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Predictors of postoperative sore throat among surgical patients at Ethiopian teaching hospitals

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Post-operative sore throat significantly impact patients' satisfaction during post-operative period. Many factors can contribute to postoperative sore throat and the incidence varies with the method of airway management. To determine the predictors and incidence of postoperative sore throat. In this facility based cross sectional study, 245 elective gynecologic and general surgical patients who had had surgery at Jimma University Teaching Hospital between February 01 and April 30, 2015 were interviewed during postoperative period between 6 and 24 h using a structured questionair. After outliers and missing value checked the data manually entered into SPSS Version 20 IBM. In addition to descriptive analysis odds ratio with 95% confidence interval was used in bivariate and multivariate logistic regression analysis to determine the effect of predictors on the postoperative sore thoat and hoarsness of voices. A total of 245 surgical patients was interviewed with a complete response rate of 228(93.1%). Their age ranges from 18 to 87years, with a majority between 31 and 40 years. From a total respondent 120 (52.6%) were females, 171(75%) American Society of Anesthesiologist class-I, 137(60.1%) cannot read and write, and 108 (47.4%) were farmer. Majority 47(20.6%) of surgery was orthopedics surgery; followed by 25(11%) breast surgery, 23(10.1%) hysterectomy and others. One hundred twenty nine (56.6%) participants had suffered postoperative sore throat and 68 of them had had hoarseness of voices. The sore throat was found to be more common with certain patient, anesthetic and surgical related factors; difficulty level of intubation, duration of ETT in trachea, being not premedicated with opioid, unexperienced anesthetists, other than ketamine anesthetic induction agent, bleeding on tip of laryngoscope/ETT, perioperative hypotension and higher estimated blood loss during surgery. Significant incidence of postoperative sore throat and hoarseness of voice were seen during study period in the study area. Awareness creation on the predisposing factors and appropriate care especially during endotracheal intubation would help in reducing or avoiding the incidence of postoperative sore throat.

Key words: Endotracheal intubation, elective surgery, postoperative complications, sore throat.

INTRODUCTION

Postoperative sore throat (POST) is one among the most common anesthesia complications during postoperative

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period. It impacts the wellbeing of patient after surgical procedures under general anesthesia. Anesthesia complication is the patient's physiologic derangement or any unwanted effect related to anesthesia management (McHardy and Chung, 1999). Safe anesthesia is multidimensional anesthetic service provision which satisfy the demand of patient care and minimizing associated complication. The important aim of good anesthetic care is to achieve a secure airway and ventilate the lung in proper physiologic manner. This can be done in a number of ways, depending on the patient characteristics and nature of the surgery intended to be performed. Safe and secure airway is achieved by endotracheal (ETT) and laryngeal mask airway (LMA), which is majorly performed by anesthetist and or anesthesiologist. The ETT is made of polyvinylchloride (PVC) and has a cuff at the distal end which is inflated after correctly placed in trachea. When intubating with the Macintosh laryngoscope, the tip of the laryngoscope has to be placed in the vallecula and lifted, which stretches these structures that may traumatize (Cirilla et al., 2015; Najafi et al., 2014).

Although POST is minor problem, it has been documented that controlling POST is difficult and imposes significant impact on patient's comfort during postoperative period (Kalil et al., 2014). Wide range of POST has been documented with the incidence range from 24 to 90% and may be more in some situations (Cirilla et al., 2015; Burgard et al., 1996; Mandoe et al., 1992). This is due to multifactorial impact contributes in the occurrence and severity of POST as indicated by scholars (Cirilla et al., 2015). For instance types of airways used, technique of insertion/experience level of intubating person, duration of surgical procedure, anesthetics type, cuff pressure, method of airway management and multitude of patient feature (Mandoe et al., 1992; Soediono, 1989).

Many researchers found highest incidence (14.4 to 50%) after tracheal intubation; while after laryngeal mask airway it has been reported (5.8 to 34%) and it is much less when a face mask is used for the maintenance of anesthesia (McHardy and Chung, 1999; Burgard et al., 1996). Different investigators have shown that the incidence is higher in female population because of the tight fit of the airway mucosa with airway equipment (McHardy and Chung, 1999; Cirilla et al., 2015; Jaensson et al., 2014; Ahmed et al., 2007), while some still did not find any difference among sex (Edomwonyi et al., 2006). It has been revealed that the experience of anesthetist and duration of intubation significantly affect its incidences (Cirilla et al., 2015). Another study identified that there is no difference on the rate of occurrence among gender and lubrication of ETT (Edomwonyi et al., 2006). Furthermore, method of interview affects the reporting of a sore throat, that is, whether the questions are asked directly or indirectly. Thang'a et al. (2013) showed that diclofenac premedication will not prevent the occurrence of sore throat. But another study done by Shresta et al. (2010) in Nepal and Teymourian et al. (2015) in Iran showed that preoperative ketamine gargling and magnesium medication significantly reduces the incidences POST. Again it has been documented by many scholars that dexamethasone showed the promises in reducing the incidence of postoperative sore throat occurrence and severety (Zhao et al., 2014; Haider and Al-ali, 2013).

Since a long time many studies have been performed to determine the incidence of postoperative sore throat and to find measures for its prevention. Most of these studies have been conducted in the developed; western countries. However, it has been documented by many researchers that there are racial differences in the occurrence of some medical events (McHardy and Chung, 1999; Ahmed et al., 2007). And limited studies have been done on predictors of postoperative sore throat in developing countries where resources and qualified man powers are limited.

Therefore this study was conducted as a preliminary step to determine the magnitude of postoperative sore throat in Jimma university teaching hospital, analyze the factors contributed in its occurrence and see if it is comparable to studies done in other parts of the world. This would in turn help us to identify the preventable causes and formulate strategies for prevention of this common postoperative complication by creating awareness.

MATERIALS AND METHODS

Study area and setting

This study conducted at Jimma University Teaching Hospital (JUTH), located 346 km away from Addis Ababa to South West of Ethiopia, from April 01 to June 30, 2015. The hospital provides a range of health care services including major surgical treatments. On average about eight major elective operations performed per day. Orthopedic surgery, hysterectomy, thyroidectomy, mastectomy, colostomy, herniorrhaphy, hemorrhoidectomy, laparotomy, prostatectomy and etc. were among the commonly performed elective surgical procedures.

As an existing hospital practices informed consent was taken a day before surgery at ward where pre-anesthetic evaluation made to verify whether the scheduled patient is fit or not for surgery and anesthesia. After pre-oxygenation with 100% O_2 for 3 min, induction was given with either of (2 mg/kg ketamine, 5 mg/kg thiopental or 2 to 2.5 mg/kg propofol) and 2 mg/kg suxamethonium for intubation. Number 3 or 4 Macintosh laryngoscope blade was used. A 6.5 and 7.0 mm internal diameter cuffed polyvinyl chloride (PVC) endotracheal tube was used for the female patients, and 7.5 and 8.5 mm tube was used for the male patients. After intubation patient's lungs were manually ventilated. All patient received 100% oxygen and 1.5 to 2% halothane for maintenance throughout the surgery, and some patients get administered pethidine/tramadol intraoperatively. At the end of surgery the airway devices were removed when patients able to open their eyes to command (awake) and some of them at deep level of anesthesia. Finally the patient taken to the post anesthesia care unit (PACU) from they were shifted to the ward after adequate recovery (mostly 30 min

to 1 h later).

Study design

The study design is facility based cross-sectional study.

Sample size

Using a single population proportion formula; a maximum estimated proportion of sore throat occurrence = 50%; since there is no previous study done on this topic in this study area; with 95% CI, 5% margin of error. We found n=384

We have 3 major operation theatre which serves for both emergency and elective surgery. The number of patients gets operated per day as an elective, range from 6 to 12, on average 8 patients per day or less. So, the total of patients operated over three months of working days estimated 528 or less. Thus, the population is estimated to be < 10,000; using correction formula n=223 and with the consideration 10% of non-respondent and incomplete data collection n=246.

Sampling technique

For the above reason we use non-randomized convenient sampling technique; thus all patients who underwent elective surgery during study period and satisfy inclusion criteria was included until 246 patient's data were obtained.

Inclusion and exclusion criteria

All patients aged 18 year or above who has been diagnosed and underwent elective surgical or gynecological procedure during the study period was included. Patients who have pre-operative sore throat complaint, seriously ill (ASA class III or more), surgery done on the airway, unable to communicate or emergency surgery will be excluded.

Data collection and measurement

Data collectors reviewed patient's card and interviewed the patient for the presence of sore throat, hoarseness of voices and other information to be filled on a pre-designed data sheet prepared by principal investigator, developed based on previous published paper. The interview was done between 12 and 24 h post operatively; after the patient fully recovered from anesthesia and feels comfortable to be interviewed. In patients with sore throat, the responsible doctor was asked whether treatment is necessary. And the age, sex, weight, American Society of Anesthesiologists' (ASA) physical status of the patients, time of intubation and extubation, type of surgical procedure, premedication given, perioperative analgesics (opioids) given, degree of postoperative pain, tube size/type/depth, level of extubation (awake/deep), laryngoscope view grade, number of intubation attempt, presence of cough during intubation and/ extubation, presence of blood on laryngoscope/ endotracheal tube (ETT) and estimated blood loss during surgery were also recorded on prepared formats.

Data entry and analysis

Each questionnaire and predesigned sheet was checked for completeness and coded. Data was manually entered into SPSS Version 20 IBM. Data cleaning was executed by using frequencies and cross tabulations to check accuracy, outliers, consistencies, and missing values. Accordingly, the incorrect entries were identified and re-entered. Descriptive analysis like percentage, mean, standard deviations were computed to describe the study population in respect of socio-demographic and other relevant variables.

Odds ratio (OR) with 95% confidence interval (95% CI) was used in bivariate and multivariate logistic regression analysis to determine the effect of various factors on the outcome variable. In logistic regression analysis, each explanatory variable with outcome variable was assessed for its association and those variables whose p-value < 0.05 were taken as candidate variables for multiple logistic regressions for further analysis of its predictive power of sore throat. Variables with P-value less than 0.05 were reported with 95% CI.

Ethical clearance

A study was conducted after ethical approval letter obtained from the Jimma university ethical review committee and official permission confirmed from hospital administration. An informed consent was taken from all study participants after their volunteer participation asked. Confidentiality of the information was assured and privacy of the study population was respected and kept secret as well. Those patients who had had pain and or sore throat were reported to the concerned physician for treatment.

RESULTS

Pre-anesthetic characteristics of participants

A total of 245 patients were enrolled in to study with a response rate of 228(93.1%). The study subjects' age ranges from 18 to 87years, with a majority 113 (49.6%) between the ages of 31 and 50 years. Out of total respondents, 120 (52.6%) were females, 171(75%) ASA class I, 122(53.5%) Oromo ethnics, 146(64%) Muslim, 129 (56.6%) married, 137(60.1%) cannot read and write, and 108 (47.4%) were farmer. Three fourth (75%) of participant classified as ASA I and 25% in ASA II.

About 99(43.4%) participants had information on surgeries and anesthesia complications. Eighty three (36.4%) patients had an experience of previous hospitalization. Seventy two (31.6%) patients had undergone previous surgery under local/regional anesthesia 21 (29.2%) and general anesthesia 51(70.8%), of which 49 experienced postoperative complications; 5 dry mouth, 9 head ache, 12 sore throat, 15 nausea and vomiting, and 8 combination of it. Regarding time of aforementioned surgeries, from a total of 72 patients who had experience of previous operation, 53 (73.6%) had operation within last three years and the rest before five years. Majority 64(88.9%) had only once previous operation while 8(11.1%) two times (Table 1).

Orthopedics surgery was the most frequently, 47(20.6%), performed procedure and followed by 25(11%) breast surgery, 23(10.1%) hysterectomy, 23(10.1%) herniorrhaphy, 20(8.8%) prostatectomy, 20(8.8%) tissue excision, 17(7.5%) laparotomy, 13(5.7%) uretroplasty and 12(5.3%) thyrodectomy; respectively

Table 1. Pre-anaesthetic characteristics of study participants of Jima University Teaching Hospital, 2015.

Variable	Character	N	Percentage
Sex	Female	120	52.6
	Male	108	47.4
Age in year	18 - 30	39	17.1
	31 - 40	61	26.8
	41 - 50	52	22.8
	51 - 65	56	24.6
	> 65	20	8.8
ASA classification	ASA I	171	75
	ASA II	57	25
Educational status	Cannot read and write	137	60.1
	Can read and write	91	39.9
Previous history	Had information about anaesthesia	99	43.4
	Had had surgery	72	31.6
	Had experienced postoperative complication	49	21.5
Ethnic group	Oromo	122	53.5
	Amhara	43	18.9
	Others♦	63	27.6

Others =, kullo, kafa, yem, tigre etc.

(Figure 1).

Incidence of postoperative sore throat (POST) and others complaints

From a total of 228, 129 (56.6%) participant had suffered postoperative sore throat (POST) and 68 (29.8%) of them develops hoarseness of voices. The sore throat complaint was severe in 27(11.8), moderate in 43(18.9) and mild in 59(25.9) patients as they indicated on numerical scale. Majority of them noticed that the suffering started immediately while they were in PACU.

About 63(27.6%) patients have three or more complaints of which 54 (23.7%) of them had two coincided complaints. In this study we found nausea and vomiting was the most frequent (68.2%) complaint of many patients and sore throat is the second (56.6%) most reported problems during postoperative period. The other postoperative complaint was; postoperative pain 46.7%, cold and thermal discomfort 44.8%, back pain 38%, dry mouth 22.2%) and others (Figures 2 and 3).

Among participants who complained sore throat, 54.3% were women. Ninety three patients was premedicated with opioids and more proportion of POST complaint was seen in patients who did not pre-medicated with opioids than those who did; 98/135 vs 31/93 or (72.6% vs 33.3%), respectively. One hundred twenty four (54.4%) patients were given intra-operative analgesic medication.

About 51.3%; 117/228 of intubation lasted less than 2 h and four surgeries lasted more than 4 h. Intubation was attempted more than once in 78(34.2%) patients; of which 49 patients complained sore throat. Laryngoscopic view was difficult in 47(20.6%) patients from which 31 patients develops POST (53.1%); patient intubation was done by students and the rest were done by senior who had practiced for 2 years or more. Less POST complaint was observed in patient for whom intubation was done by senior anesthetist.

Ninety one (39.9%) patients coughed while tube is in; and majorly suffers sore throat. One hundred forty three (62.7%) patients were extubated during awake stages. Higher incidence of POST was noticed in these patient groups (39% vs 17.5%). Postoperative pain was controlled in 91(39.9%) participants while 32(14%) patients were suffering severe postoperative pain. In the 121 participant, blood clot was observed on tip of ETT/laryngoscope in 107(46.7%) patients. Estimated blood loss was >15% of their estimated total blood volume in 93 (40.8%) participant. Persistent hypotension for more than three minutes was recorded in 94(41.2%) cases (Table 2).

Contributing factors of postoperative sore throat

The bivariate analysis showed a significant association between post-operative sore throat and the following variables: Being pre-medicated with opioids, post-operative pain, duration of intubation, stage of extubation, presence of cough on ETT, presence of blood on laryngoscope tip/ ETT, anesthetist's experience, hypotension (HPT) lasting >3 min and perioperative estimated blood loss. The association was not detected when those variables entered into final model multiple

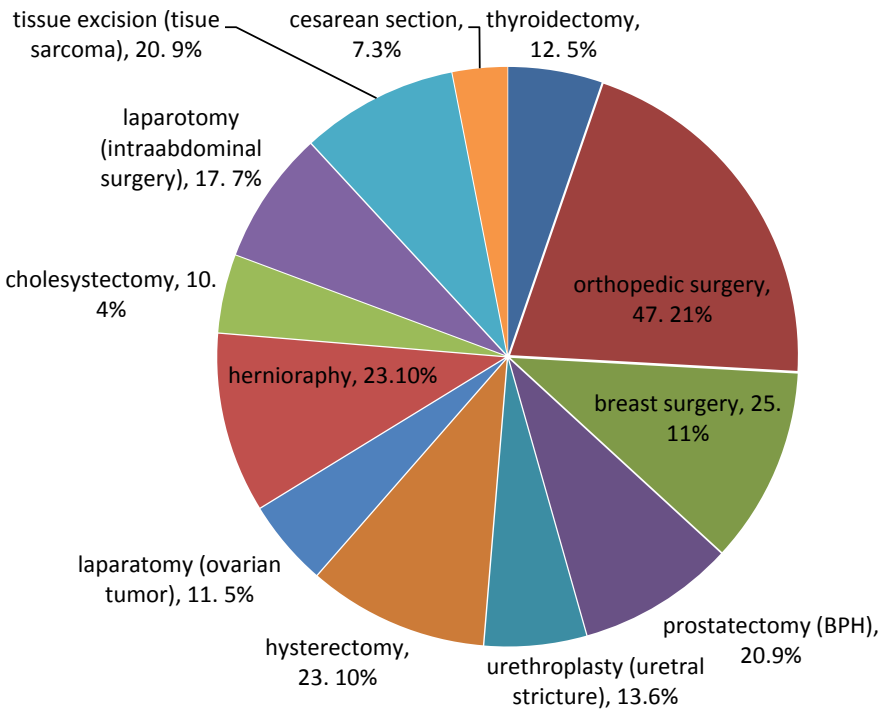

Figure 1. Percentsge distribution of surgical procedures performed during study period at Jima University Teaching Hospital, 2015.

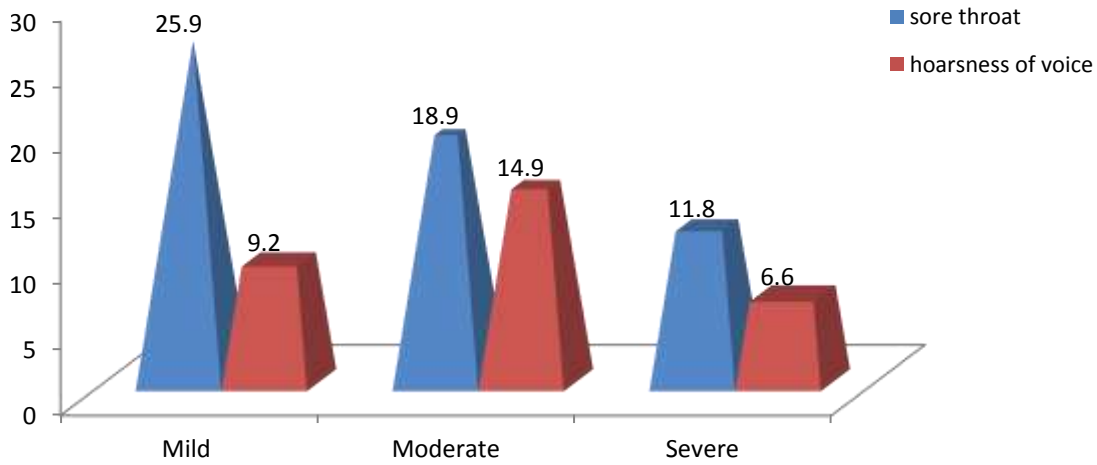

Figure 2. Percentage distribution of severity of sore thraot and hoarsness of voices after elective surgery at Jima University Teaching Hospital, 2015.

logistic regression for postoperative sore throat status, stage of extubation, presence of cough, hypotension (HPT) lasting >3 min and perioperative estimated blood loss. However, no significant associations were observed between post-operative sore throat and sex, ASA physical status, intraoperative analgesic medication, induction agent type. Multivariable linear regression was performed to determine the best linear combinations of opioid premedication, duration of intubation, presence of blood on ETT/ laryngoscope tip and anesthetists experience for predicting postoperative sore throat. (Table 3)

Being premeditated with opioid and intubation with senior anesthesia has a preventive association with postoperative sore throat. That means those patients who had been premedicated with opioid had less sore throat

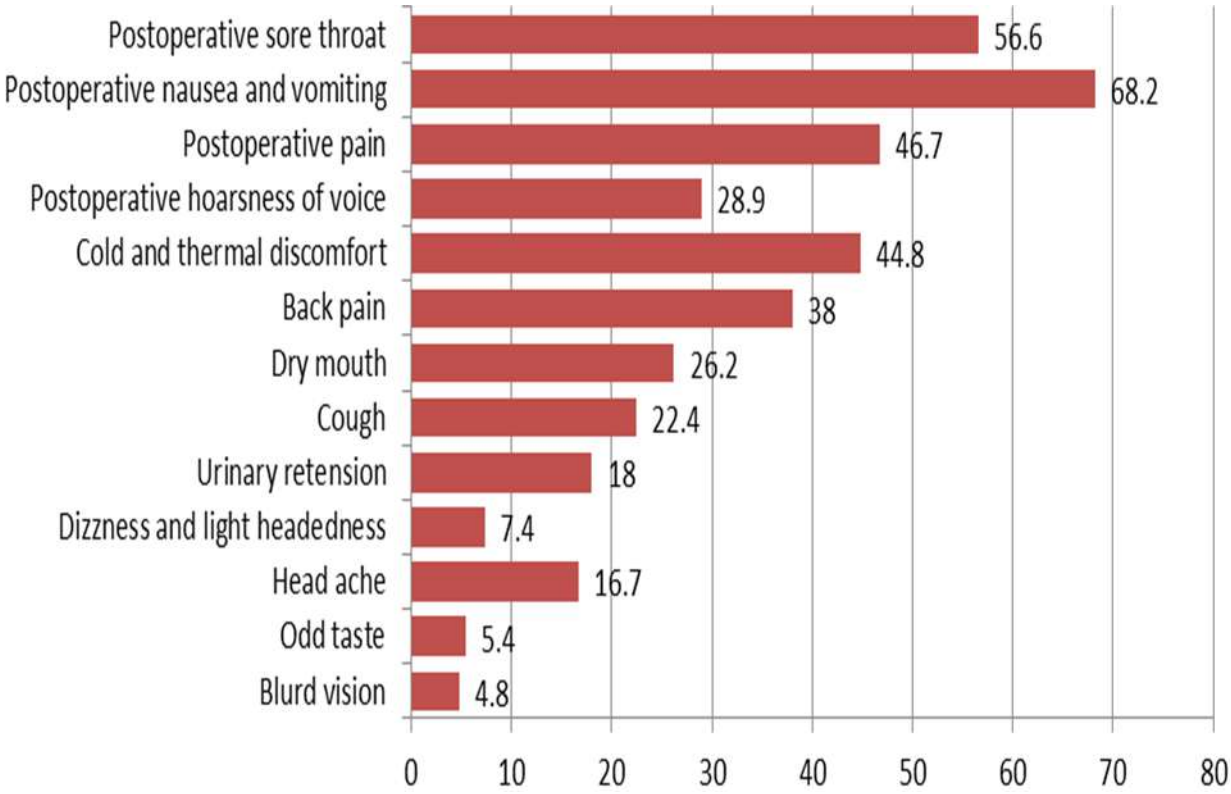

Figure 3. Percentage distribution of postoperative complications after elective surgery during study period at Jima University Teaching Hospital, 2015.

by 0.17 time (B = 0.170, 95% CI (0.057 - 0.505) in comparison to those who did not. Similarly in those intubation performed by a senior anaesthetist, had 0.25 time less likelihood of having postoperative sore throat (B=0.254, 95% CI (0.112 - 0.575) when compared with those intubated by junior.

The duration of intubation time positively associated with postoperative sore throat, that is, patients who has been lasted as intubated for more than 2 h would have increased the likely hood of developing sore throat on average by 8.5 times (B=8.467, 95% CI (3.395 - 21.121) when compared to those intubation that lasted for less than 2 h.

Patients in whom blood was observed on tip of laryngoscope or endotracheal tube during intubation complain sore throat 3.0 times more (B = 3.005, 95% CI (1.342 - 6.729) than those whose blood was not observed on laryngoscope after laryngoscopy.

DISCUSSION

Sore throat following the use of endotracheal intubation and other airway is a common minor complication (McHardy and Chung, 1999; Cirilla et al., 2015; Hu et al., 2013). But limited studies have been done in developing countries like Ethiopia, a place where anesthesia resources are very limited. The cause of POST is not clearly known, but it is hypothesized as from inflammatory response from an injured mucosal membrane underlying the EET cuff pressure (McHardy and Chung, 1999; Kalil et al., 2014; Edomwonyi et al., 2006) . An existing study results often high variable. As one might expect and know, current practice of airway management method also varied. This variety methods of airway management has varied associated problems; for inistance one study clearly showed that using glide scope vedio laryngoscope for intubation minimizes the incidence of POST compared to macintosh blade laryngoscope (Najafi et al., 2014).

The study participant's age ranges from 18 to 87 years, with a majority (26.8%) between 31 and 40 years, 120 (52.6%) were females, 171(75%) ASA class I, 146(64%) Muslim, 129 (56.6%) married, 137(60.1%) cannot read and write, and 108 (47.4%) were farmer. Two studies were done in Germany to see effect of LMA on sore throat (19) and in Iraq to determine incidence of POST (Ahmed et al., 2007), which has similar socio-demographic characteristics. Multiple surgical specialties were included in this study; 47(20.6%) orthopedics surgery; 25(11%) breast surgery, 23(10.1%) hysterectomy, 23(10.1%) herniorrhaphy, 20(8.8%)

Table 2. Distribution of postoperative sore throat against different variables after elective surgery at Jima University Teaching Hospital, 2015.

Variable	Character	Presence of sore throat		Total n=228(100%)
		No	Yes	
		n (%)	n (%)	
Gender	Female	49(21.4)	70(30.7)	119(52.2)
	Male	50(21.9)	59(25.9)	109(47.8)
Age (years)	18 - 30	15(6.6)	24(10.5)	39(17.1)
	31 - 40	31(13.6)	30(13.2)	61(26.8)
	41 - 50	24(10.5)	28(12.3)	52(22.8)
	51 - 65	22(9.6)	34(14.9)	56(24.6)
	> 65	7(3.1)	13(5.7)	20(8.8)
Physical ASA status	ASA I	75(32.9)	96(42.1)	171(75)
	ASA II	24(10.5)	33(14.5)	57(25)
Premediated with Opioid	No	37(16.2)	98(43)	135(59.2)
	Yes	62(27.2)	31(13.6)	93(40.8)
Types of drugs given as premedication	Nothing	7(3.1)	25(11)	32(14)
	Opioid	8(3.5)	12(5.3)	20(8.8)
	Diazepam	18(7.9)	29(12.7)	47(20.6)
	Atropine	14(6.1)	40(17.5)	54(23.2)
	combination (all)	47(20.6)	23(10.1)	73(32)
Intraoperative analgesic medication given	No	48(21)	76(33.3)	124(54.4)
	Yes	51(22.4)	53(22.8)	104(45.6)
Post-operative pain controlled?	No	42(18.4)	95(41.7)	137(60.1)
	Yes	57(25)	34(14.9)	91(39.9)
Postoperative pain level	Controlled	58(25.4)	33(14.5)	91(39.9)
	Mild	16(7)	42(18.4)	58(25.4)
	Moderate	14(6.1)	33(14.5)	47(20.6)
	Severe	11(4.8)	21(9.2)	32(14)
Induction anesthetic agent used	other agent IVA	41(18)	83(36.4)	124(54.4)
	Ketamine	58(25.4)	46(20.2)	104(45.6)
Laryngoscopic view grade	simple (G=I or II)	83(36.4)	98(43)	181(79.4)
	Difficult (G=III or IV)	16(7)	31(13.6)	47(20.6)
Number of intubation attempted	Once	70(30.7)	80(35.1)	150(65.8)
	> once	29(12.7)	49(21.5)	78(34.2)
ETT size (internal diameter; ID in mm)	6.5	21(9.2)	30(13.2)	51(22.4)
	7	42(18.4)	60(26.3)	102(44.7)
	7.5	17(7.5)	14(6.1)	31(13.6)
	8	18(7.9)	25(11)	43(18.9)
ETT depth (tip of tube placement from angle of mouth; in cm)	20	33(14.5)	52(22.8)	85(37.3)
	21	29(12.7)	40(17.5)	69(30.3)
	22	37(16.2)	37(16.2)	74(32.5)

Table 2. Contd.

Duration of intubation	30 min	1(.4)	2(.9)	3(1.3)
	30 - 60 min	20(8.8)	11(4,8)	31(13.6)
	1- 2 h	61(26.8)	24(10.5)	85(37.3)
	2-3 h	16(7)	71(31.1)	87(38.2)
	3 - 4 h	1(0.4)	17(7.5)	18(7.9)
	> 4 h	0	4(1.8)	4(1.8)
Is duration of ETT > 2 h	No	81(35.5)	36(15.8)	117(51.3)
	Yes	18(7.9)	93(40.8)	111(48.7)
Awake extubation	No	45(19.7)	40(17.5)	85(37.3)
	Yes	54(23.7)	89(39)	143(62.7
Presence of cough	No	83(36.4)	54(23.7)	137(60.1)
	yes (during intubation, extubation, suction)	16(17)	75(32.9)	91(39.9)
Blood were observed on ETT / laryngoscope tips	No	74(32.5)	47(20.6)	121(53.1)
	Yes	25(11)	82(36)	107(46.9)
Qualification of Anesthetists	student /junior	31(13.6)	98(43)	129(66.6)
	senior (> 2 year experience)	68(29.8)	31(13.6)	99(43.4)
BP drops persist for more than 3 min	No	73(32)	61(26.8)	134(58.8)
	yes	26(11.4)	68(29.8)	94(41.2)
Estimated blood loss > 15% of EBVt?	No	68(29.8)	67(29.4)	135(59.2)
	Yes	31(13.6)	62(27.2)	93(40.8)

Source: Own survey data, 2015.

Table 3. Predictors of post-operative sore throat among elective surgical patients at Jima University Teaching Hospital, 2015.

Variable	Character	N	Presence of post-operative sore throat			
			COR(95% of CI)	p-value	AOR(95% of CI)	p-value
Sex	Female	119	1.429	0.056		
	Male	109	0.826(0.489 - 1.396)	0.475		
ASA physical status	ASA I	171	1.28	0.109		
	ASA II	57	1.074 (0.586 - 1.970)	0.817		
Was pre-medicated with opioid?	No	135	2.649	0.000		
	Yes	93	**0.189(0.106 - 0.335)****	**0.000**	**0.170(0.057 - 0.505)****	**0.001**
Was intra-operative analgesic medication given?	No	124	1.583	0.013		
	Yes	104	0.656(0.387 - 1.112)	0.118		
Was post-operative pain controlled?	No	137	2.262	0.000		
	Yes	91	**0.264(0.151 - 0.461)****	**0.000**	2.179(.737 - 6.443)	0.159
Was the Laryngoscopic view difficult? That is (G=III or IV)	No	181	1.181	0.265		
	Yes	47	1.641(0.839 - 3.208)	0.148		

Table 3. Contd.

Was intubation attempted more than once?	No	150	1.143	0.415		
	Yes	78	1.478(0.844 - 2.589)	0.171		
Was duration of intubation lasts >2 h?	No	117	0.444	0.000		
	Yes	111	**11.625(6.133 - 22.034)****	**0.000**	**8.467(3.395 - 21.121)****	**0.000**
Was patient extubated awake?	No	85	.889	0.588		
	Yes	143	**1.854(1.076 - 3.194)***	**0.026**	.601(.256 - 1.410)	0.242
Was patient coughed (during intubation, extubation or suctioning)?	No	137	0.651	0.014		
	Yes	91	**7.205(3.802 - 13.655)****	**0.000**	2.034(.831 -4.979)	0.120
Was blood observed on ETT/laryngoscopes tip?	No	121	0.635	0.015		
	Yes	107	**5.164(2.897 - 9.206)****	**0.000**	**3.005(1.342 - 6.729)****	**0.007**
Was the anesthetists senior (> 2 year experience)?	No	129	3.161	0.000		
	Yes	99	**0.144(0.080 - 0.259)****	**0.000**	**.254(0.112 - 0.575)****	**0.001**
Does hypotension (HPT) last >3 min?	No	134	.836	0.301		
	Yes	94	**3.13(1.778 - 5.510)****	**0.000**	1.808(0.790 - 4.139)	0.161
Does estimated blood loss > 15% TBV?	No	135	.985	0.931		
	Yes	93	**2.03(1.174 - 3.509)***	**0.011**	1.061(0.482 - 2.335)	0.883
Was ketamine used as induction agent?	No	124	2.024	0.001		
	Yes	104	**0.392(0.229 - 0.671)****	0.000	0.452(.203 – 1.004)	0.051

*=P≤0.05; **=P≤0.01; Source: Own survey data, 2015.

prostatectomy, 20(8.8%) tissue excision, 17(7.5%) laparotomy, 13(5.7%) uretroplasty and 12(5.3%) thyroidectomy. Similarly many studies has evaluate the sore throat in different surgical specialties (Ahmed et al., 2007; Edomwonyi et al., 2006; Jaensson et al., 2014). This study showed 56.6% participants have complainedpostoperative sore throat from which 63% of them had hoarseness of voice. In other parts of the world it have been documented that the value varied from 20 to 50% (Ahmed et al., 2007; Edomwonyi et al., 2006), which is a bit lower than this finding. On the other side there is higher and comparable results; 64% have been reported by Mchardy and Chung (1999); and 59% in air filled ETT cuff, Navarro and Baughman (1997). This finding is higher than the result found by Jaensson et al. 40% (Jaensson et al., 2014). In another experts' report it was documented 40% of participants develop POST after extubation (Orandi et al., 2013). Another systematic review paper showed a very wide range with highest 70% and lowest 30% of POST occurrences (Tanaka et al., 2009). This discrepancy might be due to sample sizes and data collection time differences. In addition to this the educational level and understanding level of the question might be different.

Furthermore, sore throat was found to be more common with certain patient related, anesthetic and surgical factors, e.g. gender, difficulty level of intubation, duration of ETT in trachea, being not premedicated with opioid, anesthetists' experience, induction agent, bleeding on tip of laryngoscope /ETT, perioperative hypotension and estimated blood loss during surgery. However, a bigger sample size taken from various surgical specialties and the application of more advanced statistical tests would be required to comment on the true association of sore throat with these factors.

In this study women more frequently complained POST than men, (70/119 vs 59/109), but it was not statistically significant (p=0.475). Similar report were documented by Jeansson et al Orebro University Hospital (Jaensson et al., 2014) and Cirilla et al. (2015), while others still not find any difference (Jaensson, 2013).

Preoperative analgesic medication was given for only 93 (40.8%) patients and we observed less incidence of POST in these patient groups. Being premedicated by opioids decreases the likely hood of postoperative sore throat by 0.17 (B=0.170, 95% CI .057 - 0.505, p=0.001) in

comparison to those who did not premedicated. Several researchers has revealed that premedication would reduce the incidences of POST; Shrestha et al (2010) in Nepal had showed preoperative ketamine gargling decreases POST incidences. Another study revealed that dexamethasone significantly lowers the incidence; 12(20%) vs 5(8.3%) (Haider and Al-ali, 2013); similar result were obtained from other study (Kalil et al., 2014). Again another study conducted, in Iran 2014 (Teymourian et al., 2015), to compare the effect of magnesium and ketamine gargling on POST showed effective reduction of complaint with superiority of magnesium. On the contrary, Tanga'a et al. (2013) found no difference among diclofenac medicated and non-medicate groups. Soltani and Aghadavoudi (2002) studied to verify the effect of dexamethasone on sore throat and found significant difference with higher rate occurrence of POST (64%) in those who did not premedicated with dexamethasone. But we did not find any literature showing a reduction of POST with opioids premedication. This difference might be clients misunderstood the question with the supper imposed effect of postoperative pain from surgical site.

It have been seen that bleeding during intubation or suctioning increases the occurrence of postoperative sore throat (B = 3.005, 95% CI 1.342 - 6.729, p=.007) in comparison to their counterparts. This is because of direct injury to the underlying tissue during laryngoscopy and suctioning with a suction catheter. This concept were explaned by one study conducted at Tabriz, Iran; which were done to compare the effect of LMA and ETT on postoperative complication (Journal, 2010).

Higher incidence of POST was noticed in participants whose intubation lasted 2 h or more duration, 93/111 (83.8%) vs 36/117(30.8%). The likely hood of developing postoperative sore throat in participants whose intubation lasted more than 2 h is increased by 8.5 times (B = 8.467, 95% CI 3.395 - 21.121, p=0.000) when compared to those intubation lasts less than 2 h. It has been documented by many researchers that intubation duration has significant association with postoperative sore throat occurrence (Mokhtar and Choy, 2013; Ahmed et al., 2007; Edomwonyi et al., 2006).

Though this study revealed relatively higher incidence of sore throat among patients with higher laryngoscopic view grade, cough while ETT is in trachea, and estimated blood loss is greater than 15% of estimated blood volume, the association and statistical significance was no found. One researcher revealed that the these factors have association with the occurrence rate of postoperative sore throat (Jaensson, 2013).We did not detect the number of intubation attempt is associated with increased frequency of POST which agreed with findings from Albany Medical Center, Albany (Cirilla II et al., 2015).

One hundred twenty one (53.1%) particicpants were intubated by students and or junior anesthetists who had 2 years or less experience. Less POST complaint was observed in a patient who were intubated by senior anesthetist. Similarly, it was well documented by D.J. Cirilla II et al. (Cirilla et al., 2015), that higher incidence of POST was observed in patients who has been intubated by CRNA than those performed by experienced anesthesiologists, 26.8 Vs 52.3%, respectively.

One hundred forty three (62.7%) patients were extubated during awake stages and higher incidence of POST was noticed in these patient groups (39% vs 17.5%). This might be contributed by moving the tube in and out during coughing, which traumatize the underlying mucosa of larynx.

The estimated perioperative blood loss, in 93 (40.8%) participant, was more than 15% of their estimated total blood volume and persistent hypotension for more than three minutes was recorded in 94(41.2%) cases. More frequent complaint of sore throat was noticed among these patients. This might be contributed when there is hypotension the blood flow to laryngeal mucosa diminished and exacerbated by compression from tube which results in ischemia.

There are a number of limitations during this study. The result will not represent other types of surgical procedure we studied on; and the predictive factors identified in this study may not necessarily be transferable to other institution. Therefore, further studies in the larger population including multiple institution are needed. The some patients were not cooperative to provide full information because of postoperative pain; however, all possible ways of time arrangement was considered in order to cooperate during pain free time for the interview. Another limitation of this study is that the assessment of symptoms of POST and PH were made over a range of time (6 to 24 h post operatively), not at a specific point of time. However, these symptoms usually emerge in the early postoperative period and, therefore, early assessment can help the providers to capture patients at risk. Also we did not used manometer to measure the endotracheal tube cuff pressure which significantly impact the result.

Conclusion

Significant postoperative sore throat complaint was observed during the study period. Little appreciation was given to the postoperative complications in the study area, though it is reported with a surprisingly high frequency. Nevertheless, anesthetic care justifiably has been singled out as a model for patient safety and high-quality outcome. The sore throat was found to be more common with certain patient, anesthetic and surgical related factors; difficulty level of intubation, duration of ETT in trachea, being not premedicated with opioid, anesthetists' experience, type of induction agent, bleeding on tip of laryngoscope/ETT, perioperative hypotension and estimated blood loss during surgery. All

patients should be premedicated with analgesic medications, especially those with predictive factors, which minimizes the incidence of postoperative sore throat and optimize the patient satisfaction. Student should practice on manikin before an actual patient and not allowed for repeated attempt of laryngoscopy in case of difficulty. Laryngoscopy and sanctioning should be performed gently under close supervision of senior anesthetists The results of this study can have additional refine on the pervasive nature of minor perioperative adverse anesthetic events. Proposed measures to address the present situation include modifying the training of anesthesia providers to raise awareness on patient well-being during perioperative period. Minor adverse events need to be regularly discussed during Grand Rounds and with all patients during theirpreoperative anesthetic visit.

Conflicts of interests

The authors have not declared any conflict of interests.

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