

Magnitude and Factors Associated with Post Operative Sore Throat among Adult Surgical Patients Undergoing General Anesthesia at a Tertiary Care Institution, Addis Ababa, Ethiopia

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ABSTRACT

Background: Postoperative sore throat is a common postoperative complication of anesthesia. Complaints range from a minor self-limiting throat irritation to debilitating pain, inability to swallow for several days. Many factors can contribute to postoperative sore throat and the incidence has been found to vary with the method of airway management.

Aim: The aim of this study was to determine magnitude and factors associated with post operative sore throat among adult surgical patients who were operated under general anesthesia in a resource-limited setup at a tertiary care institution, Addis Ababa, Ethiopia.

Materials and Methods: Hospital-based, cross-sectional study was conducted from August 1st to September 30th, 2021 in St. Paul's Hospital Millennium Medical Collage among 303 adult patients. Stratified random sampling technique was used to group surgical patients into departments then surgical patients were sampled from each department by using simple random sampling technique. For the study, data was collected using formatted questionnaire. Sore throat and it's severity was assessed and graded once patients were responsive, communicative and cooperative (within 2 hours) then at 6, 12, 24 and 48 hours of post operation. Severity was assessed using Numerical Rating Scale (NRS).

Results: Out of 301 patients who had surgery with general anesthesia and completed 48 hours data collection, post operative sore-throat was found in 48.5% of patients with variable severity. Approximately 71% of them developed Post operative sore-throat with in the first 2 hours of post-surgery. from the multivariate binary logistic regression analysis; Naso-gastric tube insertion, blood-stained tracheal tube on extubation, duration of anesthesia, for two to six hours and for greater than six hours, number of attempts at intubation for two attempts and no laryngoscopy were strongly associated and important predictors of post operative sore-throat as compared to their counter-parts.

Conclusion and Recommendations: Nearly half of surgical patients undergoing general anesthesia had post-operative sore-throat which is considerably high. It is recommended to give attention for patients undergoing long intubation hours (>2 hours), NG tube inserted patients, multiple attempts at intubation and choice of air way equipment during General anesthesia.

Keywords:

Magnitude, Postoperative, Sore throat, Complications, Airway

Introduction

Postoperative Sore Throat (POST) is a common adverse event after general anesthesia. The methods of airway management are an important factor in causation of POST, most often following tracheal intubation. however, POST also occurs when a Laryngeal Mask Airway (LMA) or even a facemask is used [1,2]. Sore throat rank third, next to surgical site pain and nausea, most undesirable postoperative complaint after general anesthesia and remains a source of postoperative morbidity [3]. The average incidence of sore throat with tracheal tube is 45.4%; whereas

during the placement of the laryngeal mask airway is reported to be 5.8% to 34%. It is much less when a face mask is used for the maintenance of anesthesia [4]. The expression of postoperative sore throat constitutes a number of sign and symptoms. For example, sore throat is an ordinary expression of pharyngitis, which by itself can have a number of causes. It may also include a variety of symptoms including pain and discomfort, laryngitis, tracheitis, hoarseness, cough or dysphagia [5]. Postoperatively, it seems reasonable that most of the signs and symptoms are the result of mucosal injury which leads to inflammation caused by the process of airway instrumentation. Also, the postulated etiology is mucosal dehydration or edema, tracheal ischemia secondary to the pressure of Endotracheal Tube (ETT) cuffs,

aggressive oropharyngeal suctioning, and mucosal erosion from friction between delicate tissues and the ETT and trauma from tracheal intubation [6,7]. However, the etiology and the exact anatomical location of POST is still remains uncertain [8]. A number of factors, some avoidable, influence the incidence and extent of postoperative sore throat, but it is unlikely that this problem will ever be completely eliminated [5]. Overall; Instrumentation of the airway is an inherent risk factor for the development POST [9].

It is widely accepted that some complications related delivery of anesthesia care is inevitable. Post-operative sore throat is one of the potential minor complications of anesthesia which may increase patient's morbidity. But it being minor does not mean that it should be ignored since it has obvious consequences on surgical and anesthesia outcomes. It can lead to patient dissatisfaction and discomfort after surgery and can delay a patient's return to normal routine activities [4]. Complaints range from a minor throat irritation to debilitating pain and inability to swallow [6]. These complication leads to patients' ample distress, insomnia, and memory impairment [10]. Post operative sore-throat has several risk factors that include demographic features as well as clinical aspects. Factors contributing to the development of POST includes female sex, duration of anesthesia, presence of a blood-stained tracheal tube on extubation [4,11], prolonged intubation [11], larger size endotracheal tubes [7], guedel airway [8], age below 65 years old [9] and high intra-cuff pressure [12]. This study was conducted by considering the population of study area is different from others and the studies that was done have a limitation on studying severity and timing of POST, cases sampled (elective and emergency), data collection procedures (single time vs follow up) and various factors related to patient, anesthesia and surgery that may contribute to POST were assessed in this study. Thus, the result of this study may serve as a tool development to anesthesia and surgical providers to select or adjust the type of airway devices, techniques or strategies or take action for prevention and intervention of POST that reduce the incidence and severity of POST [13-16]. In addition, it will also be used as an input to the future researchers on similar problems.

Material and Methods

Study area: The study was conducted at Saint Paul Hospital Millennium Medical College which is found in Addis Ababa, capital city of Ethiopia and one of the biggest tertiary hospitals in Addis Ababa. It serves all over the country with regular catchment area of 5 million people. In addition to being a tertiary referral hospital that provides medical, surgical and obstetrical services on an elective and emergency basis. It is the training center for undergraduate and a wide spectrum of postgraduate. It was built by Emperor Haile Selassie I in 1969 with the help of the German Evangelical Church.

Study design and period: Hospital-based cross-sectional study design was employed. The study was carried-out from August 1st to September 30th, 2021.

Inclusion and exclusion criteria: American society of Anesthesiologist physical status I-III (both elective and emergency), adult patients ≥ 18 years who were operated under general anesthesia with ETT, LMA, Double-Lumen Tube (DLT) or face mask were included in the study population. Patients

who had pre-operative sore throat complaint, patients whose surgery was performed around or in the airway (nose, throat, trachea, esophagus or mouth area), obstetric patients, unable to communicate, patients who were not extubated after the procedure were excluded from the study.

Sample size determination: The sample size was determined by using single population proportion formula; $n = (Z \alpha/2)^2 \times p \times q / d^2$. for population with margin of error 5%, confidence interval 95% and proportion 45.6% (From previous study) [8]. So, $n = (1.96)^2 \times (0.456) \times 0.544 / 0.052 = 382$. After correction formula, $n = 275$ plus 10% probability of non-respondent rate. Therefore, a total sample size of 303 surgical patients was planned to participate in this study.

Sampling technique: Stratified random sampling technique were employed to group surgical study populations into stratum. The stratum is each surgical departments/units i.e., General Surgery, Urologic, Chest, Neurologic, Gynecologic, Orthopedic and Plastic Surgeries. Then surgical patients were sampled from each department by using simple random sampling technique until required sample size is achieved during the study period. The situational analysis from log books and quality assurance office of SPHMMC showed that 979 (N) patient who fulfilled inclusion criteria were expected to be operated in Saint Paul Hospital Millennium Medical College during the study periods.

Data collection tools and data quality assurance: Data were collected using an interviewer administered written questionnaire. The questionnaire was prepared with the combination of English and Amharic languages. The questionnaire includes socio-demographic data, data related to current anesthesia and surgery and post operative sore-throat complaints, it is severity and related symptoms were assessed. Data collection was carried out by three trained staff nurses, those who are not involving in the management of study participants. Data collectors were trained and oriented for a day on the data collection instrument, its administration, objectives and rights of study participants by principal Investigator. Regular daily supervision of the data collectors and cross checking for completeness and accuracy of data was made also by the principal investigator. Data collection process required two months. To assure the reliability and validity of data, questionnaire was pretested on 5% of sample size (16 patients) before actual data collection.

Data collection procedure

In the operating room

- Patient assessments was started upon arriving in the Operating Room (OR).
- The study was explained to patients and written consent was obtained from eligible participants after explanation.
- At the beginning of the study, all consultant anesthesiologists, anesthesiology residents, anesthetists were informed and familiarized with the scope of the study; their cooperation were sought seek as.
- Data related to current anesthesia and surgery were collected.

In the PACU

- Assessments for post-operative sore throat was started while the patient was ready to discharge from Post-

Anesthesia Care Unit (PACU) after confirming that the patients are responsive, communicative and cooperative (when RASS=0) at least within 2 hours of post operation.

- Patients were asked whether their throats “feel normal” and if not, the patients were asked to describe the pharyngeal discomfort in their own words.
- Then the data collector was confirmed whether the patient feels these symptoms: scratchy throat, dryness of the throat, continuous throat pain, throat pain while talking or with swallowing. The assessment for post-operative sore throat is a yes or no response.
- The first complaint of sore throat by the patient was used in the calculation of magnitude of sore throat.
- Severity of sore throat was assessed by using Numerical Rating Scale (NRS).
- When the patient was transferred to the wards, the data collector was followed-up at 6, 12, 24, 48 hours. When the patient was discharged to home before 48-hour, data was collected with telephone interviews.

Operational definition

- Postoperative sore throat=When the patients report pain, discomfort, dryness, scratching of throat with or without talking or swallowing within 48 hours after operation.
- No sore throat=When the patients report Numerical Rating Scale (NRS) zero or symptoms of sore throat beyond 48 hours after operation.
- Mild sore throat= Patients scoring 1-3 on Numerical Rating Scale (NRS)

- Moderate sore throat=Patients scoring 4-7 on NRS
- Severe sore throat= Patients scoring 8-10 on NRS

Data entry and analysis

After completion of data collection, each data was checked manually for completeness and was edited, coded, entered and analyzed by using IBM SPSS version 26 computer program. Bivariate and multivariate binary logistic regression was performed to identify associated factors of POST. It was interpreted using Odds Ratio (OR), P-value and 95% Confidence Interval (CI). On bivariate binary logistic regression analysis, a P-value of ≤ 0.2 was used as a candidate for multivariable logistic regression analysis. P-Value ≤ 0.05 was used as a cutoff point to test for statistically significant.

Results

Socio-demographic characteristics of study patients

A total of 303 eligible participants were sampled and 2 patients were excluded from analysis due to incomplete data (the patient were discharged before complete data collection and their phones were not working). Thus, Complete responses were obtained from a total of 301 respondents yielding a response rate of 99.3%.

The mean age of patients participated was 41.2 years with standard deviation of 16.0 with the minimum and maximum ages of 18 and 82 years respectively. There were 133 males and 168 females; female participants were slightly over represented with males to females ratio of (1:1.3). In terms of their Body Mass Index (BMI), 192 (63.8%) had normal BMI whereas 55 (18.3%) were either overweight or obese and 54 (17.9%) were underweight.

Table 1: Shows socio-demographic characteristics of patients who underwent surgery under general anesthesia at SPHMMC, Addis Ababa, Ethiopia from August 1st- September 30th, 2021 (n=301).

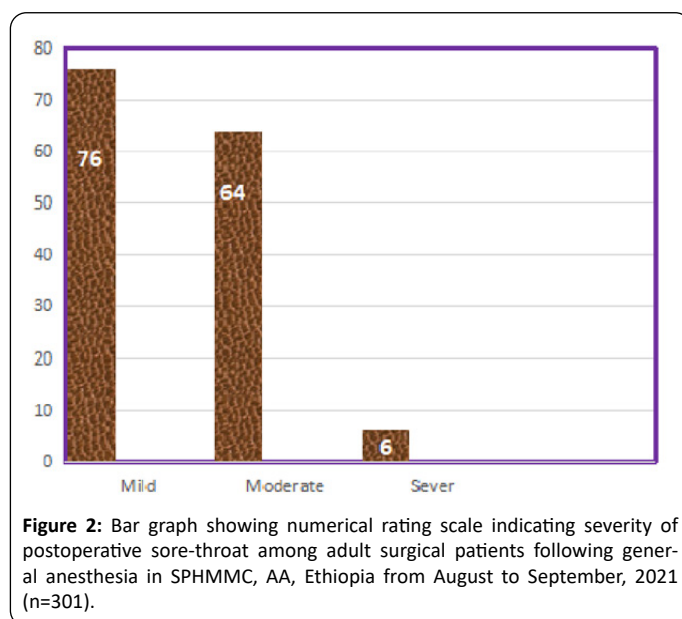
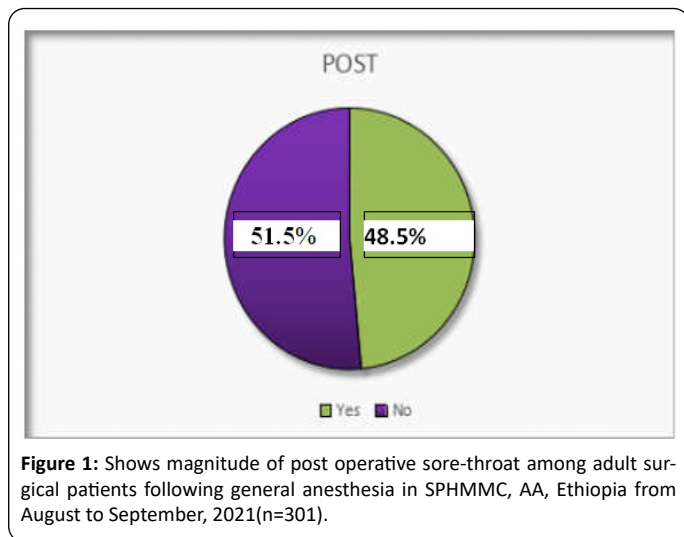
Variables	Group Categories	Frequency (n), Percentage (%)	
Age	18-29	88 (29.2%)	Mean age=41.2 SD=16.0
	30-39	67 (22.3%)	
	40-49	54 (17.9%)	
	50-59	52 (17.3%)	
	60-69	20 (6.6%)	
	≥70	20 (6.6%)	
	Total	301 (100%)	
Sex	Male	133 (44.2%)	
	Female	168 (55.8%)	
	Total	301 (100%)	
BMI (Kg/m ²)	<18.5	54 (17.9%)	
	18.5-24.9	192 (63.8%)	
	25-29.9	41 (13.6%)	
	30-39.9	12 (4.0%)	
	>40	2 (0.7%)	
	Total	301 (100%)	

Magnitude of post-operative Sore throat

In this study, nearly half of all surgical patients undergoing general anesthesia suffered from post operative sore-throat (48.5%) (Figure 1). Of these, 76 (52%), 64 (44%) and 6 (4%) of patients

had mild, moderate, and sever POST respectively as patients indicated on numerical scale (Figure 2). Regarding the timing of post operative sore-throat, the greatest report was with in the first two hours of post-surgery constituting approximately 71%

of study patients; whereas 20.6%, 5.5% and 2.7% of patients complained of post-operative sore-throat within 2-6, 6-12 and 12-24 post operative hours respectively.



Factors associated with Post operative sore-throat

Result of multivariable analysis

Multivariable binary logistic Regression was done by including candidate variables from bivariate analysis (i.e., p value ≤ 0.2) in order to avoid excessive numbers of variables and unstable estimates in the model.

The model showed that naso-gastric tube inserted patients were more than four times more likely to develop POST than patients who don't have Naso-gastric tube (AOR=4.19, 95% CI; 1.52, 11.52, P=0.006). Similarly, patients having blood on the tip of ETT during extubation had more likely to have POST, there was a four times increased risk (AOR=4.06, 95% CI; 1.80, 9.16, p=0.001). The multi variable analysis result revealed that patients without chronic medical illness had strong association

with POST. patients without Known chronic medical illness had almost five times more prone to develop POST (AOR=5.12,95% CI; 1.68,16.04. 10, p=0.04) than those with known chronic medical illness Regardless of the illness. As the number of attempts increases from single attempt to two attempts the odds of POST increased by 12.2 folds (AOR=12.2 95% CI; 1.42, 104.81, P=0.02). As the attempts increased from single to three or more the risk of POST increased by more than 3.6 times (AOR=3.64, 95% CI; 0.36, 33.43, p=0.23) but it is not statistically significant. Total duration of Anesthesia is also another factor that appeared significantly associated with POST. Duration from two to six hours, 7.36 times (AOR=7.36, 95% CI; 2.00, 27.0, P=0.003) and durations greater than six hours five times (AOR=5.04 ,95% CI; 1.74, 14.63, P=0.003) higher odds of developing POST as compared to duration less than two hours.

Table 2: Multivariable binary logistic regression-showing factors associated with post operative sore-throat among adult surgical patients following general anesthesia in SPHMMC, AA, Ethiopia.

Explanatory variables	Categories	AOR with 95% CI	P-value
History of Known chronic medical illness	Yes	Ref	Ref
	No	5.12 (1.68, 16.04)	0.04
type of pre-medication used	Benzodiazepines	Ref	Ref
	IV Lidocaine	0.088 (0.004, 1.76)	0.11
	IV Steroid	0.05 (0.002, 1.65)	0.09
	Others	0.05 (0.002, 1.28)	0.07
Cormack-Lehane grade	1	Ref	Ref
	2	0.128 (0.027, 0.60)	0.18
	3	2.24 (0.45, 11.06)	0.12
	No laryngoscopy	0.35 (0.15,0.77)	0.01
No of attempts at intubation	Single	Ref	Ref
	Twice	12.2 (1.42,104.8)	0.02
	≥three times	3.64 (0.39,33.43)	0.25
Use of a Guedel airway	Yes	0.46 (0.17, 1.23)	0.14
	No	Ref	Ref
Suctioning	During extubation only	0.50 (0.19, 1.27)	0.15

	During induction and extubation	1.2 (0.11, 12.97)	0.87
	Not done at all	Ref	Ref
Blood in the ETT during Extubation	Yes	4.06 (1.80, 9.16)	0.001
	No	Ref	Ref
Muscle relaxants used for induction	Suxamethonium	0.65 (0.30, 1.42)	0.28
	Vecuronium	12.38 (0.39, 390)	0.15
	No muscle relaxant	Ref	Ref
Total duration of Anesthesia (hrs.)	<2	Ref	Ref
	02-Jun	7.36 (2.00, 27.0)	0.003
	>6	5.04 (1.74,14.63)	0.003
Nasogastric tube use	Yes	4.19 (1.52,11.52)	0.006
	No	Ref	Ref

Ref: Reference (baseline) Category; CI: Confidence Interval; AOR: Adjusted Odds Ratio

Discussion

Magnitude of post-operative sore-throat

During two months of study period, a total of 301 patients from seven different surgical departments/units were included in the final analysis. The overall magnitude of postoperative sore throat was 48.5%. This result was in line with a study conducted in Madagascar among 158 Malagasy patients over a period of eight months which showed that 47.5% had Postoperative sore throat [17,18] and with a study that was conducted in Nigeria which involved 200 study participants in which 49% of them developed Postoperative sore throat [19]. The magnitude of this finding was lower as compared to studies conducted in United Kingdom, 63.9% [15] and in Korea, 57.5% [16]. likewise, a study from Jimma and Gondar university Teaching Hospitals showed that the magnitude of POST was 56.6% [11] and 59.6% [5] respectively.

Possible causes of these variations between our study results to those of previous studies were, first: our study was included patients who were managed with less invasive airway management equipment like face mask and Laryngeal Mask Airway (LMA). Second: due to differences in operational definition criteria used to define post operative sore-throat; some of the older studies included post operative hoarseness of voice and coughing as part of post operative sore-throat. Third: differences in the overall characteristics of the study area, study participants and sample size. All of these reasons could result lower magnitude of POST in this study [20-31].

This study also tried to assess both severity and timing of POST. The intensity of POST symptoms was graded by numerical rating scale. Mild and moderate POST had the highest occurrences constituting 54% and 44 % of all POST cases respectively as they indicated on numerical scale. It was measured after extubation within 2 hours, 2-6, 6-12, 12-24 and 24-48 hours postoperatively. Majority of them (71.2 %) developed POST within the first two hours of post operation particularly while there were in the PACU. Other few studies assessed severity and timing of POST but with wide variation with the current study [11,18,32]. This gap could be due to data collection timing differences (single point of time vs follow up) and different sore-throat assessment scales.

Factors associated to post operative sore-throat:

Stepwise logistic regression analysis showed a significant association between post-operative sore throat and the following variables: the presence of known chronic medical illnesses, Cormack-Lehane grade, number of attempts at intubation, blood in the ETT during extubation, total duration of anesthesia and NG-tube use.

Naso-gastric tube insertion was associated with an increase likelihood of exhibiting POST (AOR=4.19). This finding was similar to studies conducted in United Kingdom [10], Gondar university Teaching Hospital [5] and other studies [15]. This could be due to mechanical irritation of nasopharynx which result trauma during insertion. This study also found a positive statistically significant association between a blood-stained tracheal tube on extubation and POST (AOR=4.06). This finding was supported by the studies conducted in Jimma university teaching Hospital [11] and Madagascar [18]; which reported a significant relationship between POST and blood stained ETT.

A number of studies have been conducted to determine associations between POST and sociodemographic factors. But the relation is contradictory; including age (Compared to younger patients, older patients had more POST [4,24]. In contrast other studies showed greater incidence in younger patients as compared to older counterparts [9,14]; sex (higher in female than males [4,5,9,10,33-35]. Unlike the mentioned researches, this study showed no significant association between POST and three socio-demographic factors (age, sex and BMI). One study also revealed that there were no significant differences in POST between genders [36]. This could be justified by difference in pain (throat) perception complaints other than actual pathophysiological differences between genders.

Limitation

Manometer Tracheal cuff pressures measurement was not done in this study due to lack of manometer. high cuff pressures were considered to be a contributing factor to the occurrence of post operative sore throat by causing tracheal mucosa ischemia.

Conclusion

In summary, this study showed the magnitude of POST was considerably high 48.5% with variable severity predominantly

in mild and moderate ranges. More than two-third of POST patients developed with in the first 2 hours of post-operatively. It can be also reasonably concluded that blood-stained tracheal tube on extubation, duration of anesthesia (two to six hours and greater than six hours), number of attempts at intubation (twice attempts) and no laryngoscopy as compared with their counterparts were strongly associated with POST. Based on the findings of this study; nearly half of surgical patients had post-operative sore throat. The extent is considerably high that needs attention of surgery and anesthesia providers while taking care of surgical patients undergoing general anesthesia. In addition, this study also showed most of the factors associated with Post operative sore-throat were modifiable.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Ethical Approval

Ethical clearance was obtained from the research directorate of Saint Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia institutional review board (SPHMMC-IRB) before the start of the study.

Consent

Written consent has been obtained from the patient.

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