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ASSESSMENT OF PROPHYLACTIC MEDICATIONS PRESCRIBED FOR NAUSEA AND VOMITING AMONG POST-OPERATIVE SUBJECTS IN A TERTIARY CARE HOSPITAL, BENGALURU

Dr. Saumya[1], Dr. Sunita Bhatta[2], Dr. Rachitha N[3], Dr. Bisha biju[4], Dr. Mahesh N.M[5], Dr. Subramanyam Mahankali[6]

[1]Pharm D graduate, Department of Pharmacy Practice, KLE College of Pharmacy, Bangalore, India.
[2]Pharm D graduate, Department of Pharmacy Practice, KLE College of Pharmacy, Bangalore, India.
[3]Clinical Pharmacist, Department of Pharmacology, Aster RV Hospital, Bangalore, India.
[4]Pharm D graduate, Department of Pharmacy Practice, KLE College of Pharmacy, Bangalore, India.
[5]Head of Department, Department of Pharmacy Practice, KLE College of Pharmacy, Bangalore, India.
[6]Lead Consultant- Anesthesia, Department of Anesthesiology, Aster RV Hospital, Bangalore, India.

saumya.sh77@gmail.com[1]
sushmitabhatta35@gmail.com[2]
nrachita12@gmail.com[3]
bishabiju7@gmail.com[4]
mahesh_n_m@yahoo.com[5]
docsubra@gmail.com[6]

Abstract

Background: Postoperative nausea and vomiting (PONV) is the most common complications seen within the first 24 hours following surgery under general anesthesia, with an incidence reported between 30-80% from earlier studies. Prophylactic management of PONV typically involves administration of antiemetic such as ondansetron, metoclopramide, dexamethasone, scopolamine, granisetron and promethazine within 24 hours of post- surgery.

Objectives: Primary objective was to describe prescription pattern of prophylactic medications used for PONV whereas, secondary objectives was to assess frequency, severity and effect of PONV.

Methodology: A six-month prospective observational study was conducted at Aster RV Hospital after ethical approval from institutional human ethical committee of KLE college of pharmacy. Patient demographics, clinical data, and prescriptions were recorded. PONV risk was assessed using the APFEL score, with 24-hour postoperative follow-up and descriptive data analysis.

Results: A total of 90 patients undergoing elective surgery under general anaesthesia were included, of which 61.1% were male and 38.9% female, with a mean age of 54.4 ± 2.6 years. Most subjects received a combination of general, inhalational, and regional anaesthesia. Ondansetron with dexamethasone was the most commonly administered prophylactic regimen (78.8%). PONV was reported in 61.1% of patients, occurring more frequently among males, non-smokers, and those with a history of motion sickness. Postoperative episodes were primarily managed with ondansetron, pantoprazole, and metoclopramide.

Conclusion: The combination of ondansetron and dexamethasone was the most frequently prescribed and appropriate prophylactic regimen for PONV. Appropriateness of anti-emetics was found appropriate in most prescriptions as per Lexicomp database. PONV occurred more commonly in Female, non-smokers and patients with a history of motion sickness. Most cases were effectively managed with standard antiemetics, and recovery was achieved within 24 hours.

Keywords: Post-operative nausea and vomiting, surgery, anesthetics, anti-emetics.

1. INTRODUCTION

One of the important post-operative clinical complications is nausea and vomiting in post-surgical subjects who are administered general anesthetics[1]. Nausea refers to a feeling of a tendency to vomit and vomiting refers to reflux of the gastric contents among the affected subjects[2]. These two complications are likely to occur within 24 hours of post-surgery. Earlier studies indicate the incidence rate of nausea and vomiting ranging from 30% to 80% in post-surgical subjects who are administered with general anesthetics[3].

Nausea and vomiting are treated prophylactically using medications such as ondansetron, metoclopramide, droperidol, dexamethasone, granisetron and scopolamine4. These medications are administered within 24 hours of post-surgery to prevent nausea and vomiting associated with the administration of general anaesthetics[1].

Despite being self- limiting, it is associated with substantial distress to subjects in the early postoperative period3. Post-Operative Nausea and Vomiting is still a clinical problem after anesthetics and surgery that will cause a delay in discharge from hospital[5].

Most guidelines are in agreement that subjects at low risk for Post-Operative Nausea and Vomiting are unlikely to benefit from prophylaxis and that it should be reserved for subjects at moderate to high risk. APFEL et al. devised a simplified risk score for predicting post operative nausea and vomiting1. The ability to identify high-risk subjects for preventive intervention could significantly improve the quality of subjects care and satisfaction after surgery[5].

A study by Weibel et al (2020) have conducted a network meta-analysis study among 97516 randomized participants most commonly women (83%) whose mean age was 42 years with American Society of Anesthesiologists (ASA) physical status I and II. While assessing for Post Operative Nausea and Vomiting in adult after general anesthetics, they reported that combinations of medications were generally more effective than corresponding single drug in preventing vomiting whereas higher dose was recommended for granisetron, dexamethasone, ondansetron and droperidol[6].

In another study, Isazadehfar et al (Jan2 2017) have conducted a randomized double blinded study among 60 patients aged between 15-80 years who underwent Laparoscopic Cholecystectomy with ASA physical status I and II. They reported that, ondansetron is more effective than metoclopramide, whereas there was not any significant difference between two drugs in preventing of vomiting[5].

Yet in another study by Edward et. al (July 2019) have conducted a retrospective analysis in surgical unit among 480 presentations (mean age 49 years) in 4 weeks period. They reported that ondansetron (65.5%) was the most commonly prescribed as the first line anti emetic agent followed by metoclopramide (21.5%) for post operative nausea and vomiting patients[7].

The previous studies indicate that there is a limited information about the assessment of prescribing pattern of medications including their appropriateness among post-surgical patients receiving various general anaesthetics. In addition, limited data about safety profile of prophylactic medications is available in previous studies. These facts indicate that there is a need to assess the prescribing pattern of prophylactic medications among post operative patients who are administered with general anesthetics in Aster RV Hospital.

2. AIMS AND OBJECTIVES

Aim: To describe the prescription pattern in patients undergoing elective surgery under general anesthesia and its impact on post operative nausea and vomiting in Aster RV Hospital, Bengaluru.

Objectives:

Primary Objective: To describe the prescription pattern of medications as prophylaxis for post operative nausea and vomiting.

Secondary Objectives:

- To assess the frequency of post operative nausea and vomiting.
- To assess the severity of post operative nausea and vomiting.
- To assess the effect of prophylactic medication on post operative nausea and vomiting.

3. MATERIALS AND METHODS

Study Design and Site

A prospective observational study was conducted over six months in the surgical department of Aster RV Hospital, Bengaluru.

Sample Size

Ninety subjects were recruited based on sample-size calculation using a 95% confidence level and 1% margin of error.

Inclusion Criteria

- Adults (>18 years)
- Elective surgery under general anesthesia
- Provided written informed consent

Exclusion Criteria

- Congenital heart disease/mental retardation
- Cancer patients receiving chemotherapy

Data Collection

Demographics, co-morbidities, surgical details, anesthesia type, prophylactic antiemetic regimens, and intra-operative medications were documented. PONV was assessed at the recovery room, 2–8 hours, and 9–24 hours post-operatively.

Severity Assessment

APFEL score was used to assess PONV risk and severity.

Appropriateness Assessment

Each prophylactic medication was evaluated using the Lexicomp® database for:

- Indication
- Dose
- Patient factors (age, renal & hepatic status)

Statistical Analysis

Descriptive statistics (frequency, percentage, mean ± SD) were applied.

4. RESULTS

1. Demographics

A total of 90 patients were recruited (61.1% males, 38.9% females). The mean age was 54.4 years. Most subjects were non-smokers (78.9%) and non-vegetarians (62.2%). Common co-morbidities included hypertension + diabetes mellitus (15.5%), diabetes mellitus alone (13.3%), and hypertension alone (11.1%).

2. Types of Surgeries

The most frequent surgeries performed were:

- CABG (14.4%)
- Laparoscopic cholecystectomy (13.3%)
- Hernia repair (7.8%)

Over 40 additional surgeries were represented.

3. Prophylactic Antiemetic Prescribing Pattern

- **Ondansetron + Dexamethasone:** 78.8%
- **Ondansetron alone:** 17.7%
- **Dexamethasone alone:** 1.1%
- **No prophylaxis:** 2.2%

Doses were largely within therapeutic ranges; 91.1% of ondansetron prescriptions met Lexicomp® guidelines.

4. Incidence of PONV

- **Total incidence:** 61.1%
- **Nausea alone:** 24.4%
- **Vomiting alone:** 12.2%
- **Both:** 24.4%

Incidence was higher among:

- Females
- Non-smokers
- Subjects with history of motion sickness
- Subjects receiving intra-operative opioids

5. Severity (APFEL Score)

- Highest severity occurred in **APFEL score III** subjects
- Majority of nausea + vomiting cases occurred in APFEL score III

6. Treatment of PONV

Common treatments included:

- **Ondansetron** (various doses)
- **Pantoprazole**
- **Metoclopramide**
- **Combination regimens**

All patients reported full recovery within 24 hours.

5. DISCUSSION

Prior research presents limited information regarding prescribing patterns and medication appropriateness in patients given general anesthesia following surgery, and safety aspects of prophylactic medications are rarely reported. This indicates a need to assess the prescribing patterns of prophylactic medications in patients who underwent surgery at Aster RV Hospital.

In total, there were 90 surgical subjects eligible among 100 screened due to non-documentation of medications prescribed in the intraoperative theatre and the type of surgical procedure performed. The majority of the subjects included were male (61.1%). Among the eligible subjects, the most frequent age group was 60-69 years (26.7%) and the mean age for all subjects was 54.4 ±2.6 years. The majority of the subjects were non-smokers (78.8%) compared to smokers. Hospitalization

length for the majority of subjects ended at four days (41%). Most subjects identified for elective procedure had co-morbidities, including hypertension with diabetes mellitus (type II) (15.5%). The previous study done by Samuel Knoedler et al. is also concurrent with body mean age data of age group (around 60 years). This indicates that the majority of surgical subjects in this study were older than 55 years[50]

1. To Describe the Prescription Pattern of Medications as Prophylaxis for Post-Operative Nausea and Vomiting:

A study that examined 90 subjects undergoing elective surgery evaluated the use of general anesthetics (propofol, etomidate, and ketamine) commonly used with block anesthetics (rocuronium, ropivacaine, bupivacaine) as well as inhalational anesthetics (sevoflurane and desflurane). Multiple techniques were studied (nerve blocks and peripheral nerve block), but the majority of participants were administered combinations of medications via IV and/or intranasally. Additionally, 32.2% of subjects were administered general anesthetics and block/inhalational anesthetics. The results of this study were consistent with those reported by Sarah M. Kelly et al. in previous studies, namely that propofol was primarily used, although the combinations found in this study did not match any combinations reported in Kelly et al.'s study[48].

2. To Assess the Frequency of Post-Operative Nausea and Vomiting:

In a study involving 90 participants, 55 (61.1%) experienced nausea and vomiting following surgery. Within the first hour after surgery, 22 (24.4%) had nausea only, 11 (12.2%) had vomiting only, and 22 (24.4%) had both nausea and vomiting. In the period from hour 2 to hour 8, nausea was reported in 3 (3.3%) members of the SICU and 4 (4.4%) reported nausea in the ward. In addition, 3 (3.3%) members of the SICU and 7 (7.7%) members of the ward reported vomiting between hours 2 and 8. Low percentages were reported greater than 9 hours: 1 (1.1%) member of the ward experienced nausea, and 1 (1.1%) member of the ward experienced vomiting during the 9 to 24 hour period. There is no comparable studies that trialled participants after surgery.

3. To Assess the Severity of Postoperative Nausea and Vomiting:

In a study encompassing 90 subjects, it was found that 16.6% of males experienced nausea, as well as 7.7% of females. Males also experienced vomiting at 6.6% and females at 5.5%. Non-smokers had more cases of nausea and vomiting than smokers. A history of movement sickness was also associated with nausea and vomiting more frequently than reported by subjects without a history. In addition, it was reported that 24.4 % of subjects that received intra-operative opioid's, either reported nausea or nausea with vomiting[46]. The APFEL scoring system indicated that subjects scored II and III had more nausea reports with the III scores reporting more incidence of nausea and vomiting. The findings were consistent with previous studies demonstrating similar trends with the influences on non-smokers or patients with a history of motion sickness and the higher APFEL score categories[47].

4. To Assess the Effect of Prophylactic Medication on Post Operative Nausea and Vomiting:

of the 90 subjects who were recruited, the most common treatment (n = 29, 32.2%) was ondansetron by intravenous administration in the usual clinical dosages. The second most common medication (n = 21, 23.3%) was pantoprazole given for treatment of nausea. Nineteen subjects (21.1%) received a combination of pantoprazole and ondansetron for the treatment of nausea and vomiting. Two subjects received metoclopramide, dexamethasone and one subject received ondansetron and dexamethasone for both conditions (nausea and vomiting). Our findings of pantoprazole being superior to ondansetron for the treatment of PONV are substantiated by

findings from Rekha shah et.al., with only one difference identifying that ondansetron was not comparable to pantoprazole alone, but it was the most effective medication for vomiting[43].

6. CONCLUSION

1. Prophylactically, a combination of ondansetron and dexamethasone was most frequently prescribed, followed by ondansetron or dexamethasone alone, administered in therapeutic doses to treat nausea and vomiting.
2. Postoperative patients commonly reported nausea alone or nausea with vomiting during the recovery period.
3. Nausea alone occurred more often in males, non-smokers, and those with a history of motion sickness, while nausea with vomiting was more frequent in females with similar risk factors. All patients receiving opioid analgesics reported PONV.
4. For treatment of PONV, ondansetron and pantoprazole were most commonly administered, and all patients recovered within 24 hours of surgery.

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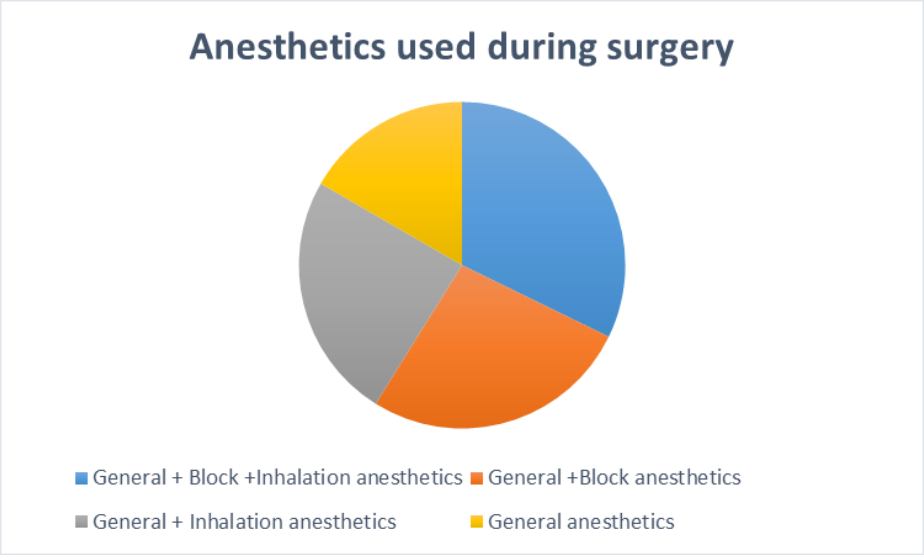
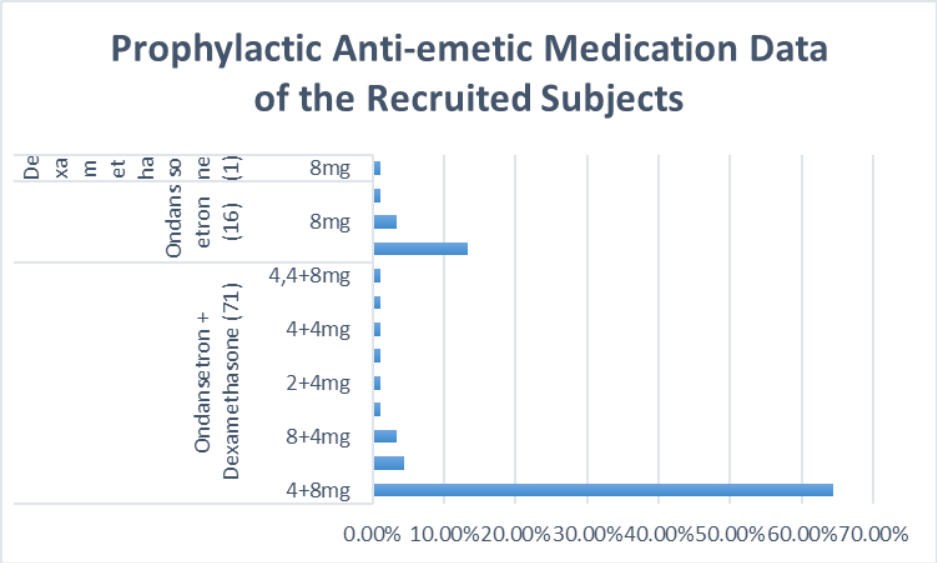
GRAPHS

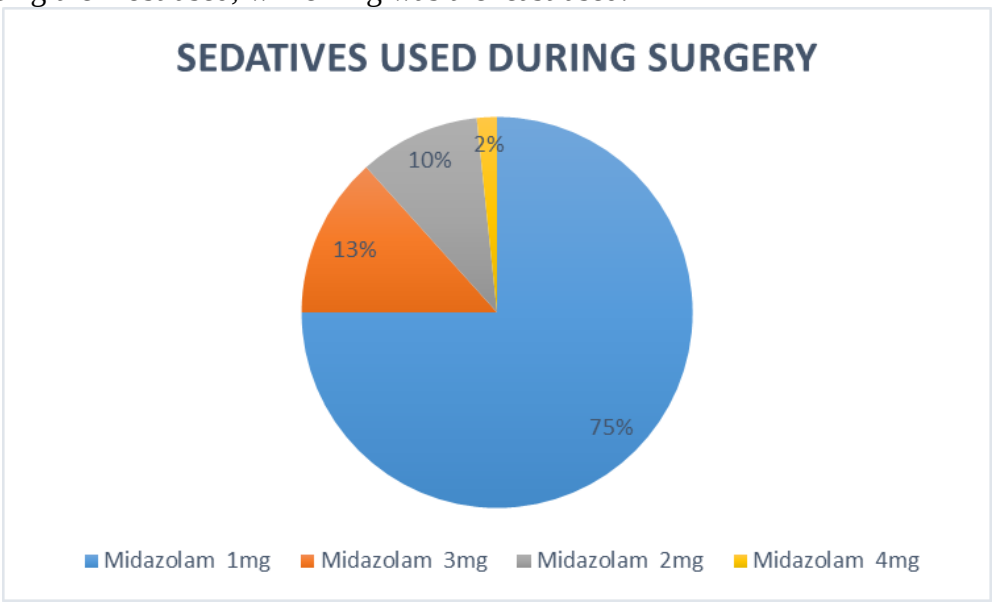
1. **Anesthetics Used During Surgery:** Ninety subjects undergoing elective surgery received various anesthetic combinations, primarily using intravenous and intranasal routes, with a preference for multiple agents over single.



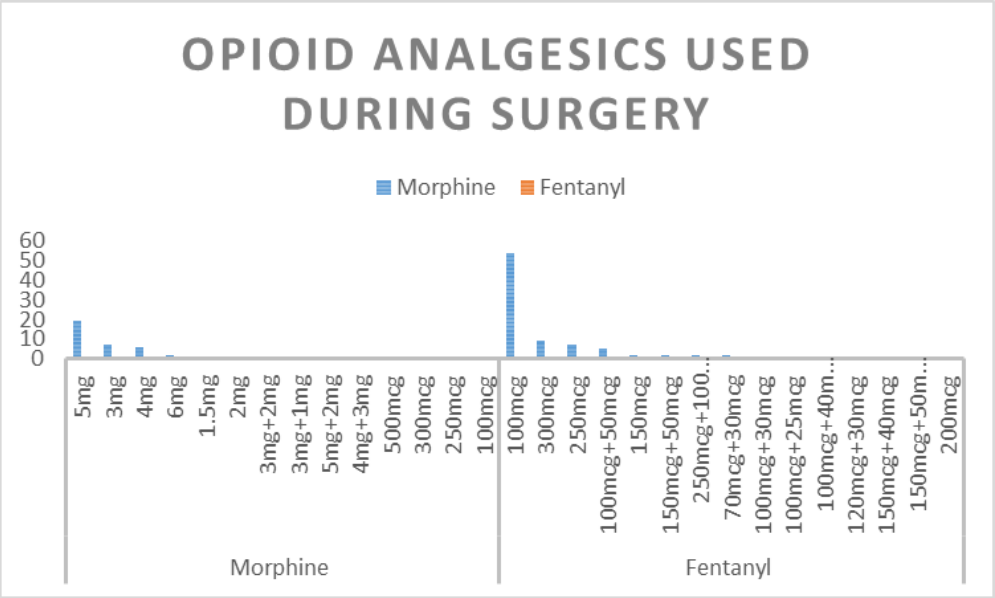
2. **Prophylactic Anti-emetic Medication Data of the Recruited Subjects:** Eighty-eight subjects received prophylactic anti-emetics, mainly a combination of ondansetron and dexamethasone.



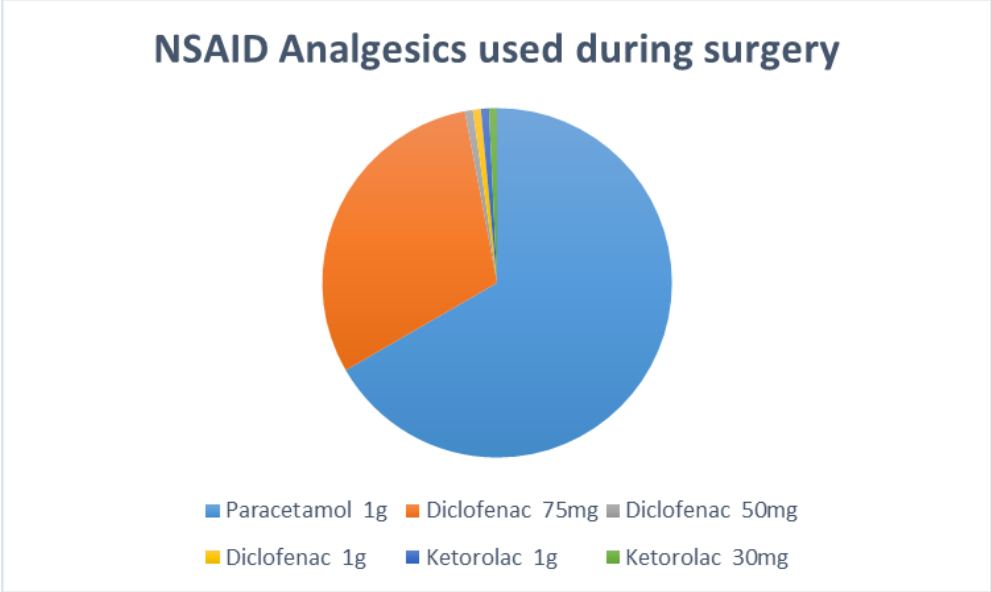
3. **Sedatives used During Surgery:** Sedative Midazolam was administered at various doses, with 1mg being the most used, while 4mg was the least used.



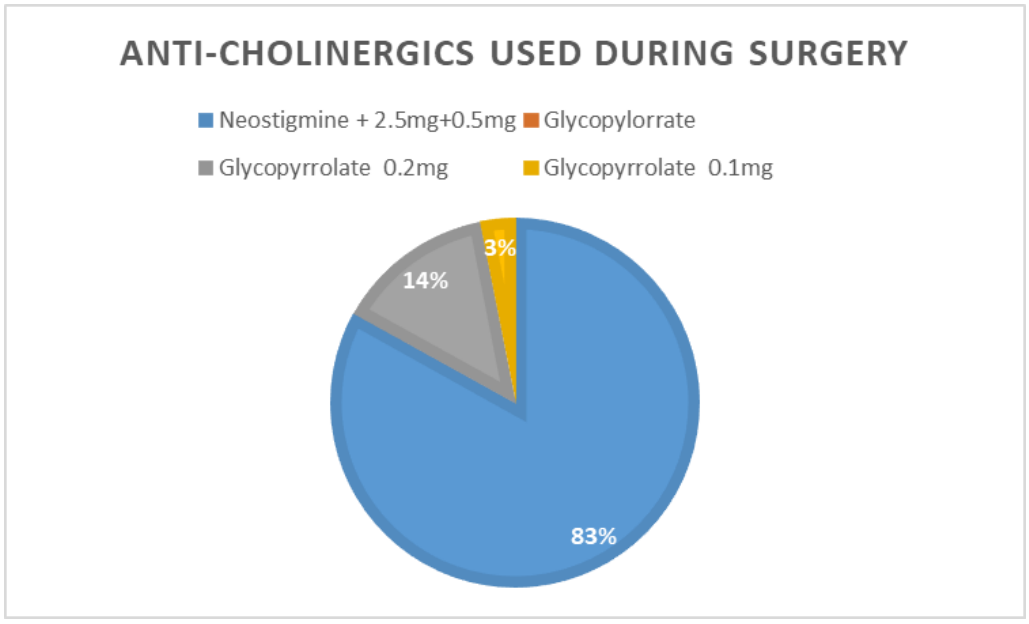
4. **Opioid Analgesics Used During Surgery:** Opioid analgesics such as morphine and fentanyl were administered at various doses in various frequencies at the start and during the surgery.



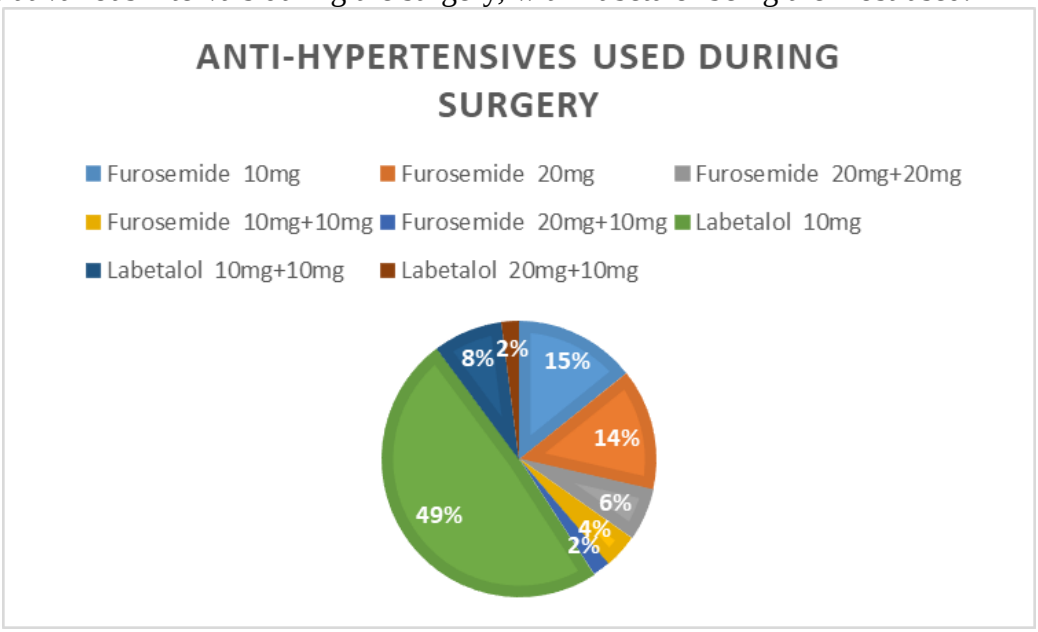
5. **NSAID Analgesics Used During Surgery:** NSAID analgesics such as paracetamol 1gram was administered at the frequency of once at the start of the surgery, whereas diclofenac and ketorolac were administered at various doses at the start and during the surgery, with Paracetamol being the more frequently used.



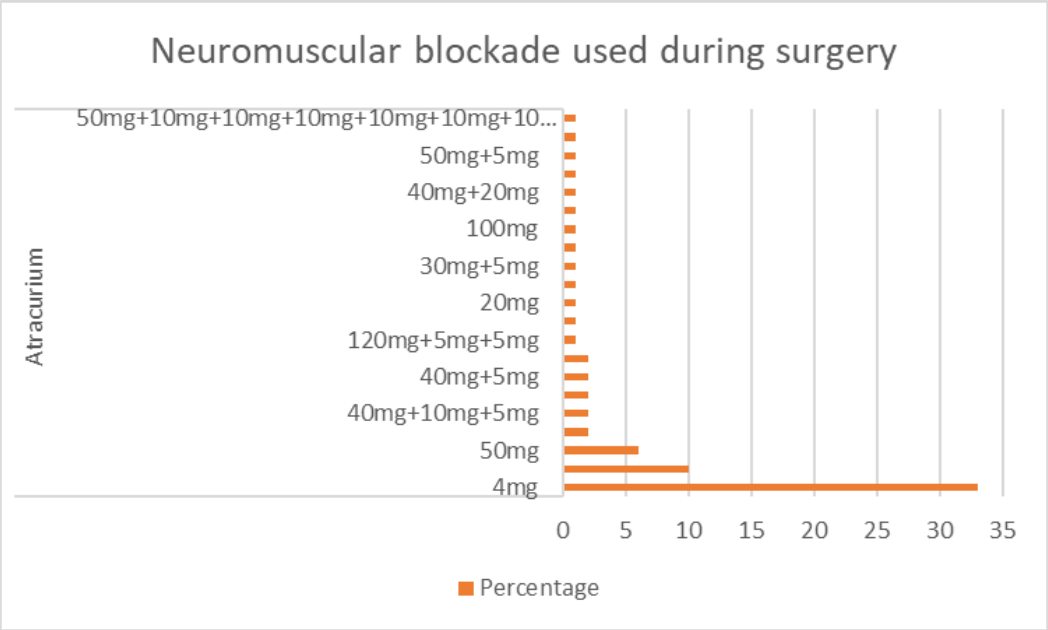
6. **Anti-Cholinergics Used During Surgery:** Neostigmine with glycopyrrolate 2.5/0.5mg was administered in majority of patients at the end of the surgery, however, glycopyrrolate was administered in various doses during the surgery.



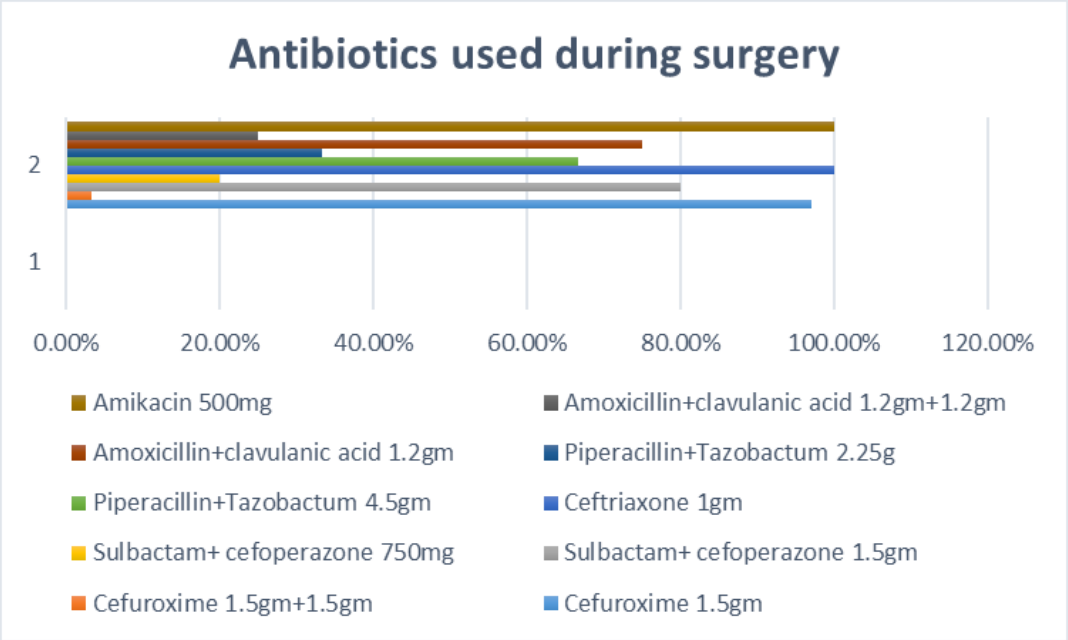
7. **Anti-Hypertensives Used During Surgery:** Anti-hypertensives were administered in various doses at various intervals during the surgery, with Labetalol being the most used.



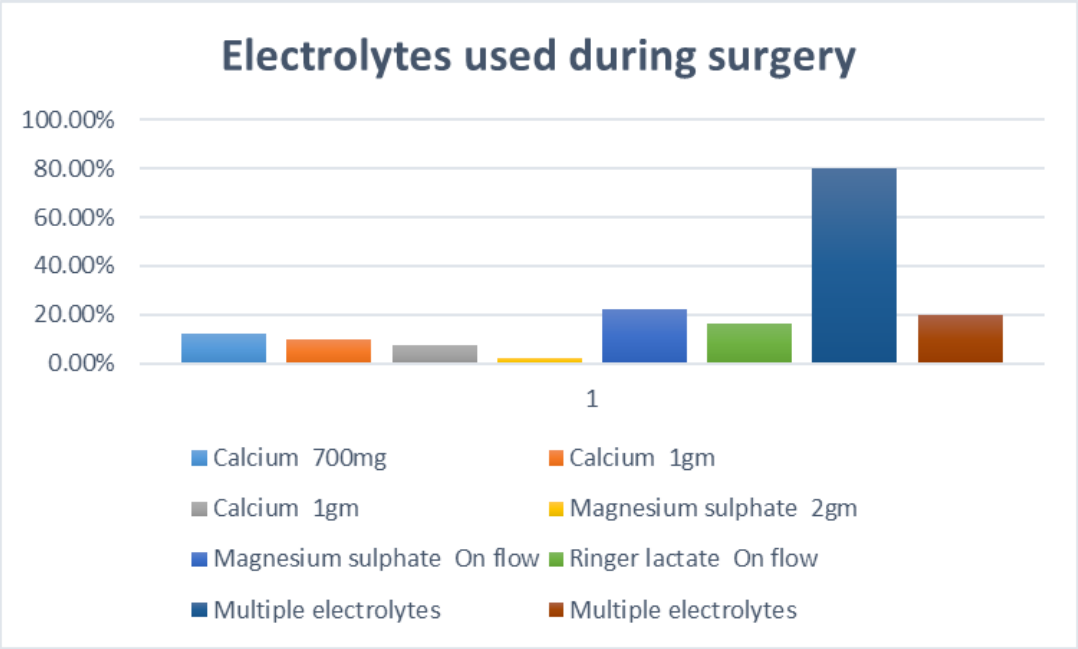
8. **Neuromuscular Blockade Used During Surgery:** Neuromuscular blockade such as atracurium was administered as intravenous infusion in various doses at various intervals during the surgery with 4mg being the most frequently used.



9. **Antibiotics Used During Surgery:** Antibiotics such as cephalosporins were administered in the majority of patients, followed by penicillin with beta-lactamase inhibitors at various doses during the surgery; however, a few patients were administered penicillin and aminoglycosides



10. **Electrolytes Used During Surgery:** Electrolytes such as calcium and magnesium sulphate were administered at various doses during the surgery whereas, ringer lactate and multiple electrolytes were administered at various doses throughout the surgery.


Electrolytes used during surgery
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
1
Calcium 700mg
Calcium 1gm
Calcium 1gm
Magnesium sulphate 2gm
Magnesium sulphate On flow
Ringer lactate On flow
Multiple electrolytes
Multiple electrolytes