

**ADDIS ABABA UNIVERSITY
COLLEGE OF MEDICINE AND HEALTH SCIENCES**



**Prevalence and Associated Factors of Post-operative
Nausea and Vomiting in Elective Surgical Patients
Operated under Anesthesia at Tikur Anbesa Specialized
Teaching Hospital**

**Research Thesis to Be Submitted to Department of Anesthesiology, Addis Ababa
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Prevalence and Associated Factors of Post-Operative Nausea and Vomiting in Elective Surgical Patients Operated under Anesthesia at Tikur Anbesa Specialized Teaching Hospital

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ABSTRACT

Background: Postoperative nausea and vomiting (PONV) is one of the common complications after surgery and anesthesia. The prevalence of postoperative nausea and vomiting may reach 25–30% in ASA 1 and 2 but may reach up to 80% in ASA 3 patients. It affects both adults as well as pediatric age groups. In pediatrics it may reach up to 13-42% which is more common above two years of age and before puberty. Though anesthesia providers use prophylactic anti emetics the incidence is still high. Different risk factors are incriminated for the high prevalence of PONV. It is also major contributing factor for patient discomfort, post-operative morbidity and mortality as well as economic crisis.

Objectives: the objective of this study was to assess the prevalence and identify associated factors of post-operative nausea and vomiting in patients undergone elective surgery under anesthesia in Tikur Anbesa Comprehensive and Specialized Hospital, Addis Ababa, Ethiopia.

Methods: a hospital based cross sectional study was conducted on 154 patients operated in Tikur Anbesa Comprehensive and Specialized Hospital on elective basis under both general and regional anesthesia during the study period from august-October 2020 GC. Data was entered using SPSS version 16 cleaned and analyzed. Association between categorical variable was determined using correlation and logistic regression. Odds ratio were calculated on variables to determine the association through binary and multivariable logistic regression done. P value 0.05 or below was considered as statistically significant.

Results: The prevalence of post-operative nausea and vomiting in this particular study was 44.2% within 24 hrs. post operatively. After multivariable logistic regression, factors that were associated with postoperative nausea and vomiting were history of motion sickness (AOR=0.42, CI [0.19-0.45]), female sex (AOR=2.96, CI [1.34-6.58]), general anesthesia (AOR=0.18, CI [0.074-0.42]), co morbidities (AOR=0.25, CI [0.1-0.6]) and intraoperative hypotension (AOR=0.35, CI [0.14-0.88]).

Conclusion and Recommendations: The prevalence of post-operative nausea and vomiting was high in Tikur Anbesa Specialized Hospital compared to other African countries and the rest of the world. Therefore it is strongly recommended to develop and use hospital based protocol to treat patients at increased risk of developing post-operative nausea and vomiting.

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LIST OF ABBREVIATIONS

AAU	Addis Ababa University
ASA	American Society of Anesthesiologists
AOR	Adjusted odd ratio
BMI	Body Mass Index
CI	Confidence Interval
COR	Crud odd ratio
DC	Data collector
GA	General Anesthesia
GC	Gregorian calendar
MAC	Minimum Alveolar Concentration
OR	Odd ratio
PACU	Post-Anesthesia care unit
PONV	Postoperative Nausea and Vomiting
TASH	Tikur Anbesa Specialized Hospital

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1. INTRODUCTION

1.1. Background

Postoperative nausea and vomiting (PONV) is defined as having at least one episode of nausea, vomiting or both within 24 hours Post-operatively (1). Vomiting can be stated as a reflux or regurgitation of gastric or intestinal contents through the mouth which may or may not contains food or fecal matter while nausea is a disturbing feeling that may or may not be associated with vomiting (2). Persistent PONV will put an impact on the patient economical, psychosocial and health issues(1,2).

The prevalence of postoperative nausea and vomiting may reach 25–30% in American Society of Anesthesiologists (ASA) class 1 and 2 but may reach up to 80% in ASA 3 patients (3). Even though the anesthesia providers use prophylactic anti emetics the incidence is still high (4). Whereas the prevalence of PONV in pediatric age group reaches up to 13-42%. Children above two years of age and before puberty are highly affected (5).

Cocktails of risk factors are incriminated for the persistently high prevalence of PONV. These can be classified as patient, surgical and drug related factors. Age, sex, co-existing diseases, non-smoking, previous history are among patient factors where as some anesthetic medications, analgesics (opioids) and premedication are among drug related factors. In addition some surgical procedures (ENT, Abdominal surgeries) are said to be high risk for PONV (6).

Because most of surgical interventions are for benign conditions, morbidities or complications happening to patients is the major concern for the patients, physicians as well as their relatives (7). PONV is one of the common complications after anesthesia. Although it is often self-resolving, most patients complain it as more uncomfortable than postoperative pain (8). This common anesthetic and procedure related side effect has been reported to be more distressing to patients than postoperative pain(8). In cases of persistent PONV common complications are dehydration, electrolyte imbalance, wound dehiscence, bleeding, esophageal rupture, and aspiration pneumonia (3).

The major goal of health professionals is treating patients without any complications with a smooth postoperative encounter and reducing the economic burden related to treatment of unwarranted complications. Since PONV is one of the major contributing factors for patient discomfort, post-operative morbidity and mortality as well as economic burden due to the unintended longer stay in the hospital and its cost. In order to prevent PONV, it's vital to study the prevalence and associated factors.

1.2.Statement of the Problem

PONV is the most common postoperative complication and the routine cause for delayed discharge from the PACU (9). It is one of the most unpleasant morbidities associated with surgical procedures(9). Because most of surgical interventions are for benign conditions, morbidities or complications happening to patients is the major concern for the patients, physicians as well as their relatives (7). This common anesthetic and procedure related side effect has been reported to be more distressing to patients than postoperative pain (10).

Various factors are attributed to the occurrences of PONV which are further divided in to patient, anesthesia and surgery related risk factors. Patient related factors include; age, sex, history of PONV, non-smoking history and a history of motion sickness (11). If it is left untreated, it may lead to complications like electrolyte derangement, dehydration and shock, wound dehiscence, malnutrition and aspiration pneumonia (2). Those complications contribute for different patient related problems such as, patient dissatisfaction, increase hospital stay and its complications (12).

Though there is an improvement of anesthetic and surgical practices, the incidence is still high ranging 30 to 80% (2,3). The study done at tertiary care hospital in northwestern Tanzania shows that the incidence of postoperative nausea and vomiting was 41.4% (13). A study done in university of Gondar, Ethiopia showed that the prevalence of postoperative nausea and vomiting was 36.2% within 24 hours after operation (14). Its unpleasant feeling makes it as the most disturbing side effect in most post-surgical patients. Most patients label it as its absence is more important than an earlier discharge from an ambulatory surgical unit and pain (15).

1.3.Significance of the study

Because PONV is one of the major problem in post-operative patients, studying on this area will have an indispensable importance for both the patient as well as the health professional. Some of them will be:

- ✓ Since high prevalence of PONV is used as measure to assess quality of anesthesia provided in hospital we can see quality of care being delivered at TASH.
- ✓ It will be a gateway for preparation of protocol for effective prevention of PONV at TASH
- ✓ the study will also be a reference for subsequent researches in the field of anesthesia

2. OBJECTIVES

2.1. General objective

To assess the prevalence and identify associated factors of post-operative nausea and vomiting (PONV) of elective surgical patients operated at Tikur Anbesa Specialized Teaching Hospital

2.2. Specific objectives

- To assess the prevalence of post-operative nausea and vomiting
- To identify associated factors of post-operative nausea and vomiting

3. LITERATURE REVIEW

3.1. Empirical Review

3.1.1 Prevalence of post-operative nausea and vomiting

PONV is the most frequent side effects of anesthesia and surgery. It is estimated that around 0.2% of all patients may experience persistent PONV that may result in life threatening complications (2). Recent interest has focused on the use of a combination of antiemetic acting at different receptors and the practice of a multimodal approach to prevent and treat this problem (16). A prospective study done in Czech Republic, a total of 1,954 patients underwent surgical procedures under general anesthesia in major and gynecological operating rooms at university hospital Olomouc, shows the overall incidence of PONV was 15.5% (15). Prospective interview based survey on incidence of PONV done at university of Oulu Hospital, Finland on 1107 patients aged 4-86 years showed that the incidence of nausea and vomiting was 52% and 25% respectively (17). An institutional based cross sectional study done in Baghdad university hospital showed that the overall prevalence of PONV in pediatrics age is 30%(18). A large scale prospective study done in Japan showed that, the overall incidence of PONV was 40%, 24hrs postoperatively (19).

A prospective study done in North West Tanzania showed that the incidence of postoperative nausea and vomiting was 41.4%. (13). In a study done at university of Gondar, the overall incidence of PONV was 36.2% (14). A study done at Gandhi memorial hospital ,Addis Ababa ,Ethiopia showed the prevalence of PONV in Obstetrics patients undergone elective cesarean section under regional anesthesia was 54%(20) .A study done at TASH,Addis Ababa, Ethiopia showed that the prevalence of PONV in patients undergone elective surgery under general anesthesia was 22%(21).

3.1.2 Risk factors for PONV

Inhalational anesthetics are highly incriminated as the major risk factors even though there are plenty of risk factors (22). The study done in University of Finland shows that, Male and female distribution was comparable with respect to age and preoperative clinical status. But some disparity occurred in patients with risk factors for PONV. Some of these include; history of migraine was more common in females 20% vs. and 4% in males. History of motion sickness, either in childhood only or in adult life as well, was reported by 26% and 13% of female whereas male being 20% and 4%, respectively; the proportion of females with PONV after previous general & regional anesthesia were 50% & 14%, respectively and those of males 25% and 6%, respectively; 30% of males and 18% of females were smokers (17). The result from a study done in Singapore was comparable with those studies mentioned above (23). According to a cross validation study done between two centers Oulu (Finland) and Wurzburg (Germany) for simplified scoring system in order to predict the occurrence of PONV, the four risk factors included in the final simple sum score were female gender, prior history of motion sickness (PONV), nonsmoking, and the use of postoperative opioids (24). Moreover, a study conducted in Wuerzburg teaching hospital (Germany) identified that the main risk factor for PONV was the use of inhalational anesthetics compared with propofol. The OR for isoflurane, enflurane and sevoflurane were 2.4 (1.6±3.7), 2.3 (1.5±3.5) and 2.3 (1.5±3.5), respectively, and were even higher when adjusted for the other factors by multiple logistic regression (i.e. 3.4 (2.2±5.4), 3.1 (2.0±4.9) and 2.8(1.8±4.3)), respectively (25).

A study done in Tanzania which was conducted on 348 patients, PONV occurred in 144 (41.4%) of whom 62(43.1%) had nausea and vomiting, 55 (38.2%) had nausea only whereas 27 (18.8%) had vomiting only. A univariate analysis showed pre-operative factors associated with PONV were age, sex, previous history of PONV, history of motion sickness and smoking status. whereas the intra-operative and postoperative factors associated with PONV were general anesthesia, pethidine use and duration of surgery more than 60 minutes (13). Similarly, a study done in Korlebu teaching hospital, Ghana showed that 77.7% of patients who developed PONV were pre-medicated with opioids (7). A study done in university of Gondar claimed that smokers are more affected than non-smokers (OR of 18.04). The study also showed that patients with

history of PONV were more prone for PONV (14). A study done at Ghandi memorial hospital ,Addis Ababa ,Ethiopia showed the prevalence of PONV in Obstetrics patients undergone elective cesarean section under regional anesthesia was 54% and the main risk factors were intraoperative shivering, uterine exteriorization more than 5 minutes(20).A study done at TASH,Addis Ababa, Ethiopia showed that the prevalence of PONV in patients undergone elective surgery under general anesthesia was 22% and the main risk factors were female sex, opioid use and previous history of PONV(21).

Although Apfel (2002) tried to put a risk scoring system for prediction of PONV, there are other plenty of risk factors identified. They are classified as three categories: patient related factors (female gender from puberty, non-smoking status, previous history of PONV/ motion sickness, and genetic predisposition), anesthesia related factors (inhalation agents, nitrous oxide, large-dose neostigmine and intra-operative and postoperative opioid use), and type of surgery (longer duration of surgery and different types of surgeries). But it is difficult to identify the specific offending factor because all possible risk factors will be incorporated in a single type of surgery (26).

4. METHODOLOGY

4.1. Study Area

As sourced from Addis Ababa university's official website, TASH is the highest tertiary level hospital, which was established in 1964 G.C. accommodating referred patient from all over the country located in Addis Ababa which is the capital city of Ethiopia.

TASH is now the main teaching hospital for both clinical and preclinical training of most disciplines. It is also an institution where specialized clinical services that are not available in other public or private institutions are rendered to the whole nation.

TASH has staffs (doctors, nurses, other health professionals and administrators) dedicated to providing quality health care services. The various departments, faculties and residents under specialty training in the School of Medicine provide patient care in the hospital. In addition, almost all regional and federal hospitals in Addis Ababa are affiliated to the School of Medicine as clinical services and training sites.

Nowadays the hospital has 15 operating tables; 9 major, 4 orthopedic and two obstetrics. With this more than 4500 peoples are being operated yearly. Most of the operating theatres are run by anesthesiology residents under the supervision of anesthesiologists especially neurosurgical and cardiothoracic surgeries.

4.2. Study design and Period

An institutional based prospective cross-sectional study design was conducted in elective surgical patients operated both under general and regional anesthesia from July-September 2020.

4.3. Population

➤ **Source of population**

- All elective surgical patients operated under anesthesia at Tikur Anbesa Specialized Hospital.

➤ **Study population**

- All elective surgical patients who were operated under anesthesia in Tikur Anbesa specialized hospital during the study period.

➤ **Inclusion criteria:**

- all elective surgical patients

➤ **Exclusion criteria:**

- emergency patients
- patients discharged before 24 hours of surgery
- patients admitted to intensive care unit after surgery ventilated and
- patients included in RCT study with similar topic and study period

4.4. Sampling method

For this study, simple random sampling method was used and the target population included all annual elective surgical patients operated at TASH during 2019/20 GC. According to the OR registration log book, the previous data showed that the average monthly elective surgery done in the hospital was around 355, this results the average yearly elective surgery be 4260. After counting the total elective procedures of each table over one month, percentage was calculated from the total .Following this, the total sample respondents that were selected for this study was determined by using a formula given below on equation 1, by using single population proportion formula taking P as 22% from previous study, Z=1.96 at 5% significance level and margin of error (D) =5%

$$n = \frac{P(1-P)Z^2}{D^2} \dots\dots\dots (1)$$

Where; n is the required sample size

Z is level of confidence at 95% interval

P is prevalence of the problem on previous study(18)

D is margin of error

Therefore, using the equation specified above, the required sample size was calculated as:

$$\frac{0.22(1-0.22)1.96^2}{0.05^2} \Rightarrow 264$$

By using correction formula for finite population since source population was below 10,000

- $nf = \frac{n}{1+n/N}$where n is the minimum sample size 264 and N is the total number of patients operated per month which is 300 from situational analysis
- $nf = \frac{264}{1+264/300} = 140$, by taking 10% non-response rate the total sample was 154.

4.5. Variables

Dependent variables: Nausea and vomiting (yes/no).

Independent variables:

- Socio-demographic variables (age, sex,BMI), smoking history
- Previous history of PONV, history of motion sickness, history of surgery
- American Society of Anesthesiologists (ASA) status, premedication, perioperative use of opioids
- Type of induction drugs and duration of surgery.

4.6. Operational definitions

The American Society of Anesthesiologists (ASA): Physical Status grading system simply to assess the degree of a patient's "sickness" or "physical state" prior to selecting the anesthetic or prior to performing.

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

Early post-operative time: early post-operative time is used starting from the time when the

patient reaches to post anesthesia care unit to six hours.

Late post-operative time: time considered from six hours of patient reached to post anesthesia care unit to 24 hours.

Nausea: is an unpleasant sensation associated with the urge to vomit, characterized by excessive salivation and disturbing feeling.

Post-operative nausea and vomiting: any nausea, retching or vomiting occurring in the first 24 hours after surgery.

Motion sickness; feeling of nausea, dizziness with or without vomiting during travel (car, plane, train).

Hypotension: a drop in blood pressure by 20% systolic or 10% diastolic from the baseline.

4.7. Data Type and Method of Data Collection

Primary as well as secondary data and some secondary information was used to conduct this study. The primary data included respondent's socio economic, demographic, intra as well as immediate post-operative conditions. Whereas, the secondary information was collected through review of published and unpublished documents. For collection of primary data, a structured questionnaire was used. For the pediatric patients, parents were interviewed. For the purpose of quality primary data collection, appropriate orientation and pretest was given for data collectors (Anesthesia residents at each respective table and PACU nurses). In addition, timely supervision was conducted by the principal investigator.

4.8. Data processing and analysis

For generation of valuable result from this study, descriptive statistics as well as econometric model was applied. Data was checked manually for completeness and clarity. After this, it was coded, entered, cleaned and analyzed using SPSS version 16 software program. Descriptive statistics was used to explore the socio-demographic characteristics of patients, and the results was summarized as mean, standard deviation and relative frequencies. Bivariate and multivariate analysis was used to see the effect of independent variable on outcome variable. Variables,

which were significant on bivariate analysis at p-value less than or equals to 0.25 was taken to multivariate analysis. The strength of association was measured by 95% confidence interval and P- value of 0.05 was used as statistically significant in all cases.

4.9. Ethical considerations

Ethical clearance was obtained from the department of anesthesiology ethical committee before the start of the study. The purposes and the importance of the study was presented and verbal informed consent was taken from each participant by the data collector. Confidentiality was kept at all levels of the study by leaving identifiers and avoiding codes to identify participants. Participation in the study was on voluntary bases.

4.10. Dissemination of Results

The result of the research will be presented for the authority of college of health sciences, school of medicine department of anesthesia, critical care and pain medicine including all anesthesia professionals and residents. And also, it will be submitted to journals for publication.

5. RESULTS AND DISCUSSIONS

One hundred fifty-four study participants were involved with a 100% response rate. According to Apfel's risk scoring system for PONV, majority of the study participants were above moderate risk which accounts eighty (52%) whereas 74(48%) were under low risk. Of all study participants, sixty-eight (44.2%) have developed PONV, twenty (13%) developed nausea only and nine (5.8%) developed vomiting only.

Socio Demographic Characteristics of the Patient and other risk factors

Both pediatrics and adult age groups were included. Among the study participants,90(58.4%) was in the age group of 25-54yr. The minimum age was one day and maximum was 77yrs with median age of 30yr. Relative to gender distribution ,81(52.6%) were females. Assessment of patients 'body mass index showed that majority of the respondents ,93 (60.4%) was with in normal range, thirty-three (21.4%) were underweight and twenty-eight (18.2) were overweight. (Table 1)

Table 1: Socio demographic characteristics of patients undergone elective surgery at TASH August-October 2020, (n=154)

Variables		Frequency	Percentage
Sex	Male	81	52.6
	Female	73	47.4
Age	0-14	26	16.9
	15-24	19	12.3
	25-54	90	58.4
	55-64	11	7.1
	>64	8	5.2
BMI	Underweight	33	21.4
	Normal	93	60.4
	Overweight	28	18.2

ASA physical status of the participants was majorly ASA II, 89(57.8%) and only 9(5.8%) of the respondents were ASA III. Majority of the study participants 141(91.6%) were non-smokers. Aside to this,61(39.6%) of the respondents had history of motion sickness. (Table 2)

Table 2: Factors associated with PONV in elective surgical patients operated at TASH August-October 2020 GC, (n=154)

Variable		Frequency	Percentage
ASA	I	56	36.4
	II	89	57.8
	III	9	5.8
Motion sickness	No	93	60.4
	Yes	61	39.6
Pre-operative opioids	No	136	88.3
	Yes	18	11.7
Comorbidity	No	112	72.7
	Yes	42	27.3

Moreover, 42(27.3%) of patients have concomitant medical illness, diabetes mellitus takes the major portion, 14(33.3%) followed by hypertension, 11(26.2%). (Table 3)

Table 3: Type of medical illness in elective surgical patients operated at TASH August-October 2020 GC.

Variable	Frequency	Percent
Diabetes mellitus	14	33.3
Hypertension	11	26.2
Asthma	3	7.1
Diabetes mellitus and hypertension	3	7.1
Diabetes mellitus and heart failure	1	2.4
Heart failure and hypertension	1	2.4
Hypertension and asthma	2	4.8
Renal failure	2	4.8
Tuberculosis	1	2.4
RVI	3	7.1
Dyslipidemia	1	2.4
Total	42	100.0

Intra Operative Characteristics of patients

Ninety-three (60.4%) of the participants had surgery under general anesthesia of which 46(49.5%) patients were induced with thiopental and the remaining with propofol. Overall, only 53(34.4%) of the participants were given prophylaxis for PONV of which plasil takes the major portion 33(62.3%). All patient had prophylactic antibiotics. Overall, 109(70.1%) of the

respondents got intraoperative analgesia. Among which morphine covers the major part, ninety (82.6%). The different surgeries done include; orthopedics 35(22.7%), obstetrics 26(16.9%), pediatric 25(16.2%), urology 18(11.7%), neurosurgery 15(9.7%), abdominal 13(8.4%), gynecological 12(7.8%) and chest 7(4.5%) and vascular 3(1.9). Of these operations, 118(76.6%) took more than 60 minutes whereas 36(23.4%) were below 60 minutes. In addition, fifty (32.5%) had developed intraoperative hypotension of this 61% of them developed 3-5 times.

Table 4: Intraoperative characteristics of patients under gone elective surgery at TASH, Addis Ababa August-October 2020 GC., (n=154)

Variables		Frequency	Percentage
Pre medication for PONV	No	101	65.6
	Yes	53	34.4
Type of premedication	Plasil	33	62.3
	Dexamethasone	19	35.8
Prophylactic antibiotics	Yes	154	100.0
	No	0	0
Type of antibiotics	ceftriaxone	128	83.1
	ampicillin	26	16.9
Type of anesthesia	GA with ETT	93	60.4
	Regional	61	39.6
Intraoperative analgesia	Morphine	90	82.6
	Tramadol	3	2.8
	PCM	15	13.8
Duration of surgery	>60 minutes	118	76.6
	< 60 minutes	36	23.4
Intraoperative hypotension	No	104	67.5
	Yes	50	32.5
Types of surgeries	Abdominal surgery	13	8.4
	Gynecological	12	7.8
	Urology	18	11.7
	Chest	7	4.5
	Obstetrics	26	16.9
	Orthopedics	35	22.7
	Vascular	3	1.9
	Neurosurgery	15	9.7
	Pediatrics	25	16.2

Post-Operative Characteristics of patients

Considering post-operative analgesia, 43(27.9%) of patients were given combination of paracetamol and tramadol whereas 39(25.3%) got paracetamol only and thirty-seven (24%) of the study participants got tramadol only. In relation to occurrence, thirty-six (23.4%) patients developed PONV in the ward, 17(11%) develop in the PACU and 15(9.7%) of the respondents develop both in the PACU and in the ward. (Table 5)

Table 5: Post-operative analgesia given to patients undergone elective surgery at TASH, Addis Ababa, August-October 2020 GC, (n=154)

Variable	Frequency	Percent
Morphine	10	6.5
pethidine	1	0.6
tramadol	37	24.0
PCM	39	25.3
PCM and Tramadol	43	27.9
Block	1	0.6
Tramadol, diclofenac and PCM	6	3.9
Tramadol and diclofenac	12	7.8
PCM and diclofenac	5	3.2

Table 6: Descriptive Analysis Of Patients Undergone Elective Surgery at TASH, Addis Ababa Ethiopia that Had PONV and associated Factors, August-October 2020
GC.(N=68,P=44.2%)

Variables		Frequency of PONV(N)	Percentage of PONV(P)	P-Value
Age	0-14	12	7.8%	0.53
	15-24	10	6.5%	
	25-54	35	22.7	
	55-64	6	3.9	
	>64	5	3.2	
Sex	Male	22	14.3	0.001***
	Female	46	29.9	
BMI	<18.5	15	9.7	0.705
	18.5-24.9	40	26	
	24.9-29.9	12	7.8	
	>29.9	1	0.5	
ASA class	I	21	13.6	0.109
	II and III	47	30.5	
Previous History of PONV	Yes	13	8.4	0.19
	No	9	5.8	
	No surgery	46	30	
Motion sickness	Yes	33	21.5	0.032**
	No	35	22.7	
Smoking	Yes	2	42.9	0.026**
	No	66	1.3	
Co morbidities	Yes	30	19.5	0.000***
	No	38	24.7	
Prophylaxis for PONV	Yes	28	18.2	0.08
	No	40	26	
Prophylactic Antibiotics	Ceftriaxone	58	37.7	0.33
	Ampicillin	10	6.5	
Intraoperative analgesia	Opioid	47	30.6	0.013**
	Non opioid	21	13.6	
Intraoperative hypotension	Yes	35	22.7	0.000***
	No	33	21.5	
Type of anesthesia	GA with ETT	52	33.8	0.000***
	Regional	16	10.4	
Duration of surgery	>1hr	59	38.4	0.006***
	<1hr	9	5.8	
Post-operative analgesia	Opioid	26	16.9	0.34
	Non opioid	42	27.3	

NB; ** And *** Represents Significant at 5% And 1% Level of Significance Respectively.

Associated Factors of Post-Operative Nausea and Vomiting

(The regression model)

The bivariate analysis for this study showed that sex, previous history of PONV, history of motion sickness, Comorbidities, intraoperative hypotension, non-smokers, type of anesthesia, duration of surgery and patients not given prophylaxis are found to be the independent variables that have association with post-operative nausea and vomiting with a P-value of below 0.25. These variables were taken together for multivariate analysis which is crucial to see the strength of association. As shown on table 7, variables which are strongly associated with PONV are: sex, history of motion sickness, type of anesthesia, comorbidities and intraoperative hypotension.

According to the multivariate analysis, female patients are 2.96 times (AOR=2.96, CI [1.34-6.58]) more likely to have post-operative nausea and or vomiting than males. Patients with history motion sickness are 42% (AOR=0.42, CI [0.19-0.45]) more likely to be suffered from PONV. Comparing type of anesthesia, the odds of patients who undergone surgery under general anesthesia 18% (AOR=0.18, CI [0.074-0.42]) more to develop post-operative nausea and or vomiting . Aside to this, patients with co morbidities and intraoperative hypotension are highly exposed for suffering from PONV with (AOR=0.25, CI [0.1-0.6]) and (AOR=0.35, CI [0.14-0.88]) respectively.

Table 7: Bivariate and Multivariate analysis of factors associated with PONV in patients undergone elective surgery at TASH Addis Ababa August-October 2020 GC, (n=154)

Variables	COR	95% CI	P-Value	AOR	95% CI	P-Value
Sex	3.05	[1.56-5.93]	0.001	2.96	[1.34-6.6]	0.008***
Male						
Female	1			1		
Motion sickness	0.512	[0.27-0.99]	0.045	0.42	[0.19-0.95]	0.036**
Yes	1			1		
No						
ASA class	1.6	[0.82-3.14]	0.16	0.3	[0.08-1.1]	0.06
I						
≥II	1			1		
Smoking	4.84	[1.03-22.6]	0.045	0.24	[0.04-1.33]	0.1
Yes						
No	1			1		
Comorbidities	0.226	[0.11-0.48]	0.000	0.35	[0.14-0.88]	0.026**
No						
Yes	1			1		
Type of anesthesia	0.28	[0.14-0.57]	0.000	0.18	[0.07-0.42]	0.000***
Regional						
GA	1			1		
Intra operative hypotension	0.2	[0.096-0.414]	0.000	0.25	[0.1-0.59]	0.002***
No						
Yes	1			1		
Duration of surgery	0.33	[0.14-0.77]	0.01	2.18	[0.8-6.0]	0.13
<60 min						
>60 min	1			1		

NB: ** and *** Describes Significant Association at 5% and 1% Level of Significance respectively.

COR—Crude Odds Ratio, AOR—Adjusted Odds Ratio

5. DISCUSSIONS

The result showed that, the prevalence of PONV was 44.2% which is comparable with the study done in Tanzania (41%) (12). This study is higher compared to previous study done on the same area in 2018(22.7%) (18). This may be due to different anesthesia techniques or patient selection and also most of our patients were not premedicated for PONV. This finding was also high compared with previous studies conducted in Czech Republic (15.5%) (14). This high difference in magnitude may be due to differences in surgery and anesthesia techniques. On the other hand, the finding was lower compared with a study done in Finland 1997 (52%) (16). This may be due to larger sample size in these studies, patient characteristics and anesthesia techniques as well.

A multifactorial etiology, including patient specific, anesthetic, surgical and postoperative factors has been suggested. Apfel did a study involving 2722 patients from two centers who received inhalational anesthetic without antiemetic prophylaxis for various types of operation. In that study four predictors of PONV were identified namely: the female gender, history of motion sickness or previous PONV, non-smoking and the use of postoperative opioids. The likelihood of PONV is 10% with no risk factors, 21% with two, 39% in the presence of three and 79% with four risk factors (21). History of motion sickness had strong association with postoperative nausea and vomiting ($p = 0.036$). This is consistent to studies conducted in Czech Republic (14). This could be because such patients are sensitive for PONV which could be aggravated by movement of patient's head during the transfer of the patient from the operation table to the stretcher and vice-versa that could cause postoperative nausea and vomiting. Being female ($P = 0.008$) was found to be significantly associated with PONV. This might be because of hormonal effects like progesterone which have emetogenic effects. This finding was consistent with the finding in Czech Republic (14) where the overall incidence was higher in women compared to men and also reported in Uganda where female patients were more affected compared to male patients. General anesthesia with ETT ($P = 0.000$) is the other associated factor with PONV in this study. This may be due to the different anesthesia drugs, intubation and complications like intraoperative hypotension ($P = 0.002$) which is found to be the main predictive for post-operative nausea and vomiting in this particular study. The reason for the association between PONV and intraoperative hypotension may be due to gastro intestinal hypo perfusion resulting in delayed gastric emptying. In addition, this study has identified patients with concomitant medical illness

(P=0.026) are more suffered from PONV than others. This can be due to the different drugs administered perioperatively which may have effects on chemoreceptor trigger zone, gastro esophageal motility causing gastric stasis and reduced gastro esophageal sphincter tone.

On the other hand, even though Apfel identified opioid use and being nonsmoker as the main predictive factors for PONV (22), they have no strong association in this study. This may be due to the very large sample size used in Apfel's study. This finding is consistent with a study done in Gondar, Ethiopia (13). Though long duration of surgery has no strong association on multivariate analysis of this study, it has still a positive association with PONV as shown on bivariate analysis. This finding was inconsistent with studies in Gondar, Ethiopia (9), and Czech Republic (14). This could be because of difference in intraoperative management and other patient related factors. In the current study major operations and gynecological surgeries had no association with PONV. This finding is in contrast to the study done in Gondar Ethiopia (13). This finding may be due to smaller sample size and selection of only elective surgical patients.

6. STRENGTH AND LIMITATIONS OF THE STUDY

6.1. Strength of the study

The strength of this study was; we tried to include both patients undergone surgery under general and regional anesthesia techniques, both who was given prophylaxis for PONV and not as well as the inclusion of both adult and pediatric patients made it more representative.

6.2. Limitations of the study

The limitations of this study were, we did not include some disciplines like ENT because the operating room was closed for long due to COVID-19 and emergency cases for the sake of homogeneity. We did not calculate the prevalence of nausea and vomiting separately. This is also because of COVID-19 the number of cases was decreased significantly which made our sample size small.

7. CONCLUSION AND RECOMMENDATIONS

7.1. Conclusion

The overall prevalence of postoperative nausea and vomiting was high in Tikur Anbessa Specialized Hospital compared with most studies conducted in Africa and other parts of the world. History of motion sickness, female sex, presence of comorbidities, intraoperative hypotension and general anesthesia were the major factors associated with postoperative nausea PONV.

7.2. Recommendations

Based on the findings of this study, strict application of Apfel's risk score of PONV as part of perioperative management elective surgical patients, use of anti-emetic prophylaxis and introduction of postoperative nausea and vomiting treatment protocols in Tikur Anbesa Specialized Hospital are recommended so that the quality of anesthesia will improve significantly.

It is good to incorporate history of motion sickness and previous history of nausea and vomiting as part of the patients' history. It is strongly recommended the practice of regional anesthesia whenever the procedure as well as the patient's condition allows. In order to assess the type of surgeries with higher association with PONV, further studies with large sample size over adequate time period is recommended.

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7. ANNEXES

7.1 Annex I: Information Sheet

Title of the Research Project: prevalence and associated risk factors of PONV among patients operated under anesthesia at TASH, Addis Ababa, Ethiopia

Name of Principal Investigator: Asfaw Nurhussen Ahmed (ACCPR₃)

Name of advisors: Dr. Fethiya Alferid (Anesthesiologist) and Dr. Tseganesh Birhanu (anesthesiologist)

Name of the Organization: Addis Ababa University, College of Medicine and Health Sciences, Department of Anesthesia critical care and pain medicine

Name of the Sponsor: Addis Ababa University

Purpose of the Research Project

The target of the study is mainly to assess prevalence and associated risk factors of nausea and Vomiting following elective surgery under anesthesia in TASH. The results will be used as a guide to prepare

Intervention programs to tackle and reduce the prevalence of PONV in Ethiopia at large.

Person to contact

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7.2 Annex II: English Questionnaire Consent Form

This questionnaire is used as a guide to collect information for the data collectors. It is designed to assess prevalence and associated risk factors of postoperative nausea and vomiting following elective surgery under anesthesia in TASH, Addis Ababa, Ethiopia.

Hello! My name is Dr. Asfaw Nurhussen. I am one of the principal investigators of the study. The purpose of this questionnaire is to collect information on prevalence and associated risk factors of PONV following elective surgery under anesthesia in TASH. I chose you as a study participant hoping that you would be willing to help me by giving some information. If you have time and are willing, I would like to ask you some questions. Your participation is definitely important to assess the incidence and associated risk factors for nausea and vomiting following elective surgery under anesthesia in TASH. I promise you that all information you provide me will be kept confidential. I will never include any identifiers, such as your name or address. Your participation and willingness to answer these questions would definitely contribute to the improvement of subsequent management and prevention strategies of PONV. Your role in the success of the research is important and I would never leave without appreciating your contribution to this research.

Are you voluntary to participate?

I understand about the advantage of the research and the roles I will have in the research. I have agreed to participate in the research.

A/ agree B/ Disagree

If Respondent agrees to be interviewed; the interview will be started

Questionnaire: Code _____

Name of data collector _____ signature _____

7.3 Annex III: Questionnaire

Instruction: read the following sentences carefully, observe and review cards or ask patients if needed. write or tick the response on the space provided (additional information can be Referred from the card or an anesthesia sheet)

Part I Socio-demographic and preoperative characteristics of patients

1. Age _____ completed year
2. Sex
 A. Male B. Female
3. Weight and Height-----
4. ASA class-----
5. Does He/she have history of previous surgery?
 A. Yes B. No
6. If yes for Q06, does he/she have history of PONV
 A. Yes B. No
7. Does He/she have history of motion Sickness?
 A. Yes B. No
8. Is He/she taking opioid in the last 24hrs preoperatively??
 A. Yes, type of opioid_____ B. No
9. Does he/she has history of smoking
 A. Yes B. No
10. Does he/she has any concomitant medical illnesses
 A. Yes B. No
11. If yes for Q 11, What type of medical illness does he/she has
 A. Diabetes Mellitus C. Heart failure E. Others (specify)
 B. Hypertension. D. Asthma

Part II Intraoperative and postoperative characteristics of patients.

1. Did the patient premedicated for PONV
 A. Yes B. No
2. If yes for Q 01, what type and dose of the drug given -----

3. Was prophylactic antibiotics given?? **A.** yes **B.** No

4. If yes for Q3 what antibiotics was given??.....

5. Type of Anesthesia

A. GA with LMA **B.** GA with ETT **C.** Regional

If regional anesthesia

4.1. Was there any complication related to regional anesthesia?

A. High spinal **C.** Partial block requiring supplemental anesthesia (Please specify)

B. Total spinal

5. Induction agent

A. Propofol **C.** Thiopental **B.** Ketamine **D.** Other specify----

6.Type of surgery

A. Abdominal surgery **C.** Urology **E.** Obstetrics (please specify parity) **G.** Others

(specify)

B. Gynecological **D.** Chest **F.** Orthopedics

7. Duration of surgery

A. >60min **B.** <60min

8. Intraoperative analgesia (drug and dose)

9.Did the patient have any episodes of intra operative hypotension

A.Yes **B.**No

10. If yes for Q 10, how many episodes does he/she had-----

Part III postoperative characteristics of patients

1.Did the patient have post-operative nausea/vomiting

A.Yes **B.**No

2.If yes for Q.01,

2.1. What he/she experienced (please specify the frequency)

A. Nausea only----- **B.**Vomiting only----- **C.**Both

2.2. When did it occurred?

A.Intraoperative **C.**≥7Hrs post-operative

B.0-6Hrs Post-operative

3. Post-operative analgesia in the PACU.....mg

4. Post-operative analgesia in the ward.....mg

