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A RESEARCH THESIS SUBMITTED TO DEPARTMENT OF ANESTHESIA, COLLEGE OF HEALTH SCIENCES, ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT FOR THE REQUIREMENT OF MASTER DEGREE IN ANESTHESIA.

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FULL TITLE OF THE RESEARCH PROJECT	**COMPARISON OF TWO DIFFERENT PRE EXTUBATION DOSES OF INTRAVENOUS LIDOCAINE ON HEMODYNAMICS AND COUGH REFLEX AT TIKURE ANBESSA SPECIALIZED HOSPITAL, ADDIS ABABA, ETHIOPIA**
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ABSRTRACT

***Background**: Hemodynamic and cough response during suctioning for extubation can cause raised heart rate, blood pressures and coughing which could result bleeding, poor surgical outcome such as graft release, increased intra cranial pressure (ICP), myocardial infarction(MI). To prevent such problems the anesthetists, use different extubation techniques and medications such as lidocaine.*

***Objectives:** The objective of our study was to compare the difference in hemodynamic and cough response to I.V lignocaine 1mg/kg (group1) and 1.5mg/kg (group2) and to evaluate the comparative efficacy between the groups at peri-extubation period.*

***Methods**: We conducted comparative observational study on one hundred thirty patients who underwent elective surgical procedures requiring orotracheal intubation (OTI) and had given 1mg/kg (n=65) and 1.5mg/kg (n=65) plain lidocaine intravenous (IV). Hemodynamic parameters like heart rate(HR), systolic blood pressure(SBP), diastolic blood pressure(DBP) and mean arterial pressure(MAP) were recorded at peri-extubation period and analysed using analysis independent t test, paired t-test and chi-square /Fisher exact test. Post extubation cough was graded as per Eshak's grading (Grade 0, 1, 2 and 3). Results on continuous measurement presented on Mean, standard deviation (SD). Significance had assessed at 5% level of significance.*

***Results:** Hemodynamic attenuation is observed in group2 as compared with their base line values throughout the study period and hemodynamics between the groups at one minute of extubation, three minute of extubation were significantly different. Hemodynamics difference at tenth minute was not significant between the groups.*

***Conclusion:** Hemodynamic suppression of lidocaine 1.5mg/kg at extubation is superior to lidocaine 1mg/kg. Cough suppression of both groups are comparable.*

Recommendation: We recommend the use of 1.5 mg/kg lidocaine than 1mg/kg lidocaine IV for suppressing hemodynamic and cough reflex at extubation.

***Keywords:** hemodynamic response, cough, lidocaine, extubation*

CERTIFICATION

The under signed certify that the research entitled comparison of two different pre extubation doses of intravenous lidocaine on hemodynamics and cough reflex at Tikur Anbessa Specialized hospital, Addis Ababa, Ethiopia. Institutional based observational prospective cohort study is my original work. 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.

Investigators

Name _____ *Signature* _____ *Date* _____

Approval of the Board of Examiners

1. Advisor

Name _____ *Signature* _____ *Date* _____

3. Internal Examiner

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Thirdly, grateful thanks also goes to my data collectors for their strong effort for success of this research and study participant for their permission to use their data to conduct this research.

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ACRONYMS

ASA-----------American Society of Anesthesiologist

ETB. ----------Ethiopian birr

TASH----------Tikur Anbessa Specialized Hospital

ICP ------------intracranial pressure

MI ----------myocardial infarction

OTI----------orotracheal intubation

HR----------heart rate

SBP----------systolic blood pressure

DBP----------diastolic blood pressure

MAP----------mean arterial pressure

Wt----------weight

OTI…….orotracheal intubation

CHAPTER ONE: INTRODUCTION

1.1. BACKGROUND

There are different phases during conduction of general anesthesia with endotracheal intubation. Intubation and extubation phases are the two most important phases we observe exaggerated hemodynamic and airway reflexes. During emergence from anesthesia interruption of anesthesia at end of procedure causes stress induced catecholamine release and become tachycardic, hypertensive, and develop airway reflexes such as coughing, bucking, laryngospasm and bronchospasm (1).

Lowrie and his colleagues evaluated the impact of tracheal extubation on changes in plasma concentrations of epinephrine and Norepinephrine in 12 patients undergoing major elective surgery and found significant increase in epinephrine levels from 0.9 to 1.4 pmol/mL 5min, after extubation. In their study in all three groups, heart rate had increased at 1min following extubation (2).

Sympathetic stimulation during extubation may be detrimental, due to increased myocardial oxygen demand, subjecting the patient to have arrhythmia, myocardial ischemia, and infarction, pulmonary edema, cerebral hemorrhage, etc. These responses are marked in hypertensive patients, coronary artery disease patients and cerebrovascular disease patients (3).

In the clinical practice respiratory complications after tracheal extubation are three times more common than during tracheal intubation and induction of anesthesia (12.6% vs. 4.6%)(4,5).

Bucking and coughing frequently occurs during extubation. It could cause negative pressure pulmonary edema if lung volumes are less than vital capacity.

They also cause abrupt increases in intracavitary pressures (intraocular, intrathoracic, intra-abdominal, and intracranial) which could put patient at high risk (6).

Lidocaine amide local anesthetic injected IV or topically applied to larynx and trachea is variably effective at blunting hemodynamic response to tracheal stimulation and it decreases intracellular calcium concentration in airway smooth muscle, decreases myofilament calcium sensitivity and has been shown to suppress coughing and prevent reflex bronchoconstriction (7, 8).

Lignocaine attenuates the hemodynamic response to tracheal extubation by its direct myocardial depressant effect, central stimulant effect, and peripheral vasodilatory effect (9).

Muzzi and his collogues demonstrated that after intracranial surgery, most of patients became hypertensive in the period beginning when the volatile anaesthetic was discontinued and ending after the trachea was extubated. In such patients, autoregulation of cerebral blood flow may be disturbed and a sudden increase in arterial pressure may lead to increases in both cerebral blood flow and intracranial pressure. These increases may result in either herniation of brain contents or decrease in cerebral perfusion pressure, leading to cerebral ischaemia. It seems reasonable, therefore, to attempt to prevent or suppress the haemodynamic response to extubation in such patients (10).

1.2. STATEMENT OF THE PROBLEM

All anaesthesia providers experience difficulty/ problems with or after tracheal extubation. Eventhough large volumes of anesthetic literatures addresses problems associated with tracheal intubation, the problems associated with tracheal extubation exceeds that of intubation, it is unusual to find adequate discussion concerning those following extubation (11).

Anesthetists use different extubation techniques and pharmacological therapies to avoid such problems. Out of these deep extubation, technique is one. It allows a smoother emergence from anaesthesia and achieved by inhalation or i.v. anaesthetic agents, opioid analgesics. However, this technique may produce depression of the respiratory and cardiovascular systems and, occasionally may result in aspiration of gastric content and difficulty in the management of the upper airway.

In patients whom deep extubation are, not desirable awake extubation technique is the acceptable. Its advantage is the return of laryngeal reflexes that allow airway protection from further contamination with blood and secretions while its disadvantages include tachycardia, hypertension, possibility of laryngospasm, coughing and bucking with subsequent oxygen desaturation, and increased risk of bleeding (12).

Problems against the act of attenuating hemodynamic and cough reflex at extubation are; lack of drugs at every set up, lack of attention toward importance of hemodynamic stabilization, side effects of drugs, lack of adequate literatures on hemodynamics and cough reflex secondary to suctioning and extubation.

Some of the side effects of commonly used drugs are post-operative sedation and hypotension (22% incidence) with dexmedetomidine (13), bradycardia, etc.

Dyson and colleagues demonstrated increases of 20% or more in both heart rate and systolic arterial pressure in 70% of the patients in 10 ASA I and II patients who were not receiving cardiovascular or antihypertensive medication. The increament in systolic blood pressure even reached 40% or more in 60% of these patients, in whom extubation was performed when they were able to breathe spontaneously and open their eyes to command (14).

1.3. SIGNIFICANCE OF STUDY

Hemodynamic and respiratory associated problems unless prevented with pharmacologic strategies or deeper extubation technique the patient may end up with poor outcome of surgery or problems, which is not detected immediately but causes long lasting problems to the patient.

Plain lidocaine IV is easily accessible elsewhere and its administration for attenuation of hemodynamic and cough reflex occurred during emergence or extubation is routinely done in surgical patients in whom tachycardia, hypertension and coughing is undesirable.

This study compare the efficacy of 1mg/kg and 1.5mg/kg plain lidocaine IV so that in order to get effective clinical dose of lidocaine to avoid problems associated with hypertension, tachycardia and coughing. Especially in hospitals where more newly introduced drugs such as fentanyl, esmolol, magnesium sulphate are not easily accessible. Studying the effect of lidocaine on hemodynamics and cough as well as comparing the two doses and specifying it is expected to contribute on techniques and methods used to avoid problems associated with emergence and extubation. Especially patients with neurological surgery, coronary artery disease, hypertensive patients and all surgical patients in whom tachycardia, hypertension, coughing, bucking or straining during emergence are not desirable are beneficiary from this study.

CHAPTER TWO: LITERATURE REVIEW

Wohlner and colleagues studied the haemodynamic responses to tracheal extubation in patients after coronary artery surgery. They demonstrated significant increases in heart rate, mean arterial pressure, cardiac index and systemic vascular resistance index, beginning at 1 min and continuing until 10 min after extubation. They also demonstrated similar significant increases in mean pulmonary artery pressure, pulmonary artery occlusion pressure and pulmonary vascular resistance index (15).

Stanley and Bidwai demonstrated that 60 mg of lidocaine sprayed down the tracheal tube before extubation and 40 mg sprayed down during tracheal tube removal prevents increases in blood pressure and pulse rate during and after extubation(16).They subsequently demonstrated that i.v. administration of lignocaine 1 mg/ kg" 2 min before tracheal extubation also prevent increases in heart rate and arterial pressure during and after extubation (17).

Lidocaine produces central sedation, suppresses autonomic reflexes, potentiates analgesia and may protect the ischemic myocardium from ultra-structural damage associated with high circulating catecholamine levels (18).

In awake patients with acute myocardial infarction, bolus doses of lidocaine, 1-2 mg/kg caused no significant depression of cardiac output, heart rate, or arterial pressure (19).

Wallin and colleagues (1987) in their RCT observed that an i.v. infusion of lignocaine 2 mg/ min" throughout the perioperative period suppressed extubation-induced tachycardia and hypertension (20).

Nagrale M. H. and his colleagues in Wardha ,India during the period of May 2008 to December 2010 conducted prospective randomized study on 90 patients to evaluate haemodynamic effects of intravenous Propofol, Lignocaine, Esmolol given two minutes prior to extubation and got significant reduction in hemodynamics to Esmolol 1.5mg/kg and Propofol 0.5 mg/kg 2 minutes prior to extubation. With lignocaine 1mg/kg there was an initial rise in blood pressure. Lignocaine, Esmolol and Propofol were able to attenuate cough and strain of extubation in >90percentage of the patients (21).

Savitha K.S and colleagues randomized prospective double blind single Centre study in 2014, at tertiary care hospital on 90 patients of both sex scheduled for elective surgical procedures requiring orotracheal intubation. They randomly divided into three groups, of 30 each Group-1 (control-saline), group-2 (lignocaine 0.5mg/kg) and group-3 (lignocaine 1mg/kg) and gave study drug 2minutes prior to extubation.

They demonstrated that in control group, there was significant rise in HR, SBP and MAP throughout the study period and the incidence of moderate and severe cough was 43.3% and 30% respectively (22).

Prospective, randomized, double blind, placebo controlled study was conducted in a tertiary care hospital in Northern India from August 2014 to August 2016. The attenuation of hemodynamic responses at the time of extubation was comparable between the patients receiving IV lignocaine and intratracheal placebo and patients receiving intratracheal lignocaine and IV placebo. Cough suppression through intratracheal route was comparable with IV route (23).

Lidocaine when administered I.V has an onset of action within 30-45 seconds with peak effect at 1-2 min. Mikawa and his colleagues reported that IV lignocaine two minutes prior to tracheal extubation attenuates increases in HR, SBP, DBP and the cough reflex (24).

CHAPTER THREE: OBJECTIVES

3.1. General objective

To assess effect of pre extubation doses of IV lidocaine on hemodynamics and cough reflex on elective surgical patients at Tikur Anbessa Specialized Hospital from January 1 to April 30 2018.

3.2. Specific objectives

1. To determine effect of 1mg/kg and 1.5mg/kg IV lidocaine on hemodynamics at extubation of elective surgical patients at TASH during study period.
2. To compare the efficacy of 1mg/kg and 1.5 mg/kg IV lidocaine on hemodynamics at extubation of elective surgical patients at TASH during study period.
3. To determine the effect of 1mg/kg and 1.5 mg/kg IV lidocaine on cough reflex at extubation of elective surgical patients at TASH during study period.

CHAPTER FOUR: METHODS

4.1. Study design: Comparative observational cohort study

Study Area and period: This study was conducted at Tikur Anbessa specialized Hospital which is located at Addis Ababa, the capital city of Ethiopia from January 1 to April 30. The hospital is multi-specialty tertiary care teaching hospital in Ethiopia, opened in 1972 and transferred to school since 1998, then it became the main teaching hospital for clinical and preclinical trainings of most disciplines. It is also an institution where specialized clinical services those are not available in other public or private institutions are rendered to the whole country.

4.2. Study population

Source of population: all patients who were admitted and underwent surgery under general anesthesia with orotracheal intubation at Tikur Anbessa specialized Hospital.

Study population: all patients scheduled for elective surgery and fulfill inclusion criteria at Tikur Anbessa specialized Hospital during study period.

Sample population: elective surgical patients who are selected for study.

4.3. Inclusion and Exclusion Criteria

Inclusion criteria**:** patients of either sex of ASA (American Society of Anesthesiologist) grade I and II, with airway assessment of Mallampatti grade 1 and 2, between the age group of 18-65 years, scheduled for elective surgeries under general anesthesia underwent General Surgery, ENT (ear), Orthopedic, Gynecological and Plastic procedures requiring oral intubation.

Exclusion criteria: Patients had been excluded if allergy to study drug, patients who took lidocaine at intubation and nerve block with study drug, patients on beta blockers or calcium channel blockers, patients with bronchial asthma and cardiovascular disease other with documented intra operative hemodynamic compromise, patients with active upper respiratory tract infection, patients with airway surgery, sore throat and history of laryngeal/tracheal surgery or pathology.

4.4. Sample size and sampling technique

Sample size calculation

As far as our knowledge is concerned there was no comparative study between lidocaine 1mg/kg and 1.5mg/kg in suppressing hemodynamic response. We did pilot study at Menelik Referral hospital on fourteen ASA1 and ASA2 patients and got the mean heart rate of 7 patients 92 with standard deviation of 22.51 in those who administered 1.5mg/kg lidocaine IV and 102.6 with standard deviation of 20.4 of who administered 1mg/kg lidocaine iv. By assuming equal sample size for two groups, the sample size will be determined by the formula as,

$n_1=n_2 = (s_1^2 + s_2^2) f(\alpha,\beta) / (m_1 - m_2)^2$

$n1=n2=2(s_p^2) f(\alpha,\beta)/ (m_1 - m_2)^2$

=64 in each group. Total of 128-sample size required by adding 5% non-respondent we required 140 patients.

Where, S_p=pooled standard deviation

N_1= number of patients taken 1mg/kg lidocaine

N_2 = number of patients taken 1.5mg/kg lidocaine

Z= 95% confidence interval =1.96

The value of f (α, β) at power function 80%= 7.84

m1:- mean heartrate of group 1 (lidocaine 1.5mg/kg)

m2:-mean heart rate of group 2 (lidocaine 1mg/kg)

Sampling technique: systematic random sampling.

Situational analysis done at TASH by revising anesthetic and surgical records of three months to be 300 surgeries, which fulfill inclusion criteria.

$k = \frac{N}{n}$= 300/140=2=every two interval schedule will be studied after the first schedule is selected by lottery method.

4.5. Study variables

Dependent variable:

- ✓ Hemodynamics change (HR,SBP,DBP,MAP)
- ✓ cough

Independent variables:

- ✓ Lidocaine IV
- ✓ Age
- ✓ Sex
- ✓ ASA class
- ✓ Duration of anesthesia
- ✓ Intraoperative opoid given
- ✓ Time of lidocaine administration
- ✓ Diagnosis
- ✓ Procedure
- ✓ Time interval between lidocaine administration and extubation

4.6. Data collection technique and procedure

All patients had monitored with pulse oximetry, non-invasive blood pressure, and electrocardiography and at the time of extubation patients had been assessed for the incidence of post extubation cough using a 4-point rating scale suggested by Eshak Grade 0, Grade 1, Grade 2 and Grade 3. HR, SBP, DBP and MAP recorded just before reversal (base line value) and 1min, 3min, 5min and 10min following extubation was collected by 3BSC anesthetists using pretested check lists prepare in English analysed. Data had been collected until the required number reached.

Results on continuous measurements had been presented on Mean±SD (min-max). Significance assessed at 5% level of significance. Independent t test and paired t test had been used to find the significance of study parameters between the two groups and within group differences respectively for normally distributed data after checking for distribution by Shapiro Wilks test and histogram.

Chi-square/Fisher Exact test had been used to find the significance of study parameters on categorical scale between the two groups.

4.7. Data Quality Assurance

Data collectors had been trained on each items included in the study tools, objective, relevance of study, confidentiality of information obtained. During data collection follow up had been made and cross check for completeness and consistency of data on daily basis and reject incomplete data.

4.8. Data Analyzing and processing

Once the data had been collected and checked for completeness, consistency and accuracy manually and sorted, categorized and summarized. Then the data entered into the computer using developed data entry, format, coded for each category of variables and again crosschecked for errors and then coded and entered in to SPSS version 20-computer program and analysed.

4.9. **Ethical consideration**

Prior to data collection, the proposal had been reviewed by the ethical committee of college of health science and medicine.

Then after official letter for permission requested from collage of public health and medicine, Tikur Anbessa specialized Hospital clinical director office. Moreover, the objective of the study had been explained to both hospital administration and patients undergo elective surgery with orotracheal intubation. Verbal consent from each patient had been asked for permission before study.

4.10. Dissemination plan

The research report will be prepared in four copies and disseminated to college of health science school of medicine/department of anesthesia, Tikur Anbessa specialized Hospital and Addis Ababa University student research office. Possible efforts will be made to publish the results of the study to international journals.

4.11. Operational definition

Duration of surgery: - the time starting from incision to end of surgery (skin suturing).

Duration of anesthesia: - the time starting from administration of anesthesia to end of administering anesthesia

Elective surgery: - is surgery done before on set (appearance) of any complication that might constitute urgent indication.

Group 1: those patients who had been taken 1mg/kg lidocaine IV

Group 1: those patients who had been taken 1.5mg/kg lidocaine IV

Duration of suctioning: - how long suctioning and how repeat

Base line: - vital signs one minute before medication of study drug

Study drug: - lidocaine

Eshak Grade 0= no coughing or straining,

Eshak Grade 1= moderate coughing, needs explanation

Eshak Grade 2 = marked coughing, straining

Eshak Grade 3 = poor extubation with laryngospasm

CHAPTER FIVE: RESULTS

5.1. Socio demographic variables

There were no significant difference between the groups regarding demographic variables such as age, BMI, Sex as given in table 1.

Table 1: patient demographic variables of elective surgical patients underwent surgery at Tikur Anbessa specialized hospital from january1 to April 30

patient demographic variables	**Group 1(n=65)**	**Group 2(n=65)**	**p-value**
Age	38.29±12.12	36.52±10.94	0.334
Gender (male/female)	28/37	25/40	0.721
BMI	22.1±2	22.43±1.71	0.316
ASA status	55/10	59/6	0.424

ASA=American Society of Anesthesiologist, BMI= body mass index of the patient, n= number of patients

5.2. Surgery and anesthesia related variables

Anesthesia and surgery related variables such as induction agent, surgical procedures, intubation attempt, intraoperative opoid, time of lidocaine administration have not statistically significant association between the groups as tested by chi-square test. See table 2 below
As we see from table there were no significant difference in surgery and anesthesia related variables such us duration of procedures, induction agent, perioperative opoid and type of surgery.

Table 2: anesthesia, and surgery related variables of elective surgical patients underwent surgery at Tikur Anbessa specialized hospital from january1 to April 30

Anesthesia, and Surgery related data		**Group1 (n=65) (%)**	**Group2(n=65) (%)**	**p-value**
Induction agent	thiopental	21(32.31%)	19(29.23%)	0.573
	ketamine	7(10.77%)	4(6.15%)	
	propofol	28(43.08%)	28(43.07%)	
	ketofol	9(13.85%)	14(21.54%)	
surgical procedures	General	39(60%)	31(47.69%)	0.222
	Urologic	4(6.154%)	8(12.31%)	
	ENT	4(6.154%)	8(12.31%)	
	Gynecologic	18(27.69%)	16(24.62)	
	orthopedic	0	2(3%)	
Intra-op opoid	tramadol	26(40%)	26(40%)	0.816
	morphine	17(26.15%)	20(30.77%)	
	fentanyl	22	19(29.23%)	
Time lidocaine administration	2minute before ext.	29(44.61%)	38(58.46%)	0.16
	3minute before ext.	36(55.38%)	27(41.54%)	
Intubation attempt	1attempt	62(95.39%)	60(92.31%)	0.718
	2attempt	3(4.62%)	5(7.69%)	

Note: ENT=ear, nose, throat surgery, %=percentage, n=number of patients, ketofol=ketamine + propofol

5.3. Hemodynamic changes

Baseline hemodynamics difference are also not significant between the groups before study drug administration.

5.3.1. Heart rate

Heart rate difference is significant at all study period (at 1, 3, 5 and 10 minute of extubation between the groups with p value of less than 0.05.

5.8% rise of heart rate was observed at first minute of extubation from base line mean heart rate in group1 while 8.5% drop in heart rate is observed from baseline mean heart in group2. Significant drop of mean heart rate was observed at tenth minute of extubation from mean base line heart rate in-group 2. The heart rate gradually dropped starting from third minute of extubation in group1.

Table 3: Comparison of peri extubation heart rate within the group and between the groups of elective surgical patients in Tikur Anbessa Specialized Hospital from January1 to April 2018

Heart rate	GROUP 1 (n=60) (Mean ± SD)	P value within group1	GROUP 2 (n=65) (Mean ± SD)	P value within group2	P value Group1 versus group2
Baseline HR	99.12±17.72		101.4±15.31		0.435
HR-1	104.86±18.22	<0.001	92.80±13.51	<0.001	<0.001
HR-3	98.54±19.25	0.719	87.38±11.86	<0.001	<0.001
HR-5	90.20±17.82	<0.001	79.65±9.94	<0.001	<0.001
HR-10	83.25±15.45	<0.001	76.98±9.54	<0.001	<0.001

Note: SD=standard deviation, n= number of patients, baseline HR=hear rate before study drug, HR-1,HR-3,HR-5,HR-10 are heart rate 1minute,3minute,5minute,10minute after extubation respectively

5.3.2. Systolic blood pressure

Systolic BP difference is significant only at first minutes of extubation between the groups with p-value of 0.036. Comparing it with base line in group1 slight rise observed while in group2 is comparable.

Table 4: Comparison of systolic blood pressure within group and between groups of elective surgical patients in Tikur Anbessa Specialized Hospital from January to April 2018

SBP (mmHg)	GROUP1 (n=65) (Mean ± SD)	P value within group1	GROUP 2 (n=65) (Mean ± SD)	P value within group2	P value
Baseline SBP	122.23±12.98		126.09±13.24		0.096
SBP-1	129.32±15.56	<0.001	124.62±8.75	0.355	0.036
SBP-3	125.09±14.27	0.115	121.98±7.84	0.025	0.127
SBP-5	119.55±13.68	0.203	118.48±7.36	<0.001	0.578
SBP-10	114.8±12.76	0.001	117.12±7.33	<0.001	0.202

Note: SD=standard deviation, n= number of patients, baseline SBP=systolic blood pressure before study drug, SBP-1,SBP-3,SBP-5,SBP-10 are systolic blood pressure at 1minute,3minute,5minute,10minute after extubation respectively

5.3.3. Diastolic blood pressure

Diastolic blood pressure difference were not significant at all study periods of between the groups. Significant at first minute and tenth minute of extubation from baseline mean DBP in group1.

Table 4: Table 5: Comparison of diastolic blood pressure of elective surgical patients in Tikur Anbessa Specialized Hospital from January to April 2018

DBP (mmHg)	GROUP1(n=65)	P value within group1	GROUP 2(n=65)	P value within group2	P value
Baseline DBP	77.22±11.19		81.14±12.89		0.069
DBP-1	83.62±12.02	<0.001	81.51±9.26	0.719	0.265
DBP-3	79.46±11.65	0.147	79.15±9.48	0.219	0.869
DBP-5	75.49±12.9	0.313	75.43±8.44	<0.001	0.973
DBP-10	71.55±11.26	0.002	73.71±8.43	<0.001	0.220

Note: SD=standard deviation, n= number of patients, baseline DBP=diastolic blood pressure before study drug, DBP-1,DBP-3,DBP-5,DBP-10 are diastolic blood pressure at 1minute,3minute,5minute,10minute after extubation respectively

5.3.4. Mean arterial blood pressure

Table 6: Comparison of mean arterial blood pressure within group and between groups of elective surgical patients in Tikur Anbessa Specialized Hospital from January to April 2018

MAP(mmHg)	GROUP1(n=65)	P value within group1	GROUP 2(n=65)	P value within group2	P value between the group
Baseline MAP	90.97±11.77		94.89±12.15		0.058
MAP-1	96.58±12.47	<0.001	94.4±8.91	0.719	0.253
MAP-3	93.82±12.11	0.08	92.68±8.89	0.156	0.542
MAP-5	88.72±12.53	0.189	88.58±8.91	<0.001	0.942
MAP-10	84.78±10.99	<0.001	86.71±8.63	<0.001	0.269

note: SD=standard deviation, n= number of patients, baseline MAP=mean arterial blood pressure before study drug, MAP-1, MAP-3,MAP-5,MAP-10 are mean arterial blood pressure at 1minute,3minute,5minute,10minute after extubation respectively

5.4. Post extubation cough

Three percent of group 1 (1mg/kg) had develop moderate cough and 1.5% develop severe cough while only 1.5% of group 2(1.5mg/kg) developed moderate cough.

Table 7: Comparison of post extubation cough of elective surgical patients in Tikur Anbessa Specialized Hospital from January to April 2018

Cough grading	Group-1 (n=65)	Group-2 (n=65)	p-value
No cough	62(95.38%)	64(98.46%)	0.252
Moderate cough	2(3.08)	1(1.54%)	
Severe cough	1(1.54%)	0	
Poor extubation with larryngospasm	0	0	
Total	65(100%)	65(100%)	

Note: %=percentage, n=number of patients, by chi-square test

CHAPTER SIX: DISCUSSION

In our study, HR significantly increased at first minute of extubation, became comparable to baseline at third minute of extubation and decreased then after until tenth minute of extubation in group1. In line with our study, Nagrale MH and his colleagues demonstrated increament in heart rate in lidocaine 1mg/kg group up to three minute of extubation. But decreased at fifth and tenth minutes of extubation (21).

Hemodynamic increament was significant in our study in lidocaine 1mg/kg group with p-value of <0.001 as compared to baseline at first minute of extubation. In contrary to our study, Bidwai AV and his colleagues studied that patients receiving lidocaine 1mg/kg two minutes before extubation did not sustain significant elevation in systolic or diastolic blood pressure at or after extubation. This difference may arise from study design difference or time of drug administration to extubation difference.

The rise in hemodynamics were less than 10% in lidocaine 1mg/kg at first minute and decreased after wards when compared to base line. The rise is totally abolished in lidocaine 1.5mg/kg group. Dyson and colleagues demonstrated increases of 20% or more in both heart rate and systolic arterial pressure in 70% of the patients in 10 ASA I and II patients who were not receiving cardiovascular or antihypertensive medication, in whom extubation was performed when they were able to breathe spontaneously and open their eyes to command (23).

The maximum rise in heart rate (5.8%) was observed at first minute of extubation in our study in group1. Lowrie and his colleagues evaluated the impact of tracheal extubation on changes in plasma concentrations of epinephrine and Norepinephrine in 12 patients undergoing major elective surgery and found significant increase in epinephrine levels from 0.9 to 1.4 pmol/mL 5min, after extubation. In their study in all three groups including lidocaine 1mg/kg, HR had increased at 1min following extubation. The possible explanation could be due to increase in plasma epinephrine levels which was not totally suppressed by 1mg/kg. (1).Lidocaine 1.5mg/kg suppressed this stress induced catecholamine release in our study.

SavithaK.S and his colleagues' study demonstrated that statistically significant increament in HR, DBP, MAP, until tenth minute of extubation in comparison with baseline values. But SBP was comparable with base line values at ten minute of extubation. In our study, the rise in HR SBP, DBP and MAP were significant only at first minute of extubation compared to baseline in lidocaine 1mg/kg group. In our study post-extubation cough was suppressed in >95% of patients in both groups which is comparable with their study that demonstrated lidocaine 1mg/kg was able to attenuate cough and strain of extubation in 100% of patients (22).

However, the residual actions of preoperative cardiovascular medication and anaesthetic or analgesic agents may have attenuated the ability of the cardiovascular system to respond to reflex stimulation as well as airway reflex in these patients.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION

7.1. CONCLUSION

Lidocaine 1.5mg/kg is superior to 1mg/kg in attenuating heart rate at first and third minute of extubation.

Hemodynamics attenuation of lidocaine 1.5 mg/kg IV is superior to lidocaine 1mg/kg at extubation.

Cough reflex suppression at extubation are comparable. No significant difference in attenuation of cough.

7.2. RECOMMENDATION

We recommend the use of 1.5 mg/kg lidocaine than 1mg/kg lidocaine IV for suppressing hemodynamic and cough reflex at extubation.

We recommend to do further research using randomized controlled trial.

STRENGTH OF THE STUDY:

As far as our search, this is the first study in my study area. Therefore, it will be helpful as baseline information for other researchers.

LIMITATION OF THE STUDY:

Observation bias was not completely removed from the study.

As it is observational study, it was unable to control some confounding factors.

Lack of prior study on this and related title to compare with and discuss

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ANNEXE1: CONCENT FORM

ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES SCHOOL OF MEDICINE

DEPARTMENT OF ANESTHESIA

Consent form

Greeting:

Hello, My name is_____. I want to ask your permission to observe effect of plain lidocaine on your hemodynamics and cough reflex in response to suctioning and extubation whenever your anesthetist give you at the end of surgery. When doing so I am not going to intervene or change the way your anesthetist treat you rather observing what was your hemodynamics periextubation period. Your name will not be written in this form and will never be used in connection with any information you tell us. Your responses will be treated with utmost confidentiality. Your participation is based on your interest and you are not obligated to answer any question if you do not wish to answer. If you feel discomfort with the participation, it is your right to leave it.

Are you willing to participate in this study?

1. Yes

2. No

CHECKLIST

1. Age ____ Sex __ Wt. in kg_____ Ht. in m_____ BMI___ ASA class_____
2. Diagnosis _____Type of procedure _____
3. Any medical problems 1. HTN 2.DM 3. Asthma 4. Others specify _____
4. Medication history _____
5. What was induction agent? 1. Thiopental 2. Ketamine 3. Propofol 4. Inhalational 5 .Others specify_____
6. Intubation attempt? 1. First attempt success 2. Two attempt 3. Three attempt
7. What was maintenance agent? 1. Inhalational (1. Isoflourine 2. Halothane) 2. IV
8. Was opoid given intra operatively? 1. Yes 2.No If yes specify type and dose_____
9. Lidocaine dose given _____
10. Duration from lidocaine administration to extubation _____
11. Table of patient heamodynamics

Heamo dynamic value	TIME				
	Base line before study drug	1minute after extubation	3minute after extubation	5minute after extubation	10 minute after extubation
HR					
SBP					
DBP					
MAP					

12 Cough

No cough	
Moderate cough	
Severe cough	
Poor extubation with larryngospasm	

13. Duration of anesthesia: _____. Duration of surgery _____.

Name of data collector _____.

*Signature*_____.

*Phone no.*_____

*date*_____