (Group L) and 38 in magnesium sulphate (Group M) were included. The hemodynamic parameters like HR, SBP, DBP, and MAP at various time points up to 7 minutes post-intubation were recorded and effect of both drugs to reduce hemodynamic responses was compared. Parametric data were analyzed using (ANOVA) and nonparametric data using Kuruska-Wallis H rank test.

Results: In all three groups, there was statistically significant rise in heart rate and blood pressure from baseline. There was statistically significant difference in mean heart rate throughout study minutes among the groups ($p<0.001$). However there was no statistically significant difference in mean heart rate between Groups M and L at all post intubation time intervals.

In blood pressure at all three parameters there was statistically significant difference among groups at all-time points except no difference at 7th minutes in DBP. There was significantly lower blood pressure in group M compared to both groups.

Conclusion and Recommendation: In conclusion prophylactic administration of magnesium sulphate and lidocaine were effective in attenuating haemodynamic responses to the stress effect of laryngoscopy and intubation but magnesium sulphate is better than lignocaine. We recommend that magnesium sulphate as alternative of lidocaine in attenuating hemodynamic response to laryngoscopy and intubation.

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List of Abbreviations and Acronyms

ASA: American Society of Anesthesiologists

BSc: Bachelor of Science

BP: Blood Pressure

CABG: Coronary Artery Bypass Grafting

DBP: Diastolic pressure

DRERC: Departmental Research and Ethics Review Committee

ETI: Endotracheal intubation

GA: General anesthesia

Group L: lidocaine group

Group M: magnesium sulphate group

Group N: non-exposed group

HR: Heart Rate

IV: intravenous

MAP: Mean arterial blood pressure

MgSO4: Magnesium sulphate

MSc: Master of Science

NMDA: *N* methyl-d-aspartate

OR: Operation room

PACU: post anesthesia care unit

SBP: Systolic blood pressure

SPSS: Statistical Package for Social Sciences

CHAPTER ONE: INTRODUCTION

1.1 Background

Endotracheal intubation is an essential component of general anesthesia. It serves in maintenance of the patency of upper airway, proper ventilation, reduction in the risk of aspiration and delivery of the inhalational anesthetic agents to the patients through breathing circuits(1).Laryngoscopy and tracheal intubation are considered the most critical events during induction of general anesthesia which stimulate somatic and visceral nociceptive afferents fibers of the four areas of the upper respiratory tract, the nose, the epipharynx, the laryngopharynx and the tracheobronchial tree, which induce reflex sympato-adrenal responses associated with enhanced neuronal activity in the cervical sympathetic efferent fibers(2).

The effect of sympato-adrenal responses can result in an increased catecholamine level which results, rise in blood pressure, heart rate, increased myocardial oxygen demand and dysrhythmia. The rise in blood pressure and heart rate are usually variable and unpredictable(3).

Cardiovascular responses; tachycardia and hypertension, and the enhanced neuronal activity secondary to sympathetic stimulation were most pronounced during stimulation of the epipharynx, whereas those arising from stimulation of the tracheobronchial tree were least marked. The reflex tachycardia and hypertension effects of laryngoscopy is greater than of tracheal intubation. Once the endotracheal tube is in position, and the laryngoscope withdraw, the hypertension , tachycardia and disturbing dysrhythmia subside, but tended to persist for up to 3 -10 minutes (2, 4). Hypertensive patients are more prone to exaggerated cardiovascular response to laryngoscopy and tracheal intubation than normotensive patients and hence they are more dangerous in those with hypertension as they may lead to myocardial ischemia, arrhythmias, and intracranial hemorrhage. Therefore, prevention of cardiovascular stimulation following tracheal intubation is of particular importance (2, 5). Cardiovascular stability during perioperative period is one of the basic goals that every anesthetist wishes to achieve.

Many methods have been identified to attenuate these responses including topical anesthesia of oropharynx, laryngotracheal instillation of lidocaine just prior to intubation, intravenous lidocaine, deep inhalational anesthesia, narcotics, vasodilators, intravenous magnesium sulphate, adrenergic and calcium blockers(6, 7). Most of these techniques have disadvantages related to either cardiovascular or respiratory depression; none directly inhibits the release of catecholamines except magnesium sulphate suppresses the release of catecholamines.

1.2 Statement of the problem

Reflex cardiovascular responses are well documented and common squeal of direct laryngoscopy and endotracheal intubation in all patients without using techniques to attenuate pressor responses and sustain several minutes after intubation (8-10).

Laryngoscopy and endotracheal intubation are the most stress full time during induction of anesthesia which stimulate somatic and visceral nociceptive afferents which induces reflex cardiovascular responses secondary to sympato-adrenal stimulation These responses increase perioperative morbidity and mortality especially in patients with pre-existing cardiovascular diseases(11).

Change in mean MAP during laryngoscopy and endotracheal intubation from base line ranges from 23 to 52 mmHg (10, 12, 13). Mean heart rate change from baseline after laryngoscopy & intubation ranges from 20 to 31 beat/minute (14, 15).

Sympathetic stimulation from laryngoscopy and endotracheal intubation cause significant increase in the plasma concentration of catecholamines (adrenaline and noradrenaline)(16, 17)that can provoke left ventricular failure, renal failure, surgical bleeding, cerebral hemorrhage and myocardial ischemia in anesthetized patients. The mechanism of this may be that, vasoconstriction, increased myocardial work, a demand for increased coronary flow, narrowed coronary arteries cannot accommodate the increased flow, and parts of the myocardium may receive insufficient oxygen(10).these all may complicate anesthesia, increase hospital stay and cost of service.

Various methods of attenuation of response to laryngoscopy and intubation are still in search from the date of its recognition. Several studies have been made in order to attenuate these hemodynamics response to laryngoscopy and endotracheal intubation. Many drugs also have been used for the same purpose. The techniques include topical anesthesia of oropharynx, intravenous lidocaine, adrenergic blocking drugs, vasodilators, deep inhalational anesthesia, intravenous opioid and magnesium sulphate (6, 7). Most of these techniques have disadvantages related to either cardiovascular or respiratory depression and none directly inhibits the release of catecholamines except magnesium sulphate suppresses the release of catecholamines. Both Magnesium sulphate and Lidocaine showed attenuation to presser response to laryngoscopy and endotracheal intubation with different success rate (4, 5, 8, 11, 18, 19).

1.3 Justification of the study

The process of endotracheal intubation brings physiological disturbances in all patients pass through this way and the result that occur during induction varies from transit physiological abnormality to fatal stage based on patients' physical status (20, 21). Therefore attenuation of these untoward hemodynamic responses is the vital part of anesthesia management for better outcome. Even though several studies have been made in order to attenuate these hemodynamics responses, there is no single ideal agent without side effects till now and finding solution for this problem is continuing.

The question regarding comparison of magnesium sulphate and lidocaine on attenuation of intubation responses following laryngoscopy has been studied in countries outside Africa by many investigators over the years. But there is a controversy regarding the comparison of effects of IV magnesium sulphate and lidocaine in attenuating hemodynamic responses. Some have shown magnesium sulphate is superior in attenuation of hypertension secondary to laryngoscopy and intubation (4, 5, 8, 11, 18). A literature has also shown lidocaine suppresses hypertensive response more than magnesium sulphate (19). Other literature stated lidocaine and magnesium sulphate are equal effective in terms of BP(22). In terms of heart rate some studies reported magnesium sulphate was less effective than lidocaine in attenuating rise in heart rate (18, 22, 23). Other literature showed lidocaine was less effective in than magnesium sulphate in attenuating tachycardia (11). Others showed there is no statistically significant difference in heart rate between lidocaine and magnesium sulphate groups(5, 8). Therefore the finding of this study will contribute in minimizing the doubt concerning which adjuvant is more effective.

Even though the effect of Lidocaine and magnesium sulphate in attenuating hemodynamics response has been studied in countries outside Africa by many investigators the hospital setup may be different with Zewditu memorial hospital. This may result different outcome from the study done before.

In our country as far as my knowledge and search, there is no similar research done and there has no published evidence on the same topic. So that, it can be used as a source of information for further researchers and to improve quality perioperative care.

CHAPTER TWO: LITERATURE REVIEW

Laryngoscopy and tracheal intubation are noxious stimuli and the most critical events during administration of general anesthesia. Sympathetic stimulation from laryngoscopy and endotracheal intubation can provoke left ventricular failure, renal failure, surgical bleeding, cerebral hemorrhage and myocardial ischemia in anesthetized patients secondary to hypertension and tachycardia. The mechanism of this may be that, vasoconstriction, increased myocardial work, a demand for increased coronary flow, narrowed coronary arteries cannot accommodate the increased flow, and parts of the myocardium may receive insufficient oxygen(10).

Magnesium may be a better as it not only has direct vasodilator properties, it also significantly suppresses the release of catecholamine (15) and it is a non-competitive *N* methyl-d-aspartate (NMDA) receptor antagonist which prevents central sensitization through that reduces postoperative pain as well as opioid consumption (24-26).

Lignocaine has been used for attenuating circulatory responses during intubation. The mechanism of action of lidocaine is due to its peripheral vasodilation, ability to suppress airway reflexes due to irritation of tracheal mucosa, analgesic as well as antiarrhythmic properties (12).

A randomized prospective double-blinded controlled study conducted in Egypt by Mohamed Ahmed Hamed in April 2018 on 80 patients to compare magnesium sulfate with lidocaine, regarding their efficiency in inducing controlled hypotension and providing a better surgical field exposure showed there was a decrease in MAP significantly in Group Lidocaine than Group Magnesium after intubation. Lidocaine group showed a lower decrease in HR than Group Magnesium and the difference was statistically significant(27).

A randomized double blinded study which was conducted in India by Vallabha R. and Muthayala VK in 2018 on 60 patients to compare magnesium sulphate and lidocaine on cardiovascular response to laryngoscopy & intubation found Magnesium sulphate in the dose of 30mg/kg result statistically significant decrement in heart rate and mean arterial pressure compared to baseline value. Mean values for heart rate and blood pressure were statistically significant lower in magnesium sulphate Group as compared to lidocaine Group at all the post-intubation time intervals they studied up to five minutes.(28).

A prospective, randomized, double-blinded study was conducted on 60 adults by Bhalerao NS, et.al in 2017, India reported that there was no significant increase in HR or BP as compared with baseline values after laryngoscopy and intubation in any group of patients. Although, patients who received magnesium sulfate developed hypotension at various points; they concluded magnesium sulfate pretreatment is associated with a good control of adrenergic response with antiadrenergic agents during intubation and maintains cardiac stability better than pretreatment with lignocaine(5).

A single-center, prospective, double-blind, randomized study which was conducted by Mendonca FT, et.al on 56 patients in 2017, Brazil showed that there was an increase in HR, SBP and DBP in both groups (lidocaine and Mgso4 group) after laryngoscopy compared to baseline. Group Magnesium had a statistically significant increase in SBP ($p = 0.018$) and DBP ($p = 0.0467$) after intubation compared to baseline. There was a tendency to hypotension in Group lidocaine. In Group magnesium, 12% patients had episodes of hypertension compared to (4%) in Group lidocaine, with no statistical difference between groups. The incidence of tachycardia was 28% in magnesium compared to 12% in lidocaine group with no statistical difference(22).

A prospective randomized controlled trial conducted by Kotwani MB, et.al. on 75 adults in 2016, Mumbai, India to compare the efficacy of two doses (30 mg/kg and 40 mg/kg) of intravenous magnesium sulphate in attenuating the cardiovascular response to laryngoscopy and intubation showed that mean systolic blood pressure change was significantly high after laryngoscopy and intubation in control group which was 40.81% from baseline than in group 30mg/kg Magnesium sulphate 7.25% from baseline. Mean heart rate rise in control group was 46.87% from baseline than in 30mg/kg Magnesium sulphate group was 22.78% which was statistically significant different. And in group 40 mg/kg magnesium sulphate change in systolic blood pressure and heart rate was 24.55% and 5.83 from baseline respectively this also was statistically significant compared to 30mg/kg(29).

A prospective randomized controlled trial conducted by Bandey S. and Singh V. on 90 adults in 2016, New Delhi, India to compare effectiveness of magnesium sulphate with lidocaine for attenuation of hemodynamic response to endotracheal intubation in patients undergoing GA found mean values for blood pressure were lower in magnesium sulphate Group as compared to lidocaine Group at all the post-intubation time intervals. Despite the increase in heart rate being significant statistically as compared to baseline, it was significantly lower as compared to group control. And mean heart rate was comparable between groups lidocaine and magnesium sulphate at all-time intervals(8).

A prospective randomized study which was carried out on 100 patients by Padmawar S. and Patil M in 2016, India to evaluate and compare the efficacy of lignocaine and magnesium sulphate for attenuating the stress responses to laryngoscopy and endotracheal intubation. They found SBP,DBP,MAP and HR increase significantly in lignocaine group as compared with $MgSO_4$ group at 1,3,5 minutes after intubation. Magnesium sulphate provide fairly good and sustained control over hemodynamic responses to the stress of laryngoscopy and intubation and is significantly better than lignocaine(11).

A randomized prospective double-blinded controlled study conducted in Turkey by Kocamanoglu, et.al. In 2015 on 99 patients to compare the effects of topical and systemic lignocaine on the circulatory response to direct laryngoscopy performed under general anesthesia showed that changes in mean arterial pressure were higher in the saline group than in the IV and topical lidocaine groups at 1 minute after intubation. Changes in HR were of greater magnitude in the saline group and IV lignocaine groups than in the topical lignocaine group at 1 minute after intubation(30).

A randomized controlled double-blind study which was conducted by Kiaee et.al on 150 patients 2014, Iran. They compared the attenuation effect of magnesium sulfate and lidocaine on hemodynamic responses after ETI. Lidocaine induces more than 20% suppression of blood pressure in all parameters (SBP, DBP, and MAP) from baseline after one minute of ETI while Mgso4 provides hemodynamic stability during the five minutes after ETI. HR was significantly lower from ETI time through the fifth minute after ETI in those receiving lidocaine or Mgso4 in comparison with the placebo group and no significant difference between lidocaine and magnesium group(19).

A randomized double blinded study which was conducted by Firoozabadi MD. And Ebadi A. on 90 patients in 2014, Iran to investigate effect of magnesium sulfate on the hemodynamic changes by laryngoscopy and endotracheal intubation. This study showed magnesium sulfate created significance statistical difference in diastolic blood pressure only immediately after laryngoscopy and there was no significant difference in other parameters (systolic blood pressure, heart rate)(14).

A randomized controlled double-blind study which was conducted by Waseem, et.al on 178 patients 2014, in Pakistan aimed to compare the efficacy of intravenous magnesium sulfate versus lidocaine on attenuating hemodynamics responses after laryngoscopy and tracheal intubation. The drug would considered efficacious if it did not alter the MAP by 20% and HR 25% when compared baseline values within 5 minutes post intubation values. In group lidocaine 20% decrease in MAP from baseline value was observed in 54% of patients as compared to magnesium group which was 36.69%.similarly 25% reduction in HR from baseline value was 11% in group lidocaine and 6.23%in group magnesium. And there was statistically significant difference in terms of efficacy(31).

A randomized study which was conducted by Kiraci G et.al on 60 patients 2014, in Turkey. To investigate the effect of magnesium on the hemodynamic response and QT dispersion related with intubation in hypertensive patients and to compare it with lidocaine. The result of this study showed no significant difference in HR and MAP after the first 15 minutes of tracheal intubation among group magnesium, group lidocaine and group control(32).

A randomized double-blind clinical trial was conducted on 60 adults by Nooraei , et.al in 2013, Iran revealed that magnesium sulfate was more effective than lidocaine in reducing mean arterial and systolic pressures in the first 2 minutes after intubation. Compared with lidocaine group, heart rate in the 2nd, 3rd, and 4th minutes after intubation was higher in magnesium group but returned to baseline on 5^{th} minutes in both groups(18).

A Prospective, randomized, double-blind study was done in 2013 by Panda, et.al on 80 adults in India to determine minimal effective dose of magnesium sulfate to control blood pressure during intubation in hypertensive patients. They were allocated randomly to one of the 4 groups, group I, II, III received 30, 40, 50 mg/kg Mgso4 respectively and group IV received lidocaine. Magnesium sulfate attenuated the pressor response to laryngoscopy and intubation in all three doses (30, 40, and 50 mg/kg) administered before induction of anesthesia. There was no significant increase in HR or BP as compared with baseline values in any group of patients. However, 30%, 80%patients who received magnesium in doses of 40 and 50 mg/kg respectively developed significant hypotension at various time points requiring intervention. Cardiac instability was there in whom received intravenous lidocaine after intubation. Magnesium maintains cardiac stability better than pretreatment with lidocaine(4).

Hypothesis testing

HO: There is no difference in mean of SBP, DBP, MAP and HR after laryngoscopy and endotracheal intubation among lidocaine, Mgso4 and non-exposed groups.

HA: At least one group's mean is different from others in SBP, DBP, MAP and HR after laryngoscopy and endotracheal intubation among lidocaine, Mgso4 and non-exposed groups.

CHAPTER THREE: OBJECTIVES

3.1 General objective

To assess the effect of intravenous lidocaine and magnesium sulphate on attenuation of cardiovascular responses after laryngoscopy and endotracheal intubation in elective surgical patients at zewditu memorial hospital Addis Ababa ,Ethiopia from November 7-2018 to March 7-2019.

3.2 Specific objectives

- To compare mean SBP response to laryngoscopy and endotracheal intubation on non-exposed, intravenous lidocaine and magnesium sulphate groups.
- To compare mean DBP response to laryngoscopy and endotracheal intubation on non-exposed, intravenous lidocaine and magnesium sulphate groups.
- To compare mean MAP response to laryngoscopy and endotracheal intubation on non-exposed, intravenous lidocaine and magnesium sulphate groups.
- To compare mean heart rate response to laryngoscopy and endotracheal intubation on non-exposed, intravenous lidocaine and magnesium sulphate groups.

CHAPTER FOUR: METHOD AND MATERIALS

4.1. Study Area and period

The Study was conducted in zewditu memorial hospital which is located in Kirkos sub city district 08, Addis Ababa. This hospital was built, owned and operated by the Seventh-day Adventist Church, but was nationalized during the Derg regime in 1976. The hospital is named after Empress Zewditu, the cousin and predecessor on the throne of Emperor Haile Selassie. Currently, the hospital is administered by Addis Ababa Health Bureau. According to the nine month report of policy and plan directorate of the hospital compiled on July 2018, the hospital provides service to an estimated 167,400 people annually in different departments who are referred from different part of the city and all over the country. It has five major operation rooms and two PACU.

The research was conducted from November 7-2018 to March 7-2019 at zewditu memorial hospital.

4.2. Study design

An institutional based prospective cohort study design was employed.

4.3. Population

4.3.1. Source Population

The source population was all adult elective surgical patients who underwent their surgical procedure under general anesthesia with endotracheal intubation at Zewditu memorial hospital.

4.3.2. Study Population

The study population was all adult elective surgical patients who were underwent their surgical procedure under general anesthesia with endotracheal intubation induced with thiopental in the specified time period.

4.4. Eligibility criteria

4.4.1. Inclusion criteria

- Patients who were induced with thiopental as non-exposed, premedicated with either iv lidocaine or magnesium sulphate
- Age 18 up to 60 years

- ASA I and II were included in the study.

4.4.2. Exclusion criteria

- Patients on beta/Calcium channel blockers
- Patients premedicated with anticholinergic.
- Hypertensive patients whose blood pressure > 140/90 mmHg
- Hypotensive patients whose systolic blood pressure <90 mmHg
- Hypothyroidism or hyperthyroidism
- Difficult intubation
- Anemic patient
- Patients premedicated with strong opioid.

4.5 Sampling Technique and Sample Size Determination

4.5.1 Sample size determination

The sample size was calculated from previous study done in Iran in 2013(18) by taking mean HR, SBP, DBP, MAP at different time and the largest sample size was taken using comparison of two mean with equal sample size formula. They compared the mean MAP changes in lidocaine and magnesium groups at 1 minute after intubation, it was 97.6±5.4 and 93.6±6.3 respectively and using 80% power, α =0.05.

The sample size for the study was determined using the formula for comparison of two mean as follows.

$$n1 = n2 = n3 = [(s_1^2 + s_2^2)]\,[(Z\alpha + Z\beta)^2] / (m_1 - m_2)^2$$

Where:

m1and s_1^2 are mean and variance of lidocaine group respectively.

m_2 and s_2^2 are mean and variance of magnesium sulphate group respectively.

α = type I error (level of significance)

β = type II error (1-β = power of the study)

Power = the probability of getting a significant result

f (α,β) =7.84, when the power = 80% and the level of significance = 5%

Therefore n1= n2 =n3 = $[(5.4)^2 + (6.3)^2] [1.96+0.84]^2 / (97.6-93.6)^2 = 34$

Therefore; including 10% to account for contingencies, a total of **112** adult elective surgical patients were involved in the study.

4. 5. 2 Sampling Technique

Study participants were selected using systematic random sampling technique using skip interval from the daily operation in the operation room (OR) in those patients induced with thiopental with or without ether lidocaine or magnesium sulphate premedication were used as a sampling frame

In situational analysis done for one month, on average 3 patients per day or 60 patients per month were undergone surgery induced with thiopental with or without study drugs in Zewditu memorial hospital.

- ✓ Thus, 240 patients were operated per the study period (4 months). The sampling interval; K was determined using the formula: K=N/n; where, n = total sample size, N = population per 4 months. K= 240/112 ≈ 2
- ✓ Therefore, the sampling interval was two and the first study participant (random start) was selected using lottery method from those induced with thiopental with or without study drugs who fulfill selection criteria.
- ✓ Then, every second cases who induced with thiopental with or without study drugs was included in study groups until the required sample size was filled during the study period.

4.6. Study Variables

4.6.1. Dependent Variables

Hemodynamic responses measured by BP and HR.

- Systolic blood pressure
- Diastolic blood pressure
- Mean arterial blood pressure
- Heart rate

4.6.2. Independent Variables

- Intravenous lidocaine/ Mgso4
- Age
- Sex
- BMI
- ASA status
- Type of inhalational agents
- Volume % of inhalational agents
- Muscle relaxant type

4.7. Data Collection procedures

Data was collected by pretested structured questionnaire which enabled to review chart records and take measurements of vital sign on monitoring displayed by two degree anesthetists and supervised by one MSc anesthetist. One day training was given for data collectors on how to collect data. In study hospital some anesthetists had been using either lidocaine or magnesium sulphate for attenuation of hemodynamic reflex secondary to laryngoscopy & tracheal intubation based on their preference and some intubated patients without lidocaine or magnesium sulphate.

On arrival of the patients to the operative theater the routine hospital monitoring protocol, HR, noninvasive blood pressure, and SPO2 were applied and after a room anesthetist decided to induce with thiopental, data collectors took verbal informed consent of patients. After preoxygenaion of patients with 100% oxygen for 3 minutes, anesthetists induced patients with thiopental 5 mg/kg and suxamethonium 2mg/kg with or without pretreatment of either magnesium or lidocaine and tramadol 100 mg IV for all patients. Lidocaine group (Group L) received 1.5 mg/kg lidocaine2%, magnesium sulphate group (Group M) received 30 mg /kg magnesium sulphate 50% and Group N patients who induced with thiopental without taking either premedication drugs. In our study area, anesthetists who used either lidocaine or magnesium had same practice regarding the dose. Socio-demographic data like the patient's age, sex, and ASA physical status, BMI, associated coexisting illness were recorded from the chart. Mean arterial pressure, systolic blood pressure, diastolic blood pressure, Heart rate and SpO2 were recorded as baseline (i.e., before starting of administration of magnesium sulfate or lidocaine for exposed or thiopental for non-exposed), 1 minute after injection of study drug, immediately after intubation (i.e., within 30 seconds after intubation), at 2nd minutes post intubation, at 5th minutes post intubation and at 7th minutes post intubation.

Hypertension was considered when the BP values of SBP>140 or DBP > 90 mmHg. Hypotension was considered when BP values of SBP < 90 mmHg. Tachycardia was considered when HR > 100 bpm. Bradycardia was considered when HR value lower than 50 bpm.

4.8 Data Processing and Analysis

The statistical analyses were performed using SPSS 20 software. The data were tested for normality using Shapiro–Wilk normality test and histogram, homogeneity of variance by Levene's test and sphericity by Mauchly's test. One way Analysis of variance (ANOVA) and repeated measure ANOVA were used for normally distributed continuous data. Kruskal–Wallis H test were used for non-normally distributed data. If ANOVAs test was significant, then Tukey post hoc test was used to compare one group with the others. Categorical data were analyzed using the Pearson Chi-squared test. Continuous variables were expressed as a mean & standard deviation (SD) and Median (Q1-Q3).Categorical variables were summarized by percentages. P-value < 0.05 considered statistically significant.

4.9. Data Quality Control and Assurance

Data was collected using by pretested structured questionnaire which enabled to review chart records and take measurements of vital sign on monitoring displayed prepared in English addressing the objective of the study. Pretest was done on 5% of the sample size at Minilik II referral hospital. Data collectors were Anesthetists who are familiar for recording perioperative data. Data collectors and Supervisors were trained on each items included in the study tools, objective, relevant of study, right of respondents. During data collection, regular supervision and follow up was made. Investigator cross checked for completeness and consistency of data on daily basis.

4.10. Dissemination plan

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

4.11. Operational definitions

Elective Surgery: Scheduled surgeries included non-emergent surgical cases ordered to surgery.

Hypertension: Systolic blood pressure >140 mmHg or, and Diastolic blood pressure >90 (33).

Hypotension: Systolic blood pressure < 90 mmHg(33).

Immediately after intubation: within 30 seconds after intubation

Tachycardia: Heart rate > 100 bpm(34).

Bradycardia: Heart rate < 60 bpm(34).

Anemic patient: Hemoglobin less than 10 gram/ dl(35)

Difficult intubation: Intubation that takes >30 seconds for successful endotracheal intubation.

Cardiovascular responses: an untoward increased responses of hemodynamic variables (HR, SBP, DBP, MAP) after laryngoscopy and endotracheal intubation.

4.12. Ethical Consideration

Prior to the study, ethical clearance was obtained from the Departmental Research and Ethics Review Committee (DRERC) of Department of anesthesia, School of Medicine, college of Health Sciences of Addis Abba University and the acquiescence was also obtained from the study institutions (Zewditu memorial Hospital). The purposes of the study were explained to the patient who were included in the study. Verbal informed consent from the patients was asked and Confidentiality of the information assured by using code numbers.

CHAPTER FIVE: RESULT

5.1 Demographic and clinical characteristics of the patients

One hundred twelve patients were analyzed in this study based on whether they received prophylactic intravenous magnesium sulphate, lidocaine or not. There was no significant difference among the three groups with regard to age, gender, BMI, diagnosis, ASA physical status, type & MAC% of inhalational agents, surgery starting time and maintenance muscle relaxant (p value > 0.05) as showed in Table 1.

Table 1: Demographic data and anesthetic characteristics of patients in Zewditu memorial hospital, Addis Ababa 2018/19.

Characteristics		Group M	Group L	Group N	P value
Age (years)	Mean ±SD	32.32±7.19	36.05±7.69	34.68±8.34	0.112
Sex (F/M)	Female (%)	84.2	78.4	89.2	0.448
	Male (%)	15.8	21.6	10.8	
ASA status	ASA I (%)	100	100	100	-
BMI	Median (Q3-Q1)	24 (25-23)	24 (25-23)	24 (25-23)	0.660
Diagnosis	Goiter (%)	47.4	40.5	51.4	0.843
	Cholilethiasis (%)	28.9	35.1	32.4	
	Neurosurgery (%)	23.7	24.4	16.2	
Maintenance inhalational agents	Isoflurane (%)	81.6	67.6	75.7	0.372
	Halothane (%)	18.4	32.4	24.3	
MAC of inhalational agent	MAC1% (%)	18.4	27	10.8	0.103
	MAC1.5 %(%)	78.9	67.6	73.0	
	MAC2 %(%)	2.7	5.4	16.2	
Maintenance muscle relaxant within 7 minutes	Pancronium (%)	28.9	10.8	13.5	0.286
	Vecronium (%)	10.5	10.8	10.8	
	No muscle relaxant within 7 minutes (%)	60.6	78.4	75.7	
Is surgery started within 7 minutes of intubation?	Yes (%)	15.8	21.6	16.2	0.765
	No (%)	84.2	78.4	83.8	

Data are analyzed by ANOVA, Kruskal Wallis and Chi-Square Test

5.2 Comparison of mean heart rate at different time points among magnesium sulphate, lidocaine and non-exposed groups.

At baseline, Mean Heart Rate (HR) among the groups did not show a significant difference statistically (p=0.436). The one way ANOVA analysis showed that there was statistically significant difference in mean heart rate throughout study minutes among the groups (p<0.001). And the post hoc analysis showed that mean HR was higher in Group N with statistically significant value compared to both groups (p<0.001). However, there was no statistically significant difference in mean heart rate between Groups M and L at immediate, 2nd ,5th and 7th post intubation time intervals(p =0.324,0.222,0.356,0.737) respectively (Table 2).

Regarding within the group comparison, there was statistically significant rise in mean heart rate from baseline in all study groups throughout study minutes (p< 0.05).

Table 2: Comparison of mean Heart Rate among the groups and between Groups in Zewditu memorial hospital, Addis Ababa 2018/19.

Time interval	Group M	Group L	Group N	Significance of the difference among the groups	Comparison between GroupM & GroupL
	Mean ± SD	Mean ± SD	Mean ± SD	P value	P value
Baseline	80.97±6.28	80.24±4.85	82.16±7.84	0.436	0.876
Immediate Post Intubation	99.82±10.86	96.35±9.25	120±11.04	<.001*, #	0.324
2min post Intubation	94.47±11.37	90.49±9.64	112.22±9.93	<.001*, #	0.222
5min post Intubation	88.13±9.58	84.84±8.28	104.46±12.70	<.001*, #	0.356

7min post Intubation	85.79±8.48	84.03±8.69	100.65±12.95	<.001*, #	0.737

***** *p<0.05 compared group N with M, #P value <0.05 compared group N with L (ANOVA, Tukey test)*

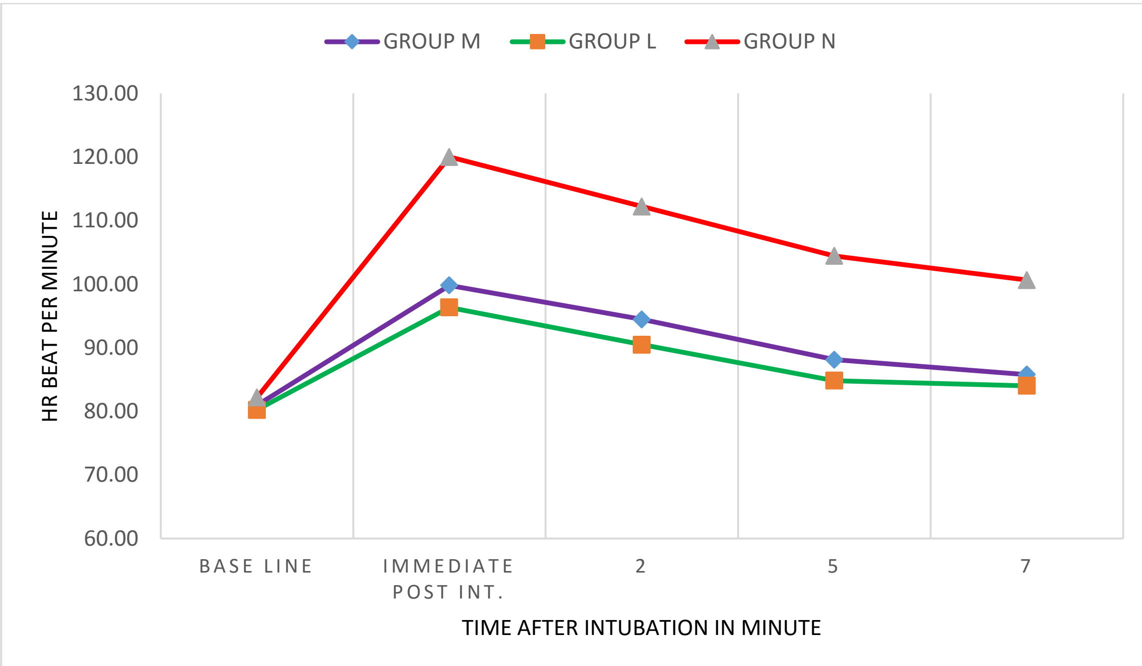

Figure 1: Within Group Change in Heart Rate at Different Time Intervals

5.3 Comparison of mean SBP at different time points among magnesium sulphate, lidocaine and non-exposed groups.

There was no statistically significant intergroup differences in baseline SBP among groups (p=0.655). There was statistically significant difference in mean SBP among groups at all-time point. Post hoc analysis showed significant lower mean SBP at immediate, 2 minutes and 5 minutes post intubation in group M compared to Group L (p <0.001, p = 0.001, p = 0.029), respectively. And there was also statistically significant decrement in mean SBP when group M compared to group N at immediate, 2, 5 minute (p<0.001) and 7 minute post intubation (p=0.006) but there was no significant difference between two treatment groups at 7th minutes. There was also statistically significant lower mean SBP in group L compared with group N at all-time point except at 7th minutes (Table 3).

Regarding within the group comparison there was significant rise in SBP in group M at immediate post intubation time only (p < 0.001) and return to baseline at 2 minutes of intubation.

In lidocaine group there was significant rise in SBP at immediate and at 2 minutes post intubation (*p*< 0.001) and return to baseline at 5 minutes of intubation (*p*= 0.643) whereas in non-exposed group significant rise in SBP continued till the fifth post intubation minute.

Table 3: Comparison of mean SBP among the groups and between Groups at different time intervals in Zewditu memorial hospital, Addis Ababa 2018/19.

Time Interval	Group M	Group L	Group N	Significance of the difference among the groups	Effect size
	Mean ± SD	Mean ± SD	Mean ± SD	P value	η2
Baseline	126.66±7.48	126.62±6.37	127.78±4.14	0.655	-
Immediate Post intubation	142.71±10.14	155.27±12.62	179.27±17.82	<.001*, #, +	0.55
2min post Intubation	129.58±10.96	141.54±11.47	152.95±17.98	<.001*, #, +	0.33
5min post Intubation	119.26±7.94	125.68±10.36	134.22±13.18	<.001*, #, +	0.25
7min post Intubation	115.71±7.81	118.35±10.08	122.49±9.81	0.003*	0.08

***** *p<0.05 compared group N with M, #P value <0.05 compared group N with L, +p<0.05 compared group L with group M (ANOVA, Tukey test)*

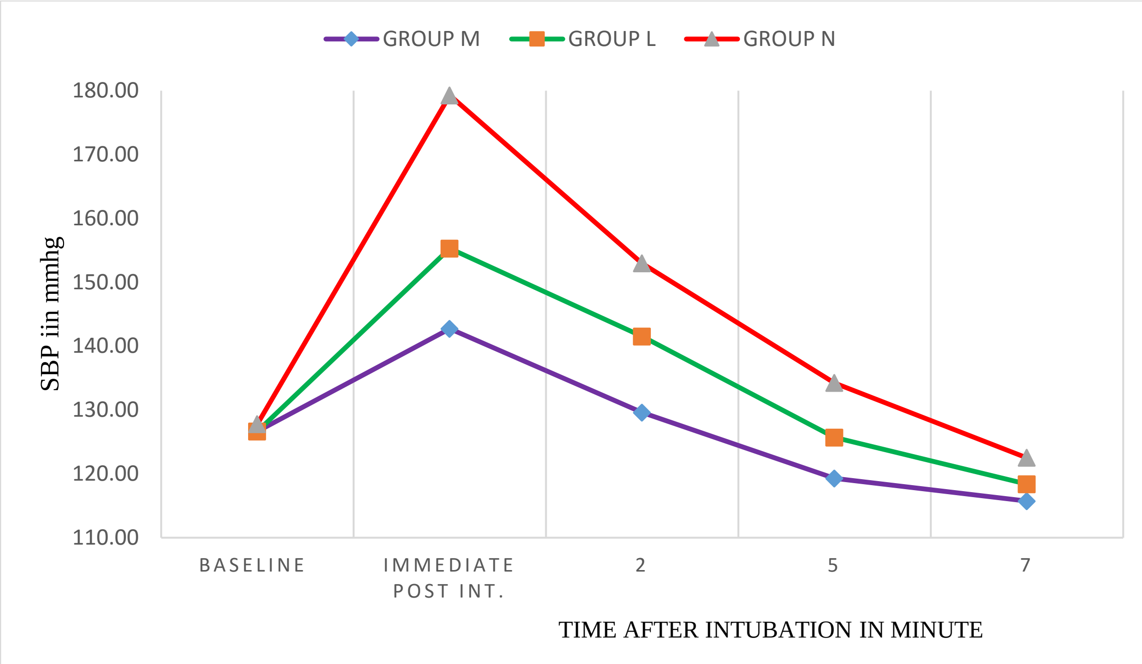

Figure 2: Within Group Change in SBP at Different Time Intervals

5.4 Comparison of mean DBP at different time points among magnesium sulphate, lidocaine and non-exposed groups.

The baseline DBP was comparable among the three groups ($p = 0.194$) and there was statistically significant difference among the groups at immediate, 2 minutes and 5 minutes post intubation intervals but not at 7 minutes post intubation.

Post hoc analysis showed group M has significantly lower mean DBP at immediate, 2 minutes and 5 minutes post intubation compared to Group N ($p < 0.001$). There was also statistically significant lower mean DBP in Group L at immediate, 2 minutes and 5 minutes post intubation compared to Group N ($p < 0.001$, < 0.001, $=0.002$); respectively. There was no statistically significant difference in mean DBP between Group M and Group L except at immediate and 2 minutes post intubation periods ($p =0.018$, 0.019) respectively (Table 4).

Regarding within the group comparison there was significant rise in DBP in group M only at immediate and at 2 minutes of intubation with ($p < 0.001$, $=0.010$) respectively. Similarly in lidocaine group there was significant rise in DBP at immediate and at 2 minutes post intubation with (p< 0.001) whereas in non-exposed group significant rise in DBP continued till fifth minute with (p< 0.001).

Table 4**:** Comparison of mean DBP among the groups and between Groups at different time intervals in Zewditu memorial hospital, Addis Ababa 2018/19.

Time Interval	Group M	Group L	Group N	Significance of the difference among the groups	Effect size
	Mean ± SD	Mean ± SD	Mean ± SD	P value	η2
Baseline	77.16±5.23	74.76±5.61	75.73±6.28	0.194	-
Immediate Post Intubation	91.29±8.29	97.70±10.28	112.81±11.40	<.001$^{*, \#, +}$	0.45
2min post Intubation	81.08±8.07	87.49±9.42	97.73 ±12.36	<.001$^{*, \#, +}$	0.32
5min post Intubation	72.87±7.44	77.11±7.79	84.59±11.96	<.001$^{*, \#}$	0.22
7min post Intubation	71.00±6.70	73.14±8.83	74.62.±6.98	0. 183	-

** p<0.05 compared group N with M, $^{\#}$P value <0.05 compared group N with L, +p<0.05 compared group L with group M (ANOVA, Tukey test)*

5.5 Comparison of mean MAP at different time points among magnesium sulphate, lidocaine and non-exposed groups.

Regarding baseline MAP groups were matched (p=0.548). There was statistically significant difference in mean MAP among all groups at all-time point (Table5). Post hoc analysis showed significant lower mean MAP at immediate, 2 minutes, 5 minutes post intubation in group M compared to Group L (p =0.002, p = 0.001,p = 0.023 respectively). Group M compared to group N, mean MAP was significantly lower at immediate, 2 minutes , 5 minutes and at 7 minutes post intubation intervals (*p*<0.001,<0.001,<0.001,=0.011) respectively. Also Group L has significantly lower mean MAP at immediate, 2 minutes and at 5 minutes post intubation intervals compared to Group N (p < 0.001, < 0.001, =0.001) respectively.at 7th minute there was no statistically significant different in MAP between group L and N(p= 0.310) (Table 5).

Regarding within the group comparison through time there was significant rise in MAP in group M at immediate and at 2 minutes of intubation with (p < 0.001, =0.041 respectively). Similarly in lidocaine group there was significant rise in MAP at immediate and at 2 minutes post intubation with (p< 0.001) whereas in non-exposed group significant rise in MAP continued till fifth minute with (p< 0.001).

Table 5: Comparison of mean MAP among the groups and between Groups at different time intervals in Zewditu memorial hospital, Addis Ababa 2018/19.

Time Interval	Group M	Group L	Group N	Significance of the difference among the groups	Effect size
	Mean ± SD	Mean ± SD	Mean ± SD	P value	η2
Baseline	93.71±4.26	92.51±5.54	92.78±4.97	0.548	-
Immediate Post Intubation	108.29±8.40	116.95±10.29	134.65±13.36	<.001*, #, +	0.51
2min post Intubation	96.47±7.56	105.57±8.97	116.03±13.41	<.001*, #, +	0.38
5min post Intubation	87.87±7.30	93.35±7.56	100.95±11.20	<.001*, #, +	0.27
7min post Intubation	85.53±6.88	88.30±8.40	91.09±9.05	0.015*	0.07

***** *p<0.05 compared group N with M, #P value <0.05 compared group N with L, +p<0.05 compared group L with group M (ANOVA, Tukey test)*

5.6 Comparison of incidence of hypotension and bradycardia among magnesium sulphate, lidocaine and non-exposed groups.

The proportions of patients with hypotension was 15.8% in group M, 13.5% in group L and 13.5% in group N with in our study minutes with X2 (2, n= 112) = 0.106, P=0.948, Cramers'v (φc) =0.031. There was no incidence of bradycardia in any group during our study minutes.

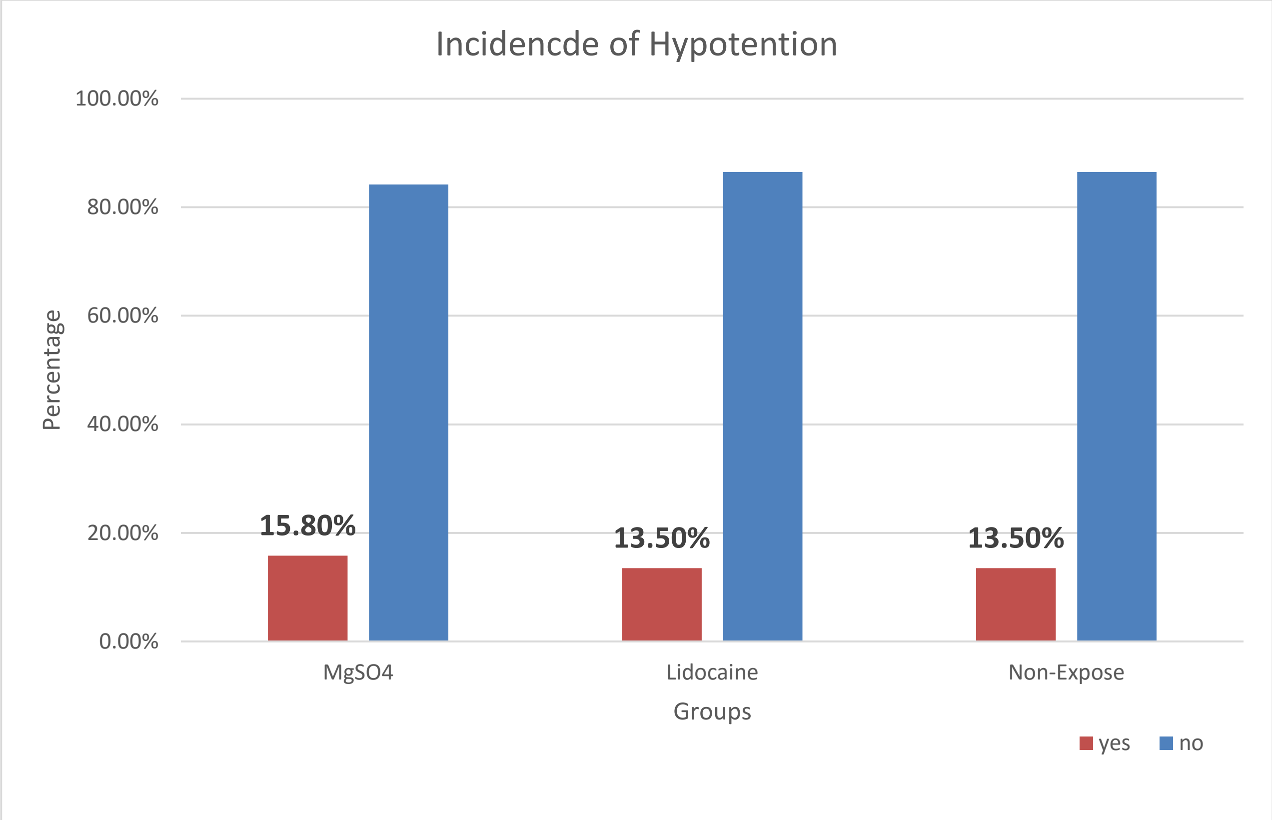

Figure 3: Incidence of hypotension within study minutes

CHAPTER SIX: DISCUSSION

In our prospective cohort study demographic data, anesthetic characteristics of patients, and baseline hemodynamic variables (SBP, DBP, MAP and HR) were comparable in both groups.

Heart rate

In this study the peak mean heart rates occurred at immediate post intubation time that were 99.82±10.86, 96.35±9.25, 120.0±11.04 in group M, L N respectively with ($p < 0.001$). Our study showed that there was statistically significant difference in mean heart rate at all-time points among the groups ($p<0.001$). The mean heart rate in Group N was significantly higher compared with Group L and M throughout study minutes. However there was no statistically significant difference in mean heart rate between Groups M and L at all post intubation time intervals. In this study at all the post intubation intervals a statistically significant increase in mean heart rate from baseline was observed in Group M, Group L, and Group N. Our study is comparable with a Study done by Bandey S. et.al in 2016 found statistically significant higher mean heart rate compared to baseline in group M, L and control group and there was statistically significant lower mean HR in group L and M as compared to Group C. Mean heart rate was comparable between Groups L and M at all-time intervals(8).

Our study is also consistent with other study done by Bhalerao NS. et. al (2017) reported that the difference in HR was not statistically significant between magnesium sulphate and lidocaine groups throughout the study period. In contrary to our study, they found no statistically significant change in mean heart rate from baseline in both groups regarding within the group comparison(5).The possible difference from our study may be the variation in the drug used for induction (propofol) and the dose of pretreatment (magnesium sulphate: 50mg/kg and lidocaine: 2mg/kg but in our study anesthetists used 30mg/kg and 1.5mg/kg respectively).

In contrary to our finding, Waseem M. et al (2011) showed that there was statistically significant difference between magnesium sulphate and lidocaine groups in attenuating increment of heart rate. Higher percentage of patients in magnesium group (25.6%) than lidocaine group (12.35%) had heart rate increment from baseline by >25% from baseline(31). The possible explanation for this difference result might be due to low dose of magnesium sulphate (10mg/kg) but in our study anesthetists used 30mg/kg.

Systolic Blood Pressure

Our study demonstrated statistically significant difference in mean SBP among all groups at all-time point. There was lower mean SBP at immediate post intubation, 2 minutes post intubation, 5 minutes post intubation in group M compared to Group L (p <0.001, p = 0.001,p = 0.029 respectively) and compared to group N (p<0.001). Again there was significantly lower mean SBP in group L compared with group N at all-time point except at 7th minutes. At 7th minute there was significantly lower mean SBP in group M compared with group N (*p*=0.006) but there was no significant difference between two treatment groups. On within the group comparison there was significant rise in SBP in group M at immediate post intubation time only with (p < 0.001) and return to baseline at 2 minutes of intubation. In lidocaine group there was significant rise in SBP at immediate post intubation time and at 2 minutes post intubation with (p< 0.001) and there was no statistically significant difference at 5 minutes post intubation time (p= 0.643) whereas in non-exposed group significant rise in SBP continued till 5th minute.

Our study is in line with study done by Sachin Padmawar, et al (2016) reported that there was significantly higher mean SBP in lignocaine group as compared with MgSO4 group at 1,3,5 minutes after intubation. Regarding within the group comparison SBP increased significantly from baseline. But it came to baseline with in 5 minutes in magnesium group, whereas in lidocaine group did not come to baseline value within 5 minutes in our study these parameters came to baseline faster(11). The possible reason may be in their study used low volume% of halothane for maintenance (0.4-0.6 %).

Our study is also consistent with other study done by Nooraei N et al (2013) found statistical significant difference in mean SBP between magnesium sulphate and lidocaine groups at 1st and 2nd minutes(p= 0.001,0.033)respectively with higher value in the lidocaine group(18).

In contrast to our study, done by Mendonca FT et al (2016) they compared the episodes of hypertension (increase in SBP >20%of baseline) after intubation and there was no statistical significance difference between magnesium and lidocaine groups. Three patients in magnesium group (12%) had compared to one patient (4%) in lidocaine group with (p >0.05) they found magnesium has similar result to lidocaine(22). The possible difference with our finding might be due to variation in induction agent they used propofol and fentanyl pretreatment in our study not.

Diastolic Blood Pressure

There was statistically significant difference among all groups at immediate, 2nd, 5th minutes post intubation intervals but not at 7th minutes post intubation. Group M has statistically significant lower mean DBP at immediate, 2nd and at 5th minutes post intubation intervals compared to Group N ($p < 0.001$).Also Group L has significantly lower mean DBP at immediate post intubation, 2nd and 5th minutes post intubation intervals compared to Group N ($p < 0.001$, < 0.001, $=0.002$). Group M compared to Group L has significantly lower value only at immediate and at 2nd minutes post intubation periods with ($p =0.018$, 0.019 respectively).DBP rose significantly from baseline in group M at immediate and at 2nd minutes of intubation with ($p < 0.001$, $=0.010$ respectively). Similarly in lidocaine group there was significant rise in DBP at immediate and at 2nd minutes post intubation with ($p< 0.001$) whereas in non-exposed group significant rise in DBP continued till fifth minute with ($p< 0.001$). In line with our study done by Bandey S et al, (2016) at 1st ,3rd and 5th minutes mean values for DBP were statistically significant lower in magnesium sulphate as compared to lidocaine group. Lidocaine group had also statistically significant lower mean values as compared to Group C(8). Our study is also consistent with other study done by Sachin Padmawar et al (2016), they found that DBP were 91.8±6.6 vs 84.5±6.2, 86.4±5.5 vs 78.7±6.1, 82.2±5.8 vs 78.7±6.1 at 1,3,5 minutes after intubation respectively which were significantly higher in lignocaine group as compared with $MgSO_4$ group at all times (11).

In contrary to our finding, Nooraei N et al (2013) showed not statistical significant difference in mean DBP between magnesium sulphate and lidocaine groups throughout study minutes for five minutes(18). The likely explanation for this inconsistency could be Nooraei N. et.al used fentanyl which is effective in attenuating hemodynamic response secondary to laryngoscopy and intubation (36).

Mean Arterial Pressure

There was statistically significant difference in mean MAP among all groups at all-time point. There was also significant lower mean MAP at immediate, 2nd minutes and 5th minutes post intubation in group M compared to Group L ($p <0.001$, $p = 0.001$, $p = 0.029$ respectively). Group M compared to group N, mean MAP was significantly lower at immediate, 2nd minutes, 5th minute and at 7th minutes post intubation intervals ($p<0.001$,<0.001,<0.001,$=0.011$ respectively). Group L has significantly lower mean MAP at immediate, 2nd minutes and at 5th minutes post intubation intervals compared to Group N ($p < 0.001$, < 0.001, $=0.001$respectively).MAP rose significantly from baseline in group M at immediate and at 2nd minutes of intubation with ($p < 0.001$, $=0.041$ respectively). In lidocaine group also there was significant rise in MAP at immediate and at 2nd minutes post intubation with ($p< 0.001$) whereas in non-exposed group significant rise in MAP continued till fifth minute with ($p< 0.001$).In line with our study done by R Vallabha et al (2018) reported mean MAP in lignocaine and magnesium sulphate group respectively were 88.70+8.95 vs 79.83+7.34, 88.70+8.95 vs 79.83+7.34, 86.50+8.37 vs 78.03+7.10 at 1st ,3rd and 5th minutes respectively ($p < 0.001$). they found significantly lower MAP in magnesium sulphate compared with lignocaine group (28).

Inconsistent to our study done by G Kiraci, et al (2014) observed no significant difference in MAP at immediate post intubation, 2nd, 5th and 10th minutes between magnesium, lidocaine and control groups. ($P > 0.05$)(32). The possible controversy from our study might be the variation in the drug used for induction (propofol) and the dose of pretreatment (magnesium sulphate: 10mg/kg and lidocaine: 1mg/kg but in our study anesthetists used 30mg/kg and 1.5mg/kg respectively).

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION

7.1: Conclusion

In conclusion prophylactic administration of magnesium sulphate and lidocaine were effective in attenuating hemodynamic responses of laryngoscopy and endotracheal intubation. But magnesium sulphate is better alternative than lignocaine.

7.2: Recommendation

Based on our finding we recommend prophylactic IV magnesium sulphate and lidocaine to consider for attenuating hemodynamic response to laryngoscopy and endotracheal intubation. We also recommend additional randomized clinical trial.

Limitation

The current study has certain limitations, including the inability to control over the confounding factors like type of inhalational agent for maintenance, MAC of inhalational agent, diagnosis and maintenance muscle relaxant.

Strength

We have tried to make comparable study groups by including patients who induced with same induction agent. We had no incomplete data with missing values, adequate sample size was attained on the planned schedule of time. So that the difference observed may be due to exposure factors.

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Annexes

Annex: I Assurance of principal investigator

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

Name of the principal investigator:

Date. November, 2018 Signature ___________________

Name of the advisor:

Date. November, 2018 Signature ___________________

Annex: II Information sheet

Hello.

My name is ________________________________. I'm a member of researchers and I have been attending postgraduate program in the field of Anesthesia at Addis Ababa University. I am going to conduct research on the comparison of intravenous lidocaine and intravenous magnesium sulphate for attenuation of cardiovascular response to laryngoscopy and endotracheal intubation in elective surgery patients at Zewditu memorial hospital, Addis Ababa Ethiopia, from November 7-2018 to March 7-2019. The information going to be obtained will help the government and other responsible bodies to decrease in morbid adverse events during & after surgery. Your participation is very valuable for the success of this project. Also be mindful that whatever we will get here is for research purposes only and the information will not be used by any other person apart from this research and therefore, confidentiality can be guaranteed. However, your names will not be mentioned or be attached to anything that you say.

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

Name and contact address of investigators

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Annex III: Amharic information sheet

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

ስሜ ____________________ ይባላል፡፡እኔ በአዲስ አበባ ዩኒቨርሲቲ በአንስቴዝያ ትምህርት ክፍል የምርምር ቡድን ዉስጥ አንድ አባል ነኝ፡፡የዚህ መጠይቅ አላማ ከኦፕራሲዎን በፊት የአንስቴዝያ መድሃኒት እና ኦክስጅን መስጫ ቱቦ በአየር ቡአቡአዎ መግባቱን ተከትሎ የሚከሰተዉን የልብ ምት እና ደም ግፊት መጨመርን ለመቀነስ ማግኒዚየም ሳልፌት እና ሊዶኬን የተባሉ መድሃኒት በሚወስዱበት ጊዜ ሁኔታውን በመመልከት የግፊት ወይም የልብ ምት መጨመር መንሴዎን ለመመራመር/ለማጥናት /መረጃ ለመሰብሰብ ነው፡፡ እርስዎን አንድ የጥናቱ ክፍል አድርጌ ስመርጠዎ አስፈላጊ የሆኑ መረጃዎችን እንደማገኝ በማሰብ ነዉ፡፡በጥናቱ ለመሳተፍ ፈቃደኛ ከሆኑ ከእርስዎ የሚገኘው ማንኛውም መረጃ በሚስጥር ይጠበቃል፡፡ለዚህም ሲባል የእርስዎ ሥምም ሆነ አድራሻ አይገለጽም፡፡ የእርስዎ ፈቃደኛነት ከኦፕራሲዎን በፊት የአንስቴዝያ መድሃኒት እና ኦክስጅን መስጫ ቱቦ በአየር ቡአቡአዎ መግባቱን ተከትሎ የሚከሰተዉን የልብ ምት እና ደም ግፊት መጨመር መንሴዎች ለሚደረገው ምርምር/ጥናት / በከፍተኛ ሁኔታ ያግዛል፡፡እንድሁም ከጥናቱ በኋላ ኦፕራሲዎን ለሚደረግላቸዉ ታካሚዎች ከኦፕራሲዎን በፊት ለሚከሰት የልብ ምት እና ደም ግፊት መጨመር ተገቢ የሆኑ እርምጃዎችን ለመዉሰድ ይረዳል፡፡

የቃል ሥምምነት

የዚህ ጥናት ዓላማው ገብቶኝ በጥናቱ ለመሣተፍ

ሀ. ፈቃደኛ ሆኛለሁ ለ. ፈቃደኛ አይደለሁም

በጥናቱ ለመሳተፍ ፈቃደኛ ከሆኑ፡-

የመጠይቁ መለያ ቁጥር_____ መጠይቁ የተካሄደበት ቀን _______

የጠያቂው ሥምና ፊርማ ________________

የሱፐርቫይዘር ስምና ፈርማ ________________

ጥናቱን በተመለከተ ማንኛዉም አይነት ጥያቄ ካላችሁ የሚከተለዉን አድራሻ ተጠቀሙ::

በዋናነት ምርምሩን የሚያካሂዉ ሰዉ ስም፡ አበባው ምስጋናው

ስ.ቁ.፡ 0918375637 ኢሜል፡ abebawmisganaw@gmail.com

Annex: IV Data collection tool

Date ____/___/____

Check list **Code _____________**

Data collection tool (questionnaire) for patient who will have taken general anesthesia induced by thiopental, premedicated either by lidocaine or magnesium sulphate at zewditu memorial hospital November 2018.

Instructions:

A. Fill the blank space provided.

B. Encircle the alternatives when necessary.

Part I: Questions on socio-demographic and physical characteristics of the patient

101	Age (years)	------------------------ years
102	Sex	A, Male , B, Female
103	Weight in Kg	……………………….
104	Height in meter	……………………..
105	Diagnosis	………………………..
106	BMI	…………..
107	ASA physical status	A, ASA I B, ASA II
108	Is there any co existing medical disease?	A, Yes B, No
109	If yes; specify the disease	------------

Part II: Questions about anesthetic characteristics of the patient.

201	The used anesthetic adjuvant five minutes before intubation	A, Magnesium sulphate(Mgso4)(……….mg) B, Lidocaine(………………….mg) C, Induction without lidocaine or Mgso4 D, Tramodol…………….mg E, other (…………………...)
202	DOSE of induction agent(thiopental)	…….
203	Intubating muscle relaxant	A, suxamethonium B, vecronium C, pancronium D, specify any others………………………
204	Number of attempts to intubate	A, 1 B, 2

Part III perioperative hemodynamic parameter measurements.

3, Hemodynamic parameter

Hemodynamic parameter	Heart rate	Systolic blood pressure	Diastolic blood pressure	Mean arterial blood pressure	Spo2
301, Before injection of lidocaine or Mgso4 if used. Or before thiopental injection if no lidocaine or Mgso4(base line)					
302**,** 1 minute after induction of anesthesia					

303, immediately after intubation					
304, 2 minutes after intubation					
305, 5 minutes after intubation					
306, 7 minutes after intubation					

4, Maintenance of muscle relaxant and inhalational agent opened immediately after intubation

401, Halothane	A, 1 % B,1.5 % C, 2% D, specify any other MAC………….
402, Isoflurane	A, 1 % B,1.5 % C, 2% D, specify any other MAC………….
403, muscle relaxant within 7 minutes of intubation. If there specify minutes ………….	A, suxamethonium C,pancronium B, vecronium D,atracurium E, no relaxant within 7 minutes
404, Is surgery started within 7 minutes of intubation?	A yes, B no; if yes specify minutes……………….
405, Is opioid given within 7 minutes of intubation? Specify……………..	A yes, B no; if yes specify minutes……………….

Appendix one

Classification of Obesity

BMI(kg/m2)	Description
<18.5	Underweight
18.5–24.9	Normal
25–29.9	Overweight
30–34.9	Obesity (class I)
35–39.9	Obesity (class II)
≥40	Morbid obesity (class III)
≥50	Super obesity
≥60	Super -super obesity

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

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

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

Adopted from Morgan and Mikhail 5th edition