

**MAGNITUDE AND ASSOCIATED RISK FACTORS OF POST  
OPERATIVE SORE THROAT FOLLOWING SURGERY BY GENERAL  
ANESTHESIA WITH ENDOTRACHEAL INTUBATION IN BLACK LION  
HOSPITAL, ADDIS ABABA, ETHIOPIA.**

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**A RESEARCH SUBMITTED TO SCHOOL OF ANESTHESIA, COLLEGE  
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**ADDIS ABABA, ETHIOPIA**

**ADDIS ABABA UNIVERSITY  
COLLEGE OF HEALTH SCIENCES  
SCHOOL OF ANESTHESIA**



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## ABSTRACT

**Background:** A complaint of postoperative pharyngeal discomfort is so prevalent that it is almost expected by patients and anesthetist alike as an unavoidable part of routine anesthesia. Complaints range from a minor throat irritation to debilitating pain, inability to swallow and temporary voice changes, and are a frequent observation on the postoperative visit. There is no data regarding the magnitude of post-operative airway complications and their associated risk factors in Ethiopia.

**Objective:** The purpose of this study is to assess the magnitude and possible associated risk factors for postoperative sore throat following surgery by general anesthesia with endotracheal intubation.

**Methods and materials:** Institutional based cross-sectional study design was conducted in Black Lion Hospital Addis Ababa, Ethiopia from February 1-30, 2016 in patients aged 18 years and above who underwent surgery under anesthesia with endotracheal intubation using structured questionnaire prepared on variables being measured. Bivariate analysis and binary logistic regression was used to measure association between dependent and independent variables. Pvalue 0.05 was used as cut off point.

**Results:** Out of 114 patients who had elective surgery by anesthesia with endotracheal intubation, 52(45.6%) of the study participants complained of various forms of post-operative throat complaints. In this study it was found that size of ETT showed statistically significant association with the post-operative sore throat with p-value 0.001, (AOR- 0.214, 95% CI 0.090-0.512) and the duration of anesthesia/surgery also showed statistically significant association with POST with p-value 0.014, (AOR 0.14, 95% CI 0.029-0.676).

**Conclusion and recommendation:** The findings of this study confirmed previous observations that the larger the ETT size, the higher the incidence of postoperative respiratory morbidities. Although tracheal intubation remains an absolute necessity for good airway protection for different surgical procedures, we recommended to use the smaller ETT sizes (6.5, 7.0 mm ID) to minimize the pressure-induced trauma on the laryngeal and tracheal mucosae.

**Key words:** -Post operative sore throat, Endotracheal tube. surgery

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<b>Table of contents</b>	<b>Page</b>
1. Abstract.....	I
2. Acknowledgment.....	II
3. Table of contents .....	III
4. List of tables .....	V
5. List of figures.....	VI
6. List of abbreviations .....	VII
<b>CHAPTER ONE: INTRODUCTION</b>	
1.1. Background .....	1
1.2. Statement of the problem .....	2
1.3. Significance of the study .....	3
<b>CHAPTER TWO: - LITRATURE REVIEW</b>	
Literature review .....	4
<b>CHAPTER THREE: - OBJECTIVES</b>	
3.1 General Objective .....	9
3.2 Specific Objectives .....	9
<b>CHAPTER FOUR: - METHODOLOGY</b>	
4.1. Study area and period.....	10
4.2. Study design .....	10
4.3. Population.....	10
4.4. Inclusive and exclusive criteria .....	10
4.5. Sample size and sampling technique .....	10
4.6. Study variables .....	10
4.7. Data collection technique and instrument .....	10
4.8. Data quality control .....	11
4.9. Data analysis and interpretation .....	11
4.10. Operational definitions .....	11
4.11. Ethical consideration .....	11
4.12 Dissemination plan.....	11
<b>CHAPTER FIVE</b>	
<b>RESULTS</b> .....	12
<b>CHAPTER SIX:</b>	

DISCUSSION.....	18
<b>CHAPTER SEVEN:</b>	
CONCLUSION AND RECOMMENDATION.....	21
<b>Annexes</b>	
Annex1 Reference .....	22
Annex2 Questionnaire .....	24
Annex3 Declaration .....	28

### List of tablespage

I.	<b>Table 1.</b> the distribution of the diagnosis in the study participants in Black Lion Hospital, Addis Ababa, Ethiopia from Feb. 1-30, 2016. ....	14
II.	<b>Table 2.</b> the frequency of the size of ETT used during the study period in Black Lion Hospital, Addis Ababa, Ethiopia, from Feb.1-30, 2016.....	15
III.	<b>Table 3.</b> the frequency of the number of attempts at laryngoscopy during the endotracheal intubation in the study period in Black Lion Hospital, Addis Ababa, Ethiopia, from Feb. 1-30, 2016.....	15
IV.	<b>Table 4.</b> The frequency of use of throat pack in the study period in Black Lion Hospital, Addis Ababa, Ethiopia, from Feb. 1-30, 2016.....	17
V.	<b>Table 5.</b> The frequency of post-operative sore throat among patients who underwent surgery by anesthesia with endotracheal intubation from Feb. 1-30, 2016 Black lion hospital, Addis Ababa, Ethiopia.....	18
VI.	<b>Table 6.</b> The frequency of the duration after surgery and occurrence of POST in the study participants in Black Lion Hospital, Addis Ababa, Ethiopia from Feb. 1-30, 2016.....	18

<b>List of figures</b>	<b>page</b>
I. <b>Figure 1.</b> Age distribution and post-operative sore throat among the study participants in Black Lion Hospital, Addis Ababa, Ethiopia from Feb. 1-30, 2016. ....	13
II. <b>Figure 2.</b> Sex distribution and post-operative sore throat among the study participants in Black Lion Hospital, Addis Ababa, Ethiopia from Feb. 1-30, 2016. ....	14
III. <b>Figure 3.</b> the percentage of the duration of anesthesia in the study group in Black Lion Hospital, Addis Ababa, Ethiopia from Feb. 1-30, 2016. ....	16
IV. <b>Figure 4.</b> the percentage distribution of the use of NG tube during the study period in Black Lion Hospital, Addis Ababa, Ethiopia from Feb. 1-30, 2016. ....	16
V. <b>Figure 5.</b> the percentage of the use of airways during the study period in Black Lion Hospital, Addis Ababa, Ethiopia from Feb. 1-30, 2016. ....	17

## **List of abbreviations**

ASA-American Society of Anesthesiologists

ETT-Endo-Tracheal tube

LMA-Laryngeal Mask Airway

PACU-Post Anesthetic Care Unit

Ph.-Postoperative Hoarseness

POST- Post-Operative Sore Throat

Mm ID- Internal Diameter in millimeter

NGT- Nasogastric tube

SD- Standard Deviation

URTI-Upper Respiratory Tract Infections

BLH                      –                      Black                      lion                      hospital

## **CHAPTER ONE: INTRODUCTION**

### **I.1 Background information**

Despite recent advances in anaesthesia and surgery, major surgical operations are still beset with undesirable postoperative sequelae. These represent a significant negative aspect of surgical care, which may in no small way diminish patients' confidence in the healthcare. The respiratory system is particularly vulnerable when general anaesthesia with endotracheal intubation is used. This is because the conduct of this technique of anaesthesia often involves interference with the normal airway mucosal barrier mechanisms by way of instrumentation, or interference with the normal mucosal or ciliary activities due to inhalation of unhumidified anaesthetic gases. The interference, in many cases, may lead to trauma, foreign body contamination, mucosal dryness and airway irritation, which manifest in various ways in the postoperative period.(1,2,3)

The etiology of POST is also not clearly understood, but it appears to be an inflammatory process since the tracheal mucosa has been found to release inflammatory mediators after intubation. However, the exact anatomical location of sore throat still remains uncertain in patients [7].

The incidence of postoperative sore throat (POST) varies from 0-50% in most research studies, but some report the incidence is as high as 51-88.4% following general anesthesia. The high variability is due to a large number of factors implicated in POST such as type and size of airway device, technique of insertion, use of lubricant, airway design, cuff pressure, length of procedure, anesthesia administered, evaluation techniques, and a multitude of patient features. Regardless of the incidence or duration, POST is rated as a patient's 8<sup>th</sup> most undesirable outcome in the postoperative period, and is certainly an opportunity to improve patient outcomes. [1, 3, 10, 11]

There is no any research available for healthcare providers that assess the incidence and its associated risk factors of POST in Ethiopia. Therefore, this study is aimed at clearly assessing the most common factors associated with POST and its incidence in Ethiopia. Awareness of the variables associated with an increased incidence of POST will allow health care providers to minimize combinations of risk factors, reduce the incidence and severity of POST, and improve a patient's anesthesia experience.

## 1.2. Statement of the problem

Despite recent advances in anesthesia and surgery major surgical operations are still beset with undesirable postoperative sequelae. These represent a significant negative aspect of surgical care, which may in no small way diminish patients' confidence in the healthcare. The respiratory system is particularly vulnerable when general anesthesia with endotracheal intubation is used. (1)

Sore throat is a common, uncomfortable; distressing sequel of tracheal intubation that contributes to postoperative morbidity and patient dissatisfaction following general anesthesia. Although intubation confers great advantages, and advances in cuff design and care has significantly reduced many of the deleterious effects on the trachea but a lot of lesions still occur. [6]

The incidence of postoperative sore throat (POST) varies from 0-50% in most research studies, but some report the incidence is as high as 51-88.4% following general anesthesia. The high variability is due to a large number of factors implicated in POST such as type of airway device, technique of insertion, use/type of lubricant, airway design, cuff pressure, length of procedure, anesthesia administered, evaluation techniques, and a multitude of patient features. Regardless of the incidence or duration, POST is rated as a patient's 8<sup>th</sup> most undesirable outcome in the postoperative period, and is certainly an opportunity to improve patient outcomes. [8, 9, 10]

Many researches done worldwide regarding the incidence of POST and its associated risk factors are overwhelming. On the other hand, there is no research available for healthcare providers that assess the incidence and its associated risk factors of POST in Ethiopia despite symptomatic management of patients who develop the symptoms. Therefore, this study is aimed at clearly assessing the most common factors associated with POST and its magnitude in Ethiopia. Awareness of the variables associated with an increased magnitude of POST will allow health care providers to minimize combinations of risk factors, reduce the incidence and severity of POST, and improve a patient's anesthesia experience.

### 1.3. **Significance of the study**

Sore throat stressful sequel of tracheal intubation that contributes to postoperative morbidity and patient dissatisfaction following general anesthesia. Therefore, identifying the risk factors associated with post-operative sore throat is mandatory for better patient outcome.

The study is also expected to provide benefits to Hospital administrators and policy makers to improve the quality of education to professionals through workshop to bring quality care in anesthesia services and an overview of patient respiratory outcomes postoperatively for the concerned body for planning and intervention on areas of deficit.

It also enables Anesthetists to select the type of airway device with minimal risk and better outcome which in turn contribute to better management of those who developed POST and other respiratory complications after with endotracheal intubation.

To my knowledge, there were no such study conducted Ethiopia so that results of this study can be used as a base line data for further researchers.

## CHAPTER TWO: LITERATURE REVIEW

The incidence of postoperative sore throat (POST) varies from 0-50% in most research studies, but some report the incidence is as high as 51-88.4% following general anesthesia. The high variability is due to a large number of factors implicated in POST such as type and size of airway device, technique of insertion, use/type of lubricant, airway design, cuff pressure, length of procedure, anesthesia administered, evaluation techniques, and a multitude of patient features (1).

According to a prospective, cross-sectional study carried out at the University Hospital in Örebro, Sweden, from March to December 2008 of the 8 variables evaluated on 97 postoperative patients, 3 variables were found to be significantly associated with development of POST. These were age greater than 60 years compared with 18 to 60 years (64% vs. 32% [14/22 vs. 24/75];  $P = .01$ ), ETT size No. 7.0 compared with ETT 6.0 (51% vs. 27% [25/49 vs. 13/48];  $P = .02$ ), and the use of a throat pack compared with no throat pack (64% vs. 35% [9/14 vs. 29/83];  $P = .04$ ). Older patients (>60 years) had almost 4 times higher the risk of developing POST while the size of the ETT played an important role in the development of POST increasing the risk by almost 3 times compared with if a smaller size ETT was used. [5]

A non-randomized, prospective and longitudinal study was performed for a period of four months from January to April 2013 at the Örebro University Hospital, Sweden to investigate the gender differences in sore throat and hoarseness following endotracheal tube or laryngeal mask airway. The result showed that more women had POST compared to men ( $p = 0.07$ ). Irrespective of airway device (ETT or LMA) used there were no significant gender difference in POST or PH at the PACU. When stratified for different surgical departments, irrespective of airway device, there were more women who had POST after hand-, orthopedic-, gynecology and general surgery. However, more men had POST after urology surgery. There were no significant differences between women and men after an ETT (27% vs. 38%,  $p = 0.2$ ). However, there were more women than men who had POST after an LMA (26% vs. 6%,  $p = 0.004$ ). More women ( $n = 11$ ) than men ( $n = 1$ ) said that POST was present during swallowing after an LMA. There were no significant differences in Ph after either an ETT or an LMA between men and women. There was a higher incidence of POST in the ETT group compared to the LMA group (32% vs. 19%,  $p$

= 0.012) as well as a higher incidence of Ph in the ETT group compared to the LMA group (57% vs. 33%,  $p < 0.001$ ) in the PACU. [7]

A double-blind, randomized-controlled study was conducted in 100 women scheduled for elective surgery in the Departments of Plastic Surgery and the Ear Nose and Throat (ENT) surgery, at the Örebro University Hospital, Sweden. After 1–2 h post-operatively, there were a higher proportion of patients with sore throat in ETT 7.0 vs. ETT 6.0 (51.1% vs. 27.1%),  $P = 0.006$ . This difference between the groups was also evident,  $P = 0.002$ , when comparing changes between the pre- and the post-operative values. The severity of discomfort from sore throat was also higher in ETT 7.0 (38.8%) compared with ETT 6.0 (18.8%),  $P = 0.02$ . No differences were found in the incidence of hoarseness between the groups. The remaining symptoms lasted up to 96 h post-operatively in 11%, irrespective of the tube size. [11]

Ahmed *et al* evaluated the factors most strongly associated with an increased incidence of POST. They agree with other researchers that the method of airway management is the single most significant influence on a patient's development of pharyngeal complications. They evaluated 312 patients undergoing general or gynecological surgery in a prospective observational study. The induction procedure is not discussed, but anesthesia was maintained with isoflurane in oxygen and nitrous oxide. They found that 26% of all patients reported POST. Twenty-eight percent of patients complained of POST following ETT while only 3.5% of patients complained after an LMA was used. A water-based lubricant was used for all ETTs and LMAs. For female patients, a 7.5 mm ETT was used and an 8.5 mm ETT for males. The size of LMAs is not discussed. Other associated factors that showed an increased incidence were the female population, older patients, difficult intubation, duration of surgery, and patient position. [12].

**Edomwonyi**, *et al* reports that 63% of patients in their study reported some throat-related complaint after tracheal intubation. They did not find a statistically significant difference in the incidence of POST between males and females, nor was there a notable difference in groups where the tube was lubricated compared to tubes without lubricant. It is not surprising that they did report that patients who had throat-related surgeries did report more POST than patients who underwent non-throat procedures, and postulate that this is due to patient positioning and ETT movement. Neither multiple attempts at intubation nor skill-level of the anesthetist increased the

reports of POST, but duration of anesthesia greater than 60 minutes did correlate with an increased incidence of POST. This group of researchers used 7-8 mm tubes for women and 8.5-9 mm sized tubes for men, but acknowledges that the use of smaller tubes does reduce POST. The associated use of nasogastric tubes or throat packing resulted in increased complaints of POST. [13]

In a study conducted on 242 patients, women were intubated with an 8-mm tracheal tube and men with a 9-mm tracheal tube. All tubes were lubricated with lignocaine jelly. However, the incidence of sore throat in women (17%) was significantly higher than that in men (9%) which was attributed to the tube being a tighter fit in women. Other factors that were found to be implicated were thyroid surgery (because of movement of the tube and cuff within the trachea) and the presence of a nasogastric tube. Surprisingly, multiple attempts at intubation did not increase the incidence of sore throat. Fifty percent of patients were hoarse voice, 18.5% had a cough and 70.5% complained of dryness of the throat. The sex difference in that study was not confirmed. The overall incidence of POST was 35% when questioned directly. [14]

A randomized, prospective, and observational study conducted in 4 tertiary care university hospitals in Shanghai, China to evaluate the correlation between ETT cuff pressure control and post-procedural complications in five hundred nine patients, the results showed that there was no significant difference in sex, age, height, weight, procedure duration, and duration of endotracheal intubation between the 2 groups. The mean ETT cuff pressure measured after estimation by palpation of the pilot balloon of the study group was 43\_23.3 mmHg before adjustment (the highest was 210 mm Hg), and 20 \_ 3.1 mm Hg after adjustment ( $P < 0.001$ ). The incidence of post-procedural sore throat, hoarseness, and blood-streaked expectoration in the control group was significantly higher than in the study group. As the duration of endotracheal intubation increased, the incidence of sore throat and blood-streaked expectoration in the control group increased. The incidence of sore throat in the study group also increased with increasing duration of endotracheal intubation. Fiberoptic bronchoscopy in the 20 patients showed that the tracheal mucosa was injured in varying degrees in both groups, but the injury was more severe in the control group than in the study group. [15]

A prospective study by Kolawole and Ishaqwas conducted for 8 months in University of Ilorin Teaching Hospital, Ilorin, Nigeria to assess the incidence and possible associated risk factors for post-anesthetic respiratory complaints following endotracheal anesthesia in lower abdominal surgery in obstetrics and gynecology patients. A total of 202 patients were studied. Out of these, 152(75.2%) patients had various forms of postoperative respiratory complaints. Overall, it was observed that caesarean section patients were more likely, than gynecology patients, to report these respiratory complications in the postoperative period (88.4% vs. 58.9%). This difference was statistically significant ( $p < 0.05$ ). The incidence of sore throat directly correlated with the size of the endotracheal tube used ( $r = 0.936$ ). There was a statistically significant difference in the incidence of sore throat between the caesarean section patients and gynecology patients ( $p < 0.05$ ), particularly with endotracheal tube sizes larger than 7.5mm ID ( $p < 0.03$ ). Duration of intubation, which was slightly longer in gynecology patients (mean =  $72.48 \pm 30.62$ ), and number of intubation attempts, did not have statistically significant effect on the incidence of respiratory complaints. [16]

A study by Biro, Seifert, and Pasch showed that POST is among the most frequent subjective complaints of patients following intubation with an ETT. Postoperative sore throat was present in 40% overall being significantly higher in female than in male (44% vs. 33%;  $P = 0.001$ ). The mean pain intensity in the affected patients ( $n = 323$ ) was  $28 \pm 12$  mm on a visual analogue scale where 0 = no pain and 100 = extreme pain. The average duration was  $16 \pm 11$  h. Main factors associated with throat complaints were female sex, history of smoking or lung disease, duration of anaesthesia, postoperative nausea, bloodstain on the endotracheal tube and natural teeth. We could find no influence on the occurrence or intensity of throat complaints by the professional assignment or the length of professional experience of the personnel involved. [17]

A study conducted in Watford General Hospital, United Kingdom, 266 intubated patients were investigated to find the incidence of sore throat after elective anesthesia in a Middle Eastern population. The overall incidence of sore throat was 63.9%. There was no significant difference in the incidence of sore throat between males and females, and in the age groups studied. Anesthetic factors including the use of relaxants, the experience of the anesthesiologist, the number of intubation attempts and lubrication of the tracheal tube did not significantly alter the incidence of sore throat. Duration of anesthesia of greater than 90 minutes was associated with

significant increase in sore throat ( $p < 0.001$ ). Surgical factors including type of surgery, the use of throat packs and early oral intake did not alter the incidence of sore throat. Nasogastric tube insertion was associated with a significantly increased incidence of sore throat ( $p < 0.01$ ). [18]

A descriptive study was carried out to determine the frequency of postoperative sore throat after thyroidectomy under general anesthesia with endotracheal intubation at a private teaching university hospital i.e. IsraUniversity Hospital, Hyderabad and another private non-teaching hospital i.e. Memon Charitable Hospital, Hyderabad by Kadri AL et al, over a period of three years from April 2005 to March 2008. Of the 140 patients, the female to male ratio was 9:1 with the mean age of about 32 years and ranges of 16-68 years ( $SD \pm 8.224$ ). The two commonly performed thyroid operations were subtotal thyroidectomy (57, 40.7%) and hemithyroidectomy (52, 37.1%). Post-operative sore throat was observed in 112 (80%) patients. The ETT having diameter of 7.5 mm or more, extensiveness of thyroidectomy, age of more than 35 years and operative duration of more than one hour were the statistically significant factors contributing in the occurrence of post thyroidectomy sore throat. There was no statistically significant impact of gender and number of intubation attempts on the occurrence of post thyroidectomy sore throat. They concluded that postoperative sore throat is a common complication after thyroid surgery. Larger size of ETT, more extensive surgery, increased age and prolong operation are the main contributing factors for the occurrence of post-operative sore throat. [19]

In the study conducted by P. P. Higgins<sup>1</sup>, F. Chung<sup>\*,1</sup> and G. Mezei<sup>1</sup> on 5264 patients, 12.1% reported a sore throat. Patients with tracheal tube had the greatest incidence, 45.4%, followed by patients with laryngeal mask airway, 17.5%, while patients with a facemask had a lower incidence of sore throat, 3.3%. Female patients had more sore throats than male patients (13.4 vs 9.1%). Airway management had the strongest influence on the incidence of sore throat. Sore throat in ambulatory surgical patients was associated with female sex, younger patients, use of succinylcholine, and gynaecological surgery (21).

## **CHAPTER THREE: OBJECTIVES**

### **3.1 General objectives**

- To determine the magnitude and associated risk factors of postoperative sore throat following surgery by general anesthesia with endotracheal intubation from February 1-30, 2016 at Black Lion Hospital, Addis Ababa, Ethiopia.

### **3.2 Specific objectives**

- To determine the magnitude of sore throat
- To describe associated risk factors for postoperative sore throat.

## **CHAPTER FOUR: METHODOLOGY**

**4.1. Study area and period:** - this study was conducted in Black Lion Hospital, which is found in Addis Ababa, Ethiopia, and is one of the teaching hospitals of Addis Ababa University. The study was conducted from February 1-30,2016.

**4.2 Study design:** Institutional based cross sectional study design was employed

### **4.3 Population**

**4.3.1 Source population:** All adult patients who undergone surgery under general anesthesia with endotracheal intubation.

**4.3.2 Study population:** Selected patients who undergone surgery under general anesthesia with endotracheal intubation in the specified period.

### **4.4 Inclusive and exclusive criteria:**

**4.4.1 Inclusion criteria:** patients with age 18 and above

**Exclusion criteria:** was surgery performed in the mouth or throat area, patients with upper airway infections and cesarean delivery as well as emergency procedures are not included.

**4.5 Sample size and sampling technique:** all the patient who undergone surgery by anesthesia with endotracheal intubation in the specified period was included.

### **4.6 Study variables:**

**4.6.1 Dependent:** - POST

**4.6.2 Independent:** age, sex, diagnosis, duration of anesthesia, ETT size, number of attempts during laryngoscopy, use of airways, use of NG tube and insertion of throat pack.

**4.7 Data collection technique and instrument:** - Data was collected using questionnaires prepared in English and then translated to Amharic. Data was collected by four MSc. in anesthesia students and follow up was made for every patient post operatively for at least 24 hours. The study tools include the type of airway device used, number of attempts during laryngoscopy to intubate the trachea, size of ETT employed, duration of

anesthesia, demographic variables and overall medical condition of the patients will be observed.

#### **4.8 Data quality control:**

- Training and orientation about the objective and process of data collection was provided for data collectors.
- Close supervision and follow up was made during the data collection.

**4.9 Data analysis and interpretation:** - After collection, data was summarized and coded. Data was entered into epi info version 7 and transported to SPSS version 20.0 for data cleaning up and analyzing. Proportions was calculated for all categorical variables, bivariate analysis was done for each independent variables with dependent variable and binary logistic regression was done to measure association between dependent and each independent variables while controlling other variables. P value and/ 95% C.I was used to judge significant of association. P-value 0.05 was used as cut off point.

#### **4.10 Operational definition**

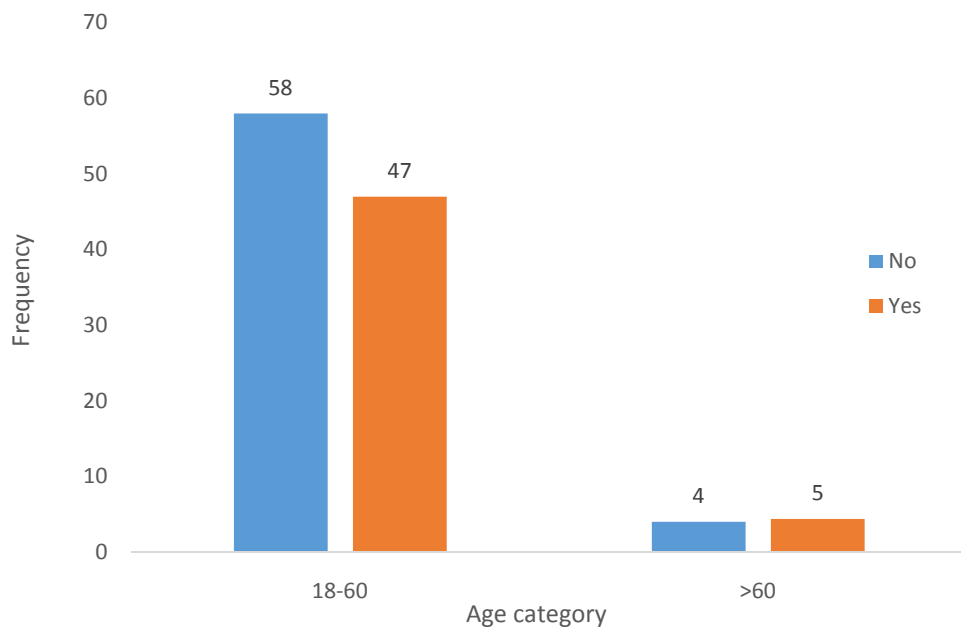
1. **Endotracheal tube (ETT):** is a specialized device used for airway maintenance.
2. **Endotracheal intubation:** a technique used for airway maintenance by which a tube is inserted to trachea through mouth or nose.
3. **Laryngoscopy:** is a technique of using a device called laryngoscope to view laryngeal structures to facilitate endotracheal intubation.

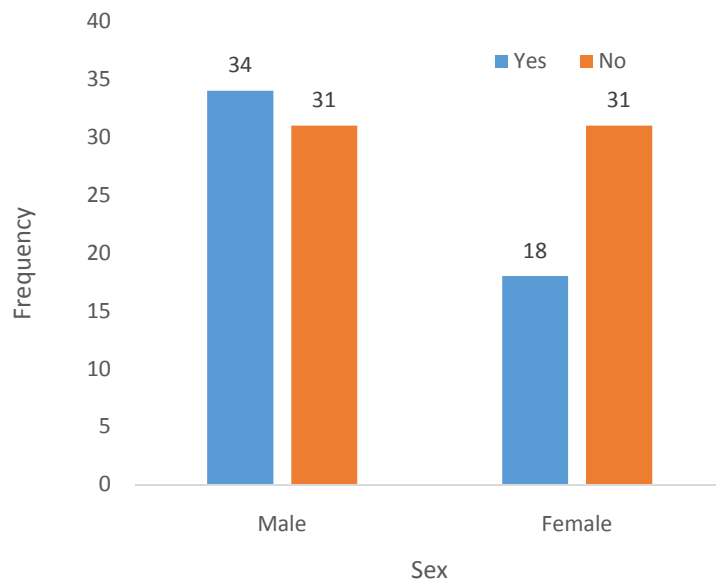
#### **4.11 Ethical consideration: -**

After approval of the proposal, ethical clearance was obtained from the Ethical review committee of department Anesthesia medical faculty, School of medicine, AAU and letter was given to Addis Ababa health bureau Black Lion Hospital for support and permission. Informed verbal consent was obtained from respondents after giving them information about the study. In addition, all the responses were kept confidential and anonymous.

#### **4.12 Dissemination plan**

The copies of final results will be disseminated to college of health science and medicine, Hospitals and health centers in Addis Ababa, Addis Ababa Health Bureau and Federal Ministry





Diagnosis	Frequency	Percent
General surgery (Thyroidectomy, Mastectomy, Cholecystectomy..)	12	10.5
Gynecologic surgery	10	8.8
Neurosurgery	16	14.0
Orthopedic surgery	34	29.8
Thoracic surgery	20	17.5
Urologic surgery	22	19.3
<b>Total</b>	<b>114</b>	<b>100.0</b>

In this study the sizes of ETT used ranged from 6.0 to 7.5. The size number 6.5 was the mostly used endotracheal tube during the study period with N=46 (40.4%).

**Table 2.** the frequency of the size of ETT used during the study period in Black Lion Hospital, Addis Ababa, Ethiopia, from Feb. 1-30, 2016.

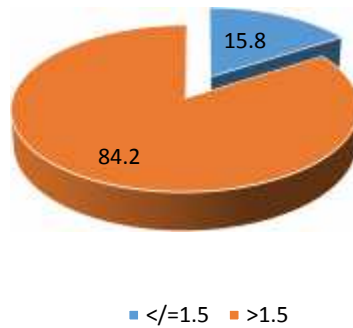
Size of ETT	Frequency	Percent	Cumulative Percent
6.0	4	3.5	3.5
6.5	46	40.4	43.9
7.0	19	16.7	60.5
7.5	45	39.5	100.0
<b>Total</b>	114	100.0	

Number of attempts at laryngoscopy during the endotracheal intubation ranged from single attempt to four attempts. The study showed that N=80(70.2%) of the patients are intubated with the single attempts at laryngoscopy. But only N=1(0.9%) of patient was intubated after four attempts at laryngoscopy.

**Table 3.** the frequency of the number of attempts at laryngoscopy during the endotracheal intubation in the study period in Black Lion Hospital, Addis Ababa, Ethiopia, from Feb. 1-30, 2016.

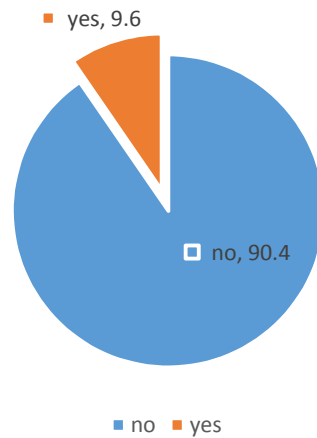
Number of attempts	Frequency	Percent
1	80	70.2
2	30	26.3
3	3	2.6
4	1	0.9
<b>Total</b>	114	100.0

The duration of anesthesia and surgery in the study was ranged from 1- 12 hours with mean duration of  $2.98 \pm 1.872$ . In the study period the minimum duration that the patients stayed under anesthesia was 1 hour and the max. was 12 hours. This study also showed that  $N= 96(84.2\%)$  of the patients stayed more than 90 minutes under anesthesia.

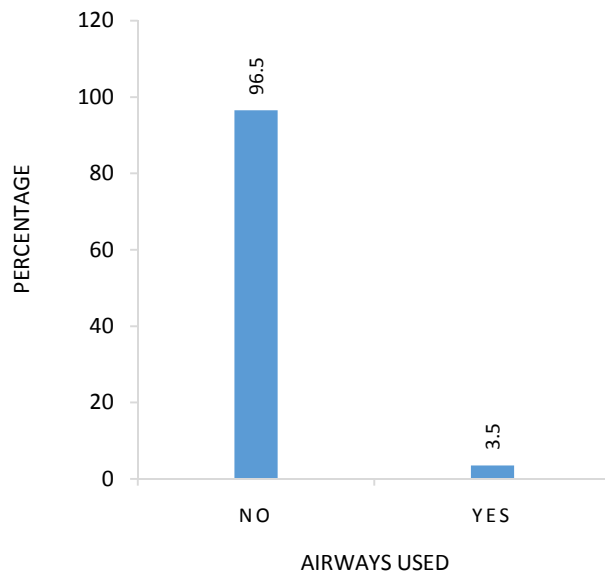


**Figure 3.** The percentage of the duration of anesthesia in the study group in Black Lion Hospital, Addis Ababa, Ethiopia from Feb. 1-30, 2016

In this study the use of NG tube was not common with the frequency of  $N=11(9.6\%)$  and the rest of the cases didn't had NG tube inserted during the surgery.



**Figure 4.** The percentage distribution of the use of NG tube during the study period in Black Lion Hospital, Addis Ababa, Ethiopia from Feb. 1-30, 2016



Throat pack used	Frequency	Percent
no	113	99.1
yes	1	.9
<b>Total</b>	114	100.0

There were 114 patients who had elective surgery by anesthesia with endotracheal intubation during the study period. Out of 114, in N= 52(45.6%) there was various forms of post-operative throat complaints observed.

**Table 5.** The frequency of post-operative sore throat among patients who underwent surgery by anesthesia with endotracheal intubation from Feb. 1-30, 2016 Black lion hospital, Addis Ababa, Ethiopia.

POST	Frequency	Percent
No	62	54.4
yes	52	45.6
<b>Total</b>	114	100.0

The study showed that POST occurred to N=50 (96.15%) of study subjects after one-hour post operatively whereas the rest of study participants had POST in less than one hour post operatively.

**Table 6.** The frequency of the duration after surgery and occurrence of POST in the study participants in Black Lion Hospital, Addis Ababa, Ethiopia from Feb. 1-30, 2016.

POST occurred (hour)	Frequency	Percent
<=1	2	3.85
>1	50	96.15
<b>Total</b>	52	45.6

In this study it was found that the size of ETT and the duration of anesthesia was associated with POST at p value of less than 0.05. it has also revealed as the size of ETT is increased there is an increased in the occurrence of the post-operative sore throat by 2.14% with p value 0.001,(OR, 0.214, 95% CI 0.090-0.512) and with the duration of anesthesia the increased the incidence of post-operative sore throat was also increased by 1.4% with p value 0.014, (OR 0.14, 95% CI0.029-0.676). The other study variables didn't show significant association to POST occurrence.

## CHAPTER SIX

### Discussion

The magnitude of post-operative throat complaints in this study was 45.6%, it is significant that needs attention of the responsible bodies while taking care of the patients and this study can be taken as base line for further studies in this area to provide more knowledge and understanding of the problem. **Edomwonyi, et al** reports that 63% of patients complained of post-operative throat complaints<sup>13</sup>. While in the other prospective study by Kolawole and Ishaqwas conducted in University of Ilorin Teaching Hospital, Ilorin, Nigeria to assess the incidence and possible associated risk factors for post-anesthetic respiratory complaints following endotracheal anesthesia in lower abdominal surgery in obstetrics and gynecology patients showed 75.2% patients had various forms of postoperative respiratory complaints<sup>16</sup>. The lower incidence in this study may be due to the use of relatively smaller size of ETT's. Postoperative sorethroat has been found to be a consequence of trauma to the larynx and pharynx during intubation, and pressure-induced ischemic airway injuries caused by the endotracheal tube or its cuff<sup>3</sup>.

In the study there was no significant association between age and occurrence of POST. A study conducted in Watford General Hospital, United Kingdom, also showed no significant difference in the incidence of sore throat between the age groups studied<sup>18</sup>. But according to a prospective, cross-sectional study carried out at the University Hospital in Orebro, Sweden, from March to December 2008, age greater than 60 years was found to be significantly associated with development of POST compared with 18 to 60 years<sup>5</sup>.

This study showed no gender association with the occurrence of the post-operative throat complaints. But the study conducted in Örebro University Hospital, Sweden to investigate the gender differences in sore throat and hoarseness following endotracheal tube or laryngeal mask airway showed that more women had POST compared to men ( $p = 0.07$ )<sup>7</sup>.

This study showed no statistically significant association between the diagnosis and POST and this study is comparable to a study conducted in Watford General Hospital which showed surgical factors including type of surgery did not alter the incidence of sore throat<sup>18</sup>. But the

study by Christensen AM, et.al. implicated thyroid surgery has association to POST<sup>14</sup>, this may be due the external tracheal manipulation and possible surgical trauma during the thyroid surgery.

The results from this study showed there is statistically significant association between size of ETT tube and occurrence of post-operative throat complaints. According to a prospective, cross-sectional study carried out at the University Hospital in Orebro, Sweden, from March to December 2008, had also comparable result showing significant association between size of ETT and the development of POST. With ETT size No. 7.0 compared with ETT 6.0 (51% vs. 27% [25/49 vs. 13/48];  $P = .02$ )<sup>5</sup>. This is because with the increasing the diameter of the ETT there is increase in tightness with the tracheal mucosa and this causes direct trauma to the tracheal mucosa and possibly results in post-operative throat complaints. The results from a double-blind, randomized-controlled study conducted in the Departments of Plastic Surgery and the Ear Nose and Throat (ENT) surgery, at the Orebro University Hospital, Sweden has also showed the comparable result. There were a higher proportion of patients with sore throat in ETT 7.0 vs. ETT 6.0 (51.1% vs. 27.1%),  $P=0.006$ <sup>11</sup>.

The results from this study showed no significant association between the POST and number of attempts during the tracheal intubation. The study conducted by Christensen AM, et.al. also showed multiple attempts at intubation did not increase the incidence of sore throat<sup>1</sup>, a prospective study by Kolawole and Ishaqwasalso found no statistical significance association between number of attempts at laryngoscopy and POST<sup>16</sup>. Another study conducted in Watford General Hospital had similar result showing no statistically significant association between the POST and multiple attempts at laryngoscopy<sup>18</sup>. Even though the number of attempts was not an independent predictor of the occurrence of POST, it causes direct trauma to the larynx and there is possibility of developing pain in the throat in the post-operative period.

This study has shown significant association between duration of anesthesia and/or surgery more than 60 minutes and the development of POST. The study conducted by Ahmed *et.al.* to evaluate the factors associated with an increased incidence of POST had comparable result showing increased incidence of developing post-operative sore throat with the increased duration of

surgery<sup>12</sup>. Another study conducted by **Edomwonyi, et.al.** also showed the duration of anesthesia greater than 60 minutes did correlate with an increased incidence of POST<sup>14</sup>. A randomized, prospective, and observational study conducted in 4 tertiary care university hospitals in Shanghai, China also shown comparable result to the above studies. The reason behind could possibly be, as there is increased duration of anesthesia and or surgery the patient will be intubated for long period especially if the tube is tight fitting the resulting compression on the mucosa of the trachea result in the associated pain during the post-operative period.

This study had shown no statistical significance to the occurrence of post-operative throat complaints and the use of the airway adjuvants (i.e. oropharyngeal airway, nasogastric tube and throat pack). But the prospective, cross-sectional study carried out at the University Hospital in Orebro, Sweden, from March to December 2008, found statistically significant association between the use of throat pack and POST<sup>5</sup>. The study conducted by **Edomwonyi, et al** shows the associated use of nasogastric tubes or throat packing resulted in increased complaints of POST<sup>13</sup>. Christensen AM, et.al also found association between POST and the presence of a nasogastric tube<sup>15</sup>. But the result of this study maybe due to the limited utilization of this devices in the study.

## **CHAPTER SEVEN**

### **Conclusion and Recommendation**

The findings of this study confirmed previous observations<sup>5,12</sup> that the larger the ETT size, the higher the incidence of postoperative respiratory morbidities. This is possibly due to the trauma induced by tight fitting ETTs. Although tracheal intubation remains an absolute necessity for good airway protection for different surgical procedures, it is recommended to use the smaller size ETTs (6.5-7.0 mm ID) to minimize the pressure-induced trauma on the laryngeal and tracheal mucosae. It is recommended that the administration of the Black Lion Hospital could provide enough amount of ETT in range of sizes so as to help anesthetists to choose appropriate size for individual patients.

The prolonged duration of anesthesia and surgery had increased the risk of developing post-operative throat complaints as also signified by another studies<sup>14</sup>. It could be advisable to perform surgeries as much as in smaller time possible and using smaller size ETT for airway maintenance could reduce the risk of developing the POST.

Even though this study didn't show statistically significant association between the number of attempts at laryngoscopy and POST, it is still wise to be able to reduce the number of attempts during tracheal access, because it is obvious that with multiple attempts there is damage to mucosa around the larynx by direct trauma due to instrumentation during laryngoscopy.

We recommend further studies in this area to evaluate the association between the practitioner experience, use of another airway maintenance devices like LMA's and the post-operative throat complaints. And also on management of the patients who complained of post-operative throat pain.

## **Annexes**

### **Annex 1 References**

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## Annex 2

### Questionnaire

**ADDIS ABABA UNIVERSITY**  
**COLLEGE OF HEALTH SCIENCE SCHOOL OF ANESTHESIA**  
**INFORMATION SHEET**

Hello ladies and gentlemen.

My name is **BIRHANU MENGISTU**. I am a researcher and I have been studying masters of Science in anesthesia at Addis Ababa University. I am going to conduct research on the incidence and associated risk factors following general anesthesia with endotracheal intubation. The information going to be obtained will help the health professionals to improve the patient experience of anesthesia and reduce postoperative respiratory complaints. 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 is not 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

Birhanu Mengistu [birhanumengistu8@gmail.com](mailto:birhanumengistu8@gmail.com)

Cell phone (+251)-917028614

Patient's card no. -----

**PART I: SOCIODEMOGRAPHIC CHARACTERISTICS**

			Skip pattern	Remark
101	Age	-----		
102	sex	-----		

**PART II. Risk factors for post-operative sore throat**

			Skip pattern	Remark
701	Diagnosis			
702	Size of ETT employed	-----		
703	Number of attempts at laryngoscopy	-----		
704	Duration of anesthesia and surgery.	----- minutes		
705	NG tube used	Yes.....No .....		
706	Airway inserted	Yes..... No.....		
707	Throat pack used	Yes..... No.....		
708	Do you any of the following feeling?	1. Pharyngeal dryness or feeling of thirst 2. Sore throat – continuous throat pain (mild, moderate or severe) 3. Dysphagia (inability to swallow or eat) 4. Pain on swallowing or eating 5. Hoarseness or voice changes	No.....	
709	If you have one or more of the above, after how long post	-----hrs.		

	operatively?		
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Name of data collector-----signature-----date-----

Name of supervisor-----signature-----date-----

**የአዲስአበባዩኒቨርሲቲጤናሳይንስኮሌጅ**

**የአንስቴዥያት/ትቤት**

**የመረጃመቀቢያ**

**ሰላምክቡራትናክቡራን**

**ስሜብርሃኑመንግስቱእባላለሁ።**

እኔበአዲስአበባዩኒቨርሲቲበአንስቴዥያት/ትሳይንስየማስትሬትድግራተማሪሲሆንየመመረቅያፅሁፌን ከቀዶህክምናተከትሎበሚከሰትየጉሮሮአካባቢህመምመጠንናለህመሙምክንያትበሚሆኑነገሮችዙርያ አቀርባለሁ።

ከዚህሁጥናትየሚገኘውመረጃየጤናባለሙያዎችበጥሩሁኔታበሽተኞችንእንድረዱያግዛቸዋልበተጨማሪም ታካሚዎቹለማደንዘዣውየተሻለዕውቀትእንድኖራቸውያደርጋል።

ስለዝህየርስዎትክክለኛየሆነመረጃመስጠትለዚህጥናትመሳካትከፍተኛአስተዋጾአለው።

ከርስዎየሚናገኘውማንኛውምመረጃለምርምርአገልግሎትእንደምወልእየገለጽኩኝበማንኛውምሁኔታ የርስዎየግልመረጃለሌላአገልግሎትእንደማይወልለማሳሰብአወዳለሁ።

ለመቀጠልይፈልጋሉ?አዎ-----

አልፈልግም-----

(ስለዕርዳታዎበቅድሚያላቅያለምስጋናአቀርባለሁ።)

**የአጥኝወስምናአድራሻ**

**ብርሃኑመንግስቱ [birhanumengistu8@gmail.com](mailto:birhanumengistu8@gmail.com)**

**ስልክቁጥር (+251) - 917028614**

		ዝለል	ማስታወሻ
101	ዕድሜ	-----	
102	ፆታ	-----	

የህክምና ካርድ ቁጥር \_\_\_\_\_

ክፍል 1 : - የግል መረጃ

ክፍል 2. ለጉርሮህ መምገም ክንያት ነት የተጠቀሱት ነገሮች

			ዝለል
701	የበሽታው አይነት	_____	
702	የተጠቀሙት የ ETT ቁጥር	-----	
703	ቱቦ በሚከተሉት ሁኔታዎች ላይ ለምሳሌ ለጉርሮህ መምገም ስሜት የሚያስከትሉት	-----	
704	ማደንዘዣ ወና ቀድሞ ህክምና ወይንም ወሰደበት የሚከተሉት	----- (በሰዓት)	
705	NGT ቱቦ ተጠቅመዋል?	አዎ.....አይ.....	
706	Airway ቱቦ ተጠቅመዋል?	አዎ.....አይ.....	
707	Throat pack ቱቦ ተጠቅመዋል	አዎ.....አይ.....	
708	ከቀድሞ ህክምና በኋላ የተሰማው ስሜት አለ?	<ol style="list-style-type: none"> <li>1. የጉርሮህ መድረቅ ወይም የጥምስሜት?</li> <li>2. የማያቋርጥ የጉርሮህ አካባቢ ህመም?</li> <li>3. ሲመገቡ ወይም ሲወጡ አስቸጋሪ ነበር?</li> <li>4. ሲመገቡ ወይም ሲወጡ ህመም ይሰማዎታል?</li> <li>5. ድምጽ ወይንም ላይ የተፈጠረ ልዩነት ነበር?</li> </ol>	አይ.....

709	ለጥያቄቁ.708 መልስዎት አዎከሆነህመመ-የተሰማዎትከስንት	-----ሰዓት/ታትብኋለነዉ?	
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የመረጃስብሳቢዉስም----- ፊርማ ----- ቀን-----

የተቆጣጣሪዉስም----- ፊርማ ----- ቀን-----

**Annex 3. Declaration**

I undersigned declare that this student research paper is my original work and all the materials used for this study have been duly acknowledged.

Name of student:**BIRHANU MENGISTU**(BSc. MSc. In Anesthesia student).

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

This student research paper has been submitted for examination with my approval,

University advisor:**Mr. LEULAYEHU AKALU** (BSc. MSc. In Anesthesia)

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