



**A Prospective Study On Incidence And Associated Risk Factors
Of Postoperative Nausea And Vomiting After General And Spinal
Anesthesia At Jimma University Specialized Hospital**

BY: Abdi Awel (Final year anesthesia student)

**RESEARCH PAPER SUBMITTED TO DEPARTMENT OF
ANESTHESIOLOGY COLLEGE OF PUBLIC HEALTH AND
MEDICAL SCIENCES JIMMA UNIVERSITY IN PARTIAL
FULFILLMENT FOR BACHELOR OF SCIENCES DEGREE
IN ANESTHESIA**

JUNE, 2013

JIMMA, ETHIOPIA

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Abstract

Background:- Nausea and vomiting post operatively occurs in 20 to 30 % of all patients. Patients find postoperative nausea and vomiting the most distressing and it is often the worst memory of their hospital stay. It is among the most common events related to surgery and anesthesia and despite modern anesthetics and surgical techniques its incidence remains at 25 to 30% which extends 70 to 80% in high risk patients.

Objective:- to determine the incidence and associated risk factors of postoperative nausea and vomiting following general and spinal anesthesia in Jimma University Specialized Hospital from May 19, 2014 to June 9, 2014.

Method:- this study was conducted in Jimma University Specialized Hospital among surgical ward patients by using general cohort study design who underwent surgery. Data was collected by interviewing of patients using structured questionnaire and review of their cards including anesthesia charts.

Results:- from a total of 290 surgical patients admitted to JUSH 22.76% 66/290 had postoperative nausea, vomiting or both. From those patients 60.61% (40/66) are females. Higher incidence is occurred in surgeries done under general anesthesia 95.46% (63/66) when compared to spinal anesthesia 4.55% (3/66). Majority (74.24%) of postoperative nausea and vomiting occurred within 24hrs after surgery and 69.7% had prolonged (>8hrs) preoperative fasting. Among surgical procedures done in JUSH in the study period obstetrics and orthopedics had higher incidence of PONV 24.24% &16.66% respectively.

Conclusion:- generally the incidence of postoperative nausea and vomiting among surgical patients admitted to JUSH in the study period is 22.758%(66/290) indicating that the problem is common. The incidence is higher in females (60.6%) and in age group between 19 and 64 (65.15%). General anesthesia was the most dominantly (96.97%) used type of anesthesia which has greater incidence of postoperative nausea and vomiting.

The risk factors for postoperative nausea and vomiting in this study include: female gender, history of motion sickness or PONV on previous surgery, use of opioids, prolonged fasting, nonsmokers and intraoperative use of inhalational agents (halothane).

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Acronyms

ADH: Antidiuretic Hormone

CTZ: Chemoreceptor Trigger Zone

GA: General Anesthesia

GIT: Gastrointestinal tract

JUSH: Jimma University Specialized Hospital

JUSRP: Jimma University Student Research Program

PACU: Post Anesthesia Care Unit

PONV: Postoperative Nausea and Vomiting

POV: Postoperative Vomiting

RA: Regional Anesthesia

SA: Spinal Anesthesia

TIVA: Total Intravenous Anesthesia

Chapter One: Introduction

1.1 Background

Patients found postoperative nausea and vomiting the most distressing and it is often the worst memory of their hospital stay. The consequence of prolonged postoperative nausea and vomiting ranged from unexpected admission of day-case patients with its economic implications to physical, metabolic and physiological effects on the patients which slow their recovery and reduce their confidence in future surgery and anesthesia.

Nausea is often described as a sensation of unease and discomfort in the stomach with an urge to vomit. Nausea may present at different intensities, may last a variable period of time.

Vomiting as a clinical symptom is a forceful expulsion of gastric contents through the mouth or nose.

Postoperative nausea and vomiting are common problems following GA, occurring in 20 to 30% of all patients. Moreover, postoperative nausea and vomiting may occur only at home within 24 hours of uneventful discharge or post discharge nausea and vomiting has a significant number of additional to inpatients.

Generally, the overall incidence of PONV is 25 to 30% which extends 70 to 80% in high risk patients

1.2 Statement of the problem

Nausea and vomiting post operatively occurs in 20-30% of patients (1). After the land mark 1992 review from watcha and white, PONV become more commonly used clinical terms and in 1999 PONV become the medical subject heading in the national library of medicine. The term PONV will be used to describe the composite postoperative symptoms of nausea and vomiting nausea or vomiting and, retching. Several large prospective cohort studies now suggested that the varying incidences of PONV observed after different types of surgeries are largely reflection of important patient specific and anesthesia related risk factors rather than surgery itself(2).

PONV can be such unpleasant experience that patients often rate it worse than postoperative pain(3). Patients willingness to pay out of pocket for effective antiemetic treatment of PONV, as measured by a well designed studies is \$56 in US and 65 euro in Europe(4). Prevention of PONV has been identified as an essential component in achieving patient satisfaction and can be more distressing than pain (5). While the experience of PONV generally self-limited, PONV can lead to a rare but serious complications suchas aspiration of gastric contents, suture dehiscence, esophageal rupture, subcutaneous emphysema, pneumothorax and delay patient discharge from PACU(6). The annual PONV related a health care cost approaches several hundred million dollars in USA alone(7).

The recognition of risk factors plays a critical role in making diagnostic and therapeutic decisions in medicine. To know which of the risk factors is most likely causal or merely correlationcan be critical for development of valid risk assessment tools to be used for clinical decision. For example females are more susceptible to emetogenic stimuli.

The average incidence in male and female is 15% and 45% (assuming the same number of men and women are anesthetized(8). PONVs more likely in children than adults,in whom its incidence decreases with age.After puberty,females are more than male to suffer PONV,especially if they are pregnant or menstruating.Physiological stress and anxiety,obesity and medical such as DM and uremia,can all increase the risk of PONV.

Ahistory of motion sickness or previous PONV is associated with greater risk for PONV (2). A high gastric volume can induce PONV.This may occur with anxious patient who swallow large amount of air preoperatively or can be secondary to gastric insufflations from mask ventilation,prolonged fasting specially in females may also increase the risk of PONV(9).After 7 hrs of fasting 56% of females report nausea compared with 38% of men after 8.5 hrs of fasting(2).

Although atropine has been used as antiemetic it may also decreases gastric emptying and so contributes to PONV(1). Narcotic slow gastric emptying,increase sensitivity of CTZ (1).They also mimic the releasing of serotonin from enterochromaffin cell in the intestine (10).Opiates increase sensitivity of vomiting center to emetic stimuli(1).Volatile anesthetics may alter neurotransmitter release in the area of postrema and in certain forebrain site known to

associated to stimulate vomiting(1).They also have on GIT, leading reduced motility and relaxation of pylorus facilitating bile reflex which is irritant(9).

The general effect of surgical procedures which include metabolic and endocrine changes can contribute to PONV. Certain procedure such as dilatation and curettage, laparoscopy, strabismus correction, orchidopexy and abdominal operations are known to be associated with PONV. Hypoxia, hypercarbia and hypotension all make PONV are more likely (3).

Excessive movement in the early postoperative period may stimulate nausea and vomiting by increasing the vestibular input to a sensitized vomiting center. Pain, swallowing of blood and nasopharyngeal suction all increase the risk of PONV (8).

This study will be expected to provide an up-to-date review of PONV that enables anesthetists and other health professionals to better manage PONV in daily clinical practice. Knowledge of risk factors of PONV can assist the anesthetists in the judicious pharmacotherapy to decrease this problem and optimize the use of prophylactic regimen.

Chapter Two: Literature Review

Most prospective cohort studies using logistic regression analysis have identified female gender (in adult) as the strongest independent predictor for PONV independent of anesthetic technique (11).

Cohen and associates found that nonsmokers were 1.8 times more likely than smokers to have PONV (11).

As a study on 1566 patients by Apfel CC, Kranke P and Eberhart LH (2004) illustrated that about a third of patients (569) presented with history of PONV, of whom every second patient (280) experienced PONV. Two thirds of patients (997) did not have history of PONV of whom one third (320) experienced PONV. Clearly patients with history of PONV were at higher risk for experiencing PONV (7).

Eberhart and coworkers have shown that an age of three years and older is associated with an increased risk for PONV (22).

Regardless of whether opioids are used intraoperatively or postoperatively, the available evidence suggested that the dose of opioids rather than type is one of the main predictors for PONV (2). Most large studies using multivariable analysis demonstrated that use of postoperative opioids doubles the risk of PONV (12). RA definitely decreases the incidence of PONV (20).

Compared with purely RA technique, GA is associated with significantly higher incidence of PONV. This raises the question of the individual contribution of the drugs used for GA, namely opioids, inhalational anesthetics and nitrous oxide. (6).

Although previous meta-analysis have demonstrated a lower incidence of nausea and vomiting with propofol compared with inhalational anesthetics, in volunteer studies an 8 hours anesthetic with sevoflurane was associated with nausea and vomiting in over 80%, strongly suggesting the emetogenicity of volatile anesthetic agents (24).

In addition, a large clinical single center study with patients demonstrated that: 1) the difference in vomiting between inhaled anesthetics and propofol occurs predominantly in the first 2 to 6 hours postoperatively. 2) the differences in early vomiting is clearly dose related so that the difference is not due to propofol, but rather related to the dose dependent emetogenic effect of volatile agents (25). There are no differences in PONV among the volatile anesthetic agents; isoflurane, enflurane and sevoflurane. This finding is consistent with meta-analysis by Gupta and coworkers, Macario and associates and very recent study by Wallenborn and colleagues (comparing isoflurane, sevoflurane and desflurane) (26).

Numerous studies in the 1980 and meta-analysis in the 1990s emphasized the emetogenic effect of nitrous oxide (27).

Many surgeries are associated with a high incidence of PONV(18).Infact, if volunteers are exposed to volatile anesthetics for extended period of time(without any surgery) almost all experienced nausea and vomiting afterward(24).

When scuduri and colleagues stratified patients according to emetogenic procedures,the incidence of PONV in the PACU was 37%(80/225) compared with 31% (112/360) for all other surgeries which is not significantly different(16).These findings are also consistent with the study which PONV incidence over 24 hrs was 42%(283/681) for emetogenic procedures and 36%(317/885) for other procedures(7).

Well designed multicenter prospective survey by Eberhart and colleagues developed predictive model for POVN in pediatrics(22).

2.1 Significance of the study

The main concern of this study was to provide information to anesthetists and other health professionals about the incidence and associated risk factors of PONV in JUSH. This study would initiate them to implement the rational approach or guidelines for the prevention and treatment of PONV based on current knowledge and understanding and, helps to focus on well-established independent predictors that appear to be cause for PONV. This study will also give a base line data for further study.

Chapter Three: Objectives

3.1 General objective

To determine the incidence and associated risk factors of postoperative nausea and vomiting following general and spinal anesthesia among surgical patients in JUSH.

3.2 Specific objectives

- 1.To determine the incidence of PONV following general and/or spinal anesthesia among surgical patients in JUSH
- 2.To assess associated risk factors of PONV following general and, or spinal anesthesia among surgical patients in JUSH
- 3.To compare the incidence of PONV between general and spinal anesthesia among surgical patients in JUSH.

Chapter Four: Methodology

4.1 Study area and period

This study was conducted in JUSH in surgical ward patients. Jimma university specialized hospital is located in Jimma town, Oromia regional state which is 350 kms in the south west of Ethiopia. This hospital is the only specialized hospital and teaching hospital in the South West of Ethiopia. It provides services like surgical, gynecological and obstetrics, medical, pediatrics, major and minor operations, ophthalmologic and diagnostic facilities. It has a capacity of 360 beds, 5 operation theatres and 310 health professionals in different field of studies. This study was conducted from May 19, 2014 to June 9, 2014.

4.2 Study design

A general cohort study design was used.

4.3 Population

4.3.1 Source population:- all surgical patients who was admitted to surgical wards.

4.3.2 Study population:- all postoperative patients in the study period who was undergone surgery under GA or SA

4.3.3 Study unit:- each patient who was undergone surgery under GA or SA.

4.4 Sample size and sampling technique

4.4.1 Sample size determination

All participants or patients in the study period were involved.

4.4.2 Sampling technique

A consecutive sampling technique was used in the predetermined study period.

4.5 Study variables

4.5.1 Dependent variables

-nausea and vomiting

4.5.2 Independent variables

* Socio-demographic variables

-sex

-age

* illness related variables

-diagnosis

-Types of surgery

- duration of surgery

* Anesthesia related variables

- GA -volatile anesthetics

-SA -duration of anesthesia

-TIVA -opioids and other drugs

- preoperative fasting

4.6 Data collection processes

4.6.1 Data collection Technique

-Detailed interview of postoperative patients using structured questionnaire and review of their cards including anesthetic charts was done. The data was collected by trained 4th anesthesia students.

4.6.2 Data collection Instruments

- Structured questionnaire

4.7 Data processing and analysis

Data was collected carefully by trained data collectors and tallied on the prepared tally sheet. The data was analyzed manually using scientific calculators for frequency, percentage and cross tabulation with different variables was made. Statistics and different cross tabulations were designed by using computers.

Finally, the results were compared, contrasted and discussed by using available data. Possible justifications and conclusions as well as recommendations were forwarded.

4.8 Data quality and assurance

The collected data was checked for its completeness, accuracy, clarity and consistency every day by the principal investigator.

4.9 Ethical Considerations

Before conducting the study; formal letter detailing the objective of the study was taken from JUSRP office to concerned body, so as to get permission to conduct the study. During data collection, the norms, values and morals of patients or participants was respected by principal investigator and data collectors.

4.10 Dissemination plan

Results and recommendations were disseminated to department of Anesthesiology, department of surgery and JUSRP office.

4.11 Definition of Terms

- * **Postoperative Nausea and Vomiting**:- Nausea and vomiting occurring within 24 hours of surgery.
- * **Nausea**:- a subjective sensation of the need to vomit
- * **Vomiting**:- a forced expulsion of stomach and gastrointestinal contents through the mouth.
- * **General Anesthesia**:- medically induced loss of consciousness loss of protective reflexes resulting from administration of one more general anesthetic agents.
- * **Spinal Anesthesia**:- is a form of regional anesthesia involving injection of local anesthetic into subarachnoid space usually between L3 and L4 generally for procedures below umbilicus.
- * **Volatile Anesthetic Agent**:- is a chemical compound possessing general anesthetic properties that can be delivered via inhalation.
- * **Total Intravenous Anesthesia**:- is a combination of hypnotics agents, analgesic drugs and muscle relaxants excluding simultaneous administrations of any inhaled drugs.

Chapter Five: Results

5.1 Sociodemographic characteristics of surgical patients in JUSH

During the study period surgical patients admitted to Jimma University were 290. Among surgical patients admitted to JUSH in the study period, females were dominant 53.1%(154/290) and the largest age group was age group ranging from 19-64years old which is 61.7%. The age group 65 and older were the least which was 13.1% (38/290)

Table 1: Age and sex distribution of surgical patients admitted to JUSH from May 19, 2014 to June 9, 2014.

Variables		Frequency	Percentage
Sex	Male	136	46.89
	Female	154	53.10
Age group	≤ 18	73	25.17
	19-64	179	61.72
	≥65	38	13.10

5.2 Incidence of PONV among surgical patients admitted to JUSH in the study period

The table below shows that from a total of 290 surgical patients admitted to JUSH in the study period 66 (22.758%) of them complained postoperative nausea, vomiting or both. It also shows larger incidence of PONV in females (60.61%) and age group of 19-64 (65.15%) followed by age group ≤18 years (27.27%).

General Anesthesia was the most dominantly (96.97%) used type of anesthesia and spinal anesthesia was only used 3.03% in this study area. So general anesthesia has higher incidence of PONV (23.1%) when we compare it with SA which is used only has lower (15%) of incidence. Majority of the PONV 74.24% or 49/66 occurred within 24hrs after surgery in the study period.

Table 2: The incidence of PONV by sex, age, type of anesthesia and duration of anesthesia among surgical patients admitted to JUSH from May 19, 2014 to June 9, 2014.

Variables	PONV	Frequency	Percentage
	YES	66	22.76
Sex	Male	26	39.39
	Female	40	60.61
Age group	≤ 18	18	27.27
	19-64	43	65.15
	≥ 65	5	13.63
Type of Anesth	GA	64	96.97
	SA	2	3.03
Duration of Anesthesia	≤ 1hrs	16	24.24
	1-3	33	50
	≥ 3hrs	17	25.75
Time when PONV occur	≤ 24hrs	49	74.24
	>24hrs	17	25.76

5.3 Types of surgical procedures carried out and their incidence of PONV in JUSH in the study period

The table below shows that majority of surgical procedures done in the study period were abdominal operations (63/290) followed by orthopedics (55/290). Higher incidence of PONV was observed in obstetrics surgery (24.24%) followed by orthopedic surgery (16.66%).

Table 3: Types of procedures carried out and their incidence of PONV among surgical patients admitted to JUSH from May 19, 2014 to June 9, 2014.

Procedures	Frequency	PONV	Percentage
Abdominal	63	13	19.69
Thyroidectomy	15	4	6.06
Breast surgery	16	5	7.57
Orthopedics	55	16	16.66
Obstetrics	46	16	24.24
Gynecologic	15	3	4.54
Ophthalmic	12	5	7.57
Neurosurgery	11	2	3.03
Urologic	28	3	4.54
Others	29	4	6.06
Total	290	66	100

5.4 Risk factors for PONV in JUSH in the study period

According to this study which is conducted among surgical patients admitted to JUSH from May 19,2014 to June 9, 2014, Duration of fasting (>8hrs) had the highest incidence (69.7) of PONV followed by use of opioids (42.85) intraoperatively.(Table 4)

Table 4: Associated risk factors for PONV among surgical patients admitted to JUSH from May 19, 2014 to June 9, 2014.

Risk factors	Frequency	PONV	Percentage
Nonsmokers	276	63	22.82
Smokers	14	3	21.42
Hx of motion sickness or PONV	18	6	33.33
Use of opioids	7	3	42.85
Use of inhalational agents	284	52	20.67
IV anesthetics	279	57	18.63
Duration of fasting (>8hrs)	258	46	69.7

Chapter Six: Discussion

According to study done in Australia on the most frequently recorded complications in the first 24hrs after surgery and anesthesia, overall 37.7 % of patients experienced nausea, vomiting or both(4).

From Africa a prospective study done in Nigeria found the incidence of postoperative nausea and vomiting 24hrs after surgery to be 41.6% and 19% respectively (5). According to this study which is conducted among surgical patients admitted to JUSH from May 19, 2014 to June 9, 2014, the incidence of PONV 24hr after surgery was 22.76% and 25.76% respectively.

According to prospective study under taken at Mulago National Referral Teaching Hospital between November 2006 and March 2007, the prevalence of PONV was generally 20 to 30%. In this study most of the incidence of PONV was occurred (52%) in females (15). A prospective study was also done in Korle Bu Teaching Hospital from June to August 2004 had showed 34% (106/306) had episodes of PONV of whom 82(72.4%) had intraoperative opioids(28).

According to this study which is conducted among surgical patients admitted to JUSH from May 19,2014 to June 9, 2014, from a total of 290 patients admitted to all surgical wards, 22.76% (66/290) had complained episodes of postoperative nausea, vomiting or both of whom 60.6% (40/290) are females. The age group between 19 and 64 had highest (65.1%) incidence followed by age group ≤ 18 years (27.27%). General anesthesia is the most dominantly used type of anesthesia in this study period (96.97%). Most of the PONV (74.24%) were occurred within 24hrs after surgery and most of them (69.7%) had prolonged fasting (>8hrs). Abdominal surgery 21.7% followed by orthopedics surgery (18.98%) are dominantly done procedures in JUSH in the study period. But the incidence of PONV was larger in obstetrics surgery (24.24%) followed by orthopedics surgery (16.66%).

When we compare the prevalence of PONV in JUSH with other studies, it is relatively lower. This may be because of the use of opioids is not common and laparoscopic surgeries are not available in this set up which are risk factors for PONV.

According most prospective cohort studies using logistic regression analysis had identified female gender (in adult) as the strongest independent predictor for PONV independent of the

anesthetic technique(3). Similarly in case of JUSH there is higher incidence (60.6%) in females in the study period.

Cohen and associates found that nonsmokers were 1.8 times more likely than smokers to have PONV(3). In case of JUSH 63/66 are nonsmokers compared to 3/66 of smokers which is not different from the above studies. This study showed the largest incidence of PONV in obstetrics surgery (24.24%) followed by orthopedics surgery (16.66%). The former may be because of they are female and the effect of pregnancy whereas the later is supported by a study done by Sinclair et al in 1999, where they found orthopedic surgeries to be among the independent predictors of PONV(11).

Most large studies using multivariable analysis demonstrated that use of postoperative opioids doubles the risk of PONV (2). On the other hand RA definitely decreases the incidence of PONV(20). Compared with purely regional anesthesia, GA is associated with significantly higher incidence of PONV (6). This raises the question of the individual contribution of drugs used for GA, namely; inhalational anesthetics, opioids and IV anesthetics.

Ebert and coworkers had shown that an age of three and older had associated with an increased risk for PONV (22). Apfel et al designed a simplified risk score for predicting PONV and their final score consisted of four predictors; female gender, history of motion sickness or PONV, nonsmoking and use of postoperative opioids.

In the study conducted among surgical patients admitted to surgical wards of JUSH from May 19, 2013 to June 9, 2014 the associated risk factors include: female gender, use of opioids, prolonged fasting(>8hrs), history of motion sickness or PONV, nonsmokers and intraoperative use of inhalational agents. Other intraoperative factors like body mass index (BMI), IV fluids, hypotension, tachycardia and medical problems are not included because of time constraints. Commonly used induction agents in the study period were ketamine, thiopentone and propofol. In almost all patients atropine was used as a premedication in the study period and only halothane was used from inhalational anesthetics. This is because of other inhalational agents are not available in this set up in the study period.

Chapter Seven: Conclusion and Recommendation

7.1 Conclusion

Generally the incidence of postoperative nausea and vomiting in the Jimma University Specialized Hospital in the study period is 22.758% (66/290) indicating that the problem is not uncommon. Higher incidences of PONV are documented in females(60.6%), age group between 19 and 64 (65.1%), obstetrics surgery(24.24%) and orthopedics surgery(16.66%).

General anesthesia is the most dominantly used type of anesthesia in the study period which has greater incidence of PONV (23.1%) when compared to SA (15%). Most of PONV (74.24%) occurred within 24hrs after surgery and 69.7% of patients who had PONV were fasted >8hrs preoperatively.

The predictive risk factors of PONV among surgical patients admitted to JUSH in the study period include: female gender, use of opioids, nonsmokers, prolonged fasting, history of motion sickness or PONV and intraoperative use of inhalational anesthetics (halothane).

7.2 Recommendation

I would like to recommend anesthesia department to encourage students to do further studies in other health institutions to confirm the incidence and identify patients who are at greater risk so as to apply the rational guidelines to reduce PONV.

Secondly, I would like to recommend all anesthetists and other concerned professionals:-

- Patients who are at increased risk of developing PONV should be given anti-emetic prophylaxis and managed appropriately.
- Prolonged preoperative fasting (>8hrs) should be avoided
- It is better to use SA unless it is contraindicated as it has lower incidence of PONV when compared to GA.

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ANNEX-I

Questionnaire

Jimma University College of Public Health and Medical Sciences, Department of anesthesia.

Questionnaire to assess the incidence and associated risk factors of postoperative nausea and vomiting in Jimma University Specialized Hospital from May 1, 2013 to May 21, 2013.

Part-I. Identification

- 1) Name -----
- 2) Age-----
- 3) Sex: a) male--- b) female----

Part-II. Assessing the incidence of PONV

- 1) Do you have PONV? a) yes--- b) no---
- 2) If the answer for question no 1 is yes, when does it occur?
 - a) before 24hrs of operation
 - b) after 24 hrs of operation
- 3) Duration of anesthesia: a) < 1hrs b) 1-3 hrs c) >3 hrs
- 4) Types of anesthesia used : a) GA b) SA c) others
- 5) Duration of preoperative fasting: a) \leq 8hrs b) \geq 8hrs
- 6) Types of procedures done:
 - a) abdominal surgery
 - b) Thyroidectomy
 - c) Breast surgery
 - d) Gynecological surgery
 - e) Obstetrics surgery
 - f) Ophthalmic surgery
 - g) Neurologic surgery

- h) Orthopedics surger
- i) urologic surgery
- j) others(specify)

Part III: Risk factors ass't

- a) Nonsmokers
- b) Previous history of PONV or motion sickness
- c) Preop use of opioids
- d) Postop use of opioids
- e) Use of intraop inhalational anesthetics
- f) Duration of operation
- g) TIVA& other IV anesthetics agent used
- h) Other medical problems

Part IV: Types of induction agent used: a) ketamine

- b) thiopentone
- c) propofol
- d) other (specify)

part V: Types of inhalational anesthetics used: a) halothane

- b) isoflurane
- c) sevoflurane
- d) N2O
- e) other (specify)

Part VI Analgesics used: a) opioids(speify)

- b)NSAIDS (specify)