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Original Article

Evaluating the Incidence of Post-Operative Nausea and Vomiting in General and Regional Anaesthesia Using Apfel Scoring System and Post-Operative Nausea and Vomiting Intensity Scale: A Prospective Observational Study

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ABSTRACT

Background: To evaluate the incidence of Post Operative Nausea and Vomiting in General and Regional anaesthesia using Apfel Scoring System and Post Operative Nausea and Vomiting Intensity Scale. **Materials and Methods:** A Prospective observational study was conducted in general surgery department at Vivekanandha Medical Care Hospital and Swamy Vivekanandha College of Pharmacy, Elayampalayam for a period of 6 months. 100 patients were recruited and their demographic details, type of anaesthesia and risk factors were monitored. The incidence of Post Operative Nausea and Vomiting (PONV) in patients who underwent surgery was assessed using the Apfel Scoring System and PONV intensity scale. The outcomes were studied and the data were analyzed using Graph Pad Prism. **Results:** In our study, which involved 100 patients, two groups were established: 50 underwent surgery with general anesthesia, and 50 with regional anesthesia. The majority of patients belonged to the 59 to 68 age group. We utilized the Apfel simplified scoring system to assess Post Operative Nausea and Vomiting risk in patients who had undergone both general and regional anesthesia. We then determined the incidence of Post Operative Nausea and Vomiting using a PONV intensity scale. Significantly, the Apfel simplified scoring system confirmed the suitability of the administered antiemetic drug for each patient in our study. **Conclusion:** Post Operative Nausea and Vomiting (PONV) is a significant challenge in surgery, impacting patient recovery and increasing healthcare costs. Our research found that Post Operative Nausea and Vomiting (PONV) incidence varies based on anesthesia type, with general anesthesia leading to higher rates compared to regional anesthesia. Additionally, regardless of anesthesia type, females consistently experienced higher Post operative nausea and vomiting rates than males, highlighting a gender-based trend.

Key words: Post-operative nausea and vomiting, anaesthesia, Apfel scoring system, Intensity scale.

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INTRODUCTION

The phrase "Post-Operative Nausea and Vomiting" (PONV) refers to nausea and/or vomiting that starts to manifest 24 hr after surgery. Approximately 70-80% of high-risk individuals may be affected by this illness. The root reasons of PONV vary and include things like personal characteristics, anesthetic techniques, and surgical risks. PONV increases patient discomfort and dissatisfaction and raises hospital expenses because of longer stays. For example, a study indicated that patients experiencing PONV had a 25% longer post-surgery recovery time.[1] Severe consequences such as aspiration in the lungs may lead to vomiting, which worsens the condition of the patients and increases costs of healthcare facilities. PONV, or postoperative distress, is a serious condition that can lead to hospital readmissions and additional costs. Effective management involves assessing risks, implementing preventive measures, and prompt intervention.[2] Historically, PONV was more frequent and severe with general anesthesia compared to regional anesthesia methods. Recent research indicates a shift in the field of regional anesthesia, with a growing interest in investigating causes, identifying high-risk individuals, and developing preventive and treatment plans for PONV, highlighting current recommendations and exploring alternative therapeutic options.[3-5] A vital tool for assessing the risk of Post Operative Nausea and Vomiting (PONV) is the

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1999-created Apfel simplified risk score. Six popular prediction models have had their utility and validity assessed. The simplified Apfel score, which accounts for female gender, PONV history, non-smoking status, and opioid use, has been found to have better calibration and discriminating features. This multimodal approach may help keep the cost of preventative medication under control by treating fewer individuals.[6,7] Using a systematic survey among patients, families, and medical professionals as well as a study of the literature, the PONV intensity scale identifies significant cases of postoperative nausea and vomiting and assesses its clinical significance and importance.[8] A PONV scale was created to rate the severity of vomiting episodes, and the study determined the factors that affect nausea, such as strength, frequency, and duration.[9,10]

MATERIALS AND METHODS

For six months, this prospective observational study was carried out (MARCH 2023-AUGUST 2023) involving 100 patients who underwent surgical procedures. Among 100 patients, 50 underwent surgery using GENERAL ANAESTHESIA and remaining 50 underwent surgery using REGIONAL ANAESTHESIA at the surgery department tertiary care hospital (Vivekanandha Medical Care Hospital and Swamy Vivekanandha Medical College Hospital and Research Institute).

INCLUSION & EXCLUSION CRITERIA

Patients who underwent surgery with surgical procedure ≥30 min and patient ≥18 years old are included in the study. Patients who had previously used Palanosetron had previously received chemotherapy, radiation, or experimental medications within 30 days prior to surgery, pregnancy or women who want to become pregnant while the trial is underway and those who decline to participate in the trial or who are unwilling are excluded from the study.

PLAN OF STUDY

STUDY PROCEDURE

A prospective observational study was conducted in the General Surgery Department at VMCH and SVMCH & RI, Namakkal. This investigation was conducted prospectively during a 6 month period. The ethics committee approved the study before it started. The plan of the study is explained in Figure 1. The study's inclusion and exclusion criteria were used to determine which patients were included. The patient information was gathered using a structured patient demographic questionnaire. The incidence of PONV (Post-Operative Nausea and Vomiting) in patients was evaluated using the PONV Intensity Scale. The incidence of PONV was evaluated using the score derived from the aforementioned scale. The significance of the findings was assessed after statistical analysis of the data.

DATA COLLECTION

Patients' case sheets and direct patient interviews were used to gather information on the patient, including gender, motion sickness, smoking status, and usage of post-operative painkillers, using a structured data collecting form with patient demographic proforma. Microsoft Excel 2019 was used to perform a descriptive analysis on the data, with percentages and numbers representing the findings.

RESULTS

Age wise distribution of study population

Over the course of the trial, 100 patients received postoperative treatment in the general surgery wards of Tiruchengode's Swamy Vivekanandha Medical College Hospital and Research Institute and Vivekanandha Medical Care Hospital. Among the 100 patients, 14% fell between the ages of 18 and 28, 9% between 29 and 38, 16% between 39 and 48, 12% between 49 and 58, 23% between 59 and 68, 19% between 69 and 78, and 7% between 79 and 88.

Gender wise distribution of study population

Among 100 patients, (52%) patients were identified as male and (48%) patients were identified as female.

Distribution based on surgery department

Among 100 patients, 46 patients are in General surgery Department, 16 patients are in Orthopedics department, 32 patients in Urology department, 3 patients in Gynaecology Department and 3 patients in ENT Department.

Diagnosis based characterization of study population

Among 100 patients, 18 patients were done surgery for Fracture, 12 patients were done surgery for OA knee,12 patients were done surgery for Calculus, 6 patients were done surgery for Hernia, 4 patients were done surgery for Diabetic foot ulcer, 4 patients were done surgery for Prostatomegaly, 4 patients were done surgery for Cholelithiasis, 3 patients were done surgery for fibroid uterus, 2 patients were done surgery for appendicitis, 2 patients were done surgery for OA Hip, 5 patients were done surgery for Hemorrhoids, 3 patients were done surgery for ENT, 25 patients were done surgery for other general surgery.

Combination of drugs provided in regional anaesthesia

Among 100 patients, 50 patients were provided with regional anaesthesia, 23 patients were administered with Bupivacaine + Clonidine, 17 patients were administered with Bupivacaine + Bupergesic, 5 patients were administered with Bupivacaine + Buprenorphine and 5 patients were administered with Bupivacaine.

Combination of drugs provided in general anaesthesia

Among 100 patients, 50 patients were provided with General Anaesthesia, 6 patients were administered with Propofol + Fentanyl + Succinycholine + Vecuronium, 1 patient were administered with Glycopyrrolate + Midazolam + Propofol + Fentanyl + Succinylcholine + Vecuronium + Neostigmine, 2 patients were administered with Glycopyrrolate + Midazolam + Propofol + Fentanyl + Succinylcholine + Vecuronium, 35 patients were administered with Glycopyrrolate + Midazolam + Propofol + Fentanyl + Succinylcholine + Vecuronium, 2 patients were administered with Glycopyrrolate + Midazolam + Fentanyl + Succinylcholine + Vecuronium, 1 patient was administered with Glycopyrrolate + Midazolam + Propofol + Fentanyl + Neostigmine, 1 patient was administered with Glycopyrrolate + Midazolam + Propofol + Fentanyl + Succinylcholine + Vecuronium + Isoflurane, 1 patient was administered with Midazolam + Propofol + Fentanyl, and 1 patient was administered with Glycopyrrolate + Midazolam + Propofol + Succinylcholine + Vecuronium.

Gender-wise distribution in regional anaesthesia

Among 50 patients provided with regional anaesthesia, (62%) patients were identified as Male and (38%) patients were identified as Female.

Gender-wise distribution in general anaesthesia

Among 50 patients provided with General anaesthesia, (44%) patients were identified as Male and (56%) patients were identified as Female.

Prophylactic treatment of anti-emetics in regional anaesthesia

Among 50 patients of regional anesthesia, (92%) of patients were administered with Inj. Ondansetron as prophylactic anti-emetic and (8%) of patients were administered with Inj. Dexamethasone as prophylactic anti-emetic.

Prophylactic treatment of anti-emetics in general anaesthesia

Among 50 patients of General anaesthesia, (82%) of patients were administered with Inj. Ondansetron as prophylactic anti-emetic and (18%) of patients were administered with Inj. Dexamethasone as prophylactic anti-emetic.

Apfel risk score assessment of PONV in regional anaesthesia

Among 50 patients of Regional anaesthesia, 6 patients were assessed with risk score of 1, 24 patients were assessed with risk score of 2, 14 patients were assessed with risk score of 3 and 6 patients were assessed with risk score of 4 (Figure 2).

Apfel risk score assessment of PONV in General Anaesthesia

Among 50 patients of General anaesthesia, 1 patient was assessed with risk score of 1, 17 patients were assessed with risk score of 2, 20 patients were assessed with risk score of 3 and 12 patients were assessed with risk score of 4 (Figure 3).

PONV intensity score assessment in Regional Anaesthesia

Among 50 patients of Regional anaesthesia, (38%) of patients were assessed with intensity score of 2, (22%) of patients were assessed with intensity score of 4, (18%) of patients were assessed with intensity score of 8, (16%) of patients were assessed with intensity score of 50, (4%) of patients were assessed with intensity score of 100 and (2%) of patients were assessed with intensity score of 200 (Figure 4).

PONV intensity score assessment in General Anaesthesia

Among 50 patients of General anaesthesia, (4%) of patients were assessed with intensity score of 2, (18%) of patients were assessed with intensity score of 4, (14%) of patients were assessed with intensity score of 8, (28%) of patients were assessed with intensity score of 50, (24%) of patients were assessed with intensity score of 100, (6%) of patients were assessed with intensity score of 150 and (6%)of patients were assessed with intensity score of 200 (Figure 5).

DISCUSSION

The term "Post Operative Nausea and Vomiting" (PONV) refers to nausea and/or vomiting that occurs one to two days after surgery. This condition can impact approximately 70% to 80% of individuals deemed at high risk. The complex underlying factors contributing to PONV include individual characteristics, anesthesia methods, and surgical risks. PONV not only results in heightened patient discomfort and dissatisfaction but also contributes to increased hospital costs due to extended stays. For instance, one study demonstrated that patients experiencing PONV had a 25% longer post-surgery recovery period. It was widely believed that PONV was more frequent and severe when patients received general anesthesia as opposed to regional anesthesia methods. Essential insights into the connection between anesthetic techniques and PONV have come from recent controlled studies. Since general anesthesia has been linked to a higher prevalence of PONV, research on the disease has typically focused on individuals undergoing this kind of treatment. Many antiemetic drugs and procedures to reduce the risk of post-operative nausea and vomiting have been developed as a result of this focus. Furthermore, among female patients in particular, PONV constituted a significant concern as a consequence after surgery.[11,12] One hundred patients in

all were split into two groups for this study: fifty underwent surgery under general anesthesia, and fifty underwent surgery under regional anesthesia. When the patients were categorized by age, those in the 59-68 age range made up the bulk. There is no correlation between age and the likelihood of post-operative nausea and vomiting. As you get older, it gets smaller. Compared to men, women in our research cohort had a greater frequency of postoperative nausea and vomiting (PONV). In accordance with the observations reported in article by Yoshitaka Fujii 2009 it is established that female patients exhibit a PONV incidence 1.5-3 times higher than that of male patients. This increased susceptibility is primarily attributed to elevated plasma progesterone levels during their menstrual cycles. Female patients undergoing surgery are exposed to anesthesia drugs and the physiological stress of surgery, which can further exacerbate the effects of elevated progesterone. Anesthesia drugs can affect the body's ability to regulate nausea and vomiting, and the stress of surgery can also contribute to postoperative nausea. In the course of our research, we conducted an analysis involving a cohort of 50 patients who had undergone regional anesthesia. The risk score assessed was 2, primarily among a group of 50 patients who underwent surgery using regional anesthesia. These patients exhibited risk factors that were stratified using the Apfel simplified risk score. The predominant proportion was found in just 2 out of the 4 risk factors that were taken into account in the Apfel score in this study population (Figure 2). In cohort of 50 patients who had undergone general anesthesia. In this specific group, a significant proportion of the patients, representing the majority, received a risk score of 3. These patients exhibited risk factors that were stratified using Apfel simplified risk score. The significant proportion was found in 3 out of 4 risk factors that were taken account in the Apfel score in this study population (Figure 3). Jai Darvall *et al.*, in 2021 conducted a study that the Apfel simplified scoring system tool was employed to assess the risk score.[13] This tool incorporated four risk factors, namely, female sex, non-smoking status, a history of PONV or motion sickness, and the use of postoperative opioids. The study categorized patients based on their risk score and examined how these risk factors were considered in research studies that utilized the Apfel Risk Score. In our study, we implemented the Apfel simplified risk score to determine the patients' risk factors and calculate their scores. Among the 50 patients who received regional anesthesia, the assessments for Post Operative Nausea and Vomiting (PONV) showed varying levels of intensity. Notably, 38% of them experienced mild PONV with a score of 2, while 22% had moderately intense episodes with a score of 4. Additionally, 18% reported a moderate level of intensity with a score of 8, and 16% faced severe PONV with a score of 50. A smaller percentage, 4%, experienced very intense PONV with a score of 100, and only 2% reached the maximum intensity (Figure 4). In contrast,

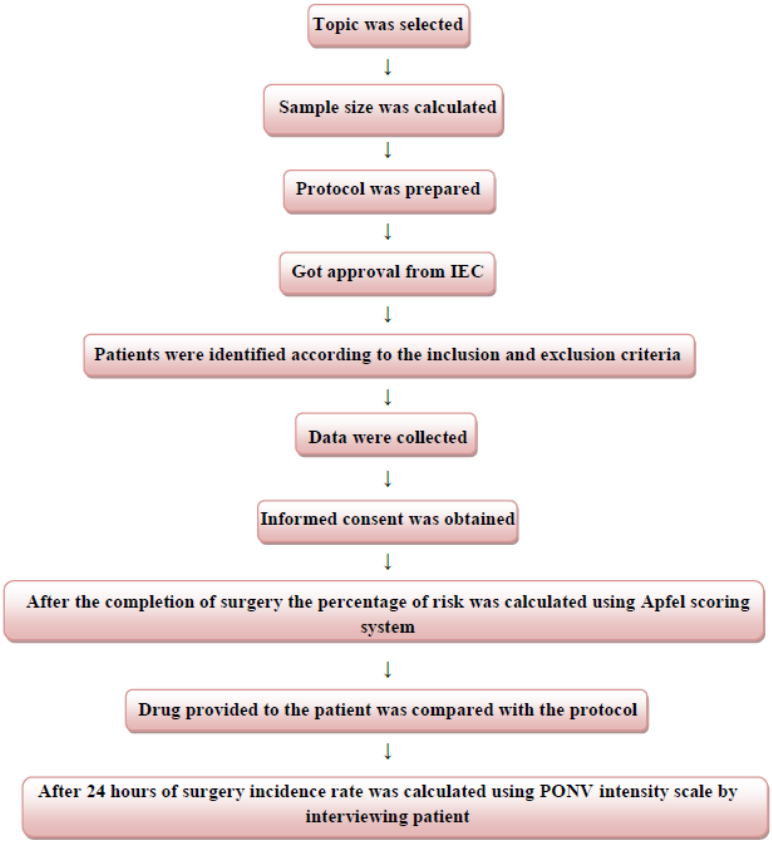

Figure 1: Plan of study.

among the 50 patients who underwent general anesthesia, the PONV intensity scores displayed different patterns. Only 4% reported mild PONV with a score of 2, whereas 18% experienced a moderate episode with a score of 4. Furthermore, 14% had moderate intensity with a score of 8, and a substantial 28% faced severe PONV with a score of 50. Moreover, 24% reported very intense PONV with a score of 100, while 6% experienced extreme scores of 150 or 200. These findings underscore the contrasting PONV experiences between the two anesthesia groups, emphasizing the necessity for tailored management strategies (Figure 5).[14] The intensity scores mentioned were acquired through post-surgery questionnaires administered to patients 24 hr after their procedures, utilizing the PONV intensity scale. Veiga Dalila *et al.*, 2013 employed the PONV intensity scale to validate the intensity scores reported by the patients included in their research.[15] They were able to precisely count the number of research participants who had Post Operative Nausea and Vomiting (PONV) because to this stringent validation approach. A thorough grasp of this crucial component of postoperative treatment has been made possible by the researchers' use of the PONV intensity scale, which offered a dependable and consistent means to evaluate and quantify the severity of PONV episodes.[16]

In our study, we implemented Apfel scoring system along with the Post Operative Nausea and Vomiting (PONV) intensity scale as a crucial tool to comprehensively evaluate the incidence and severity of PONV among selected group of 100 patients. Furthermore, our study aimed to assess the effectiveness of anti-emetic drugs in mitigating PONV among these 100 patients. Overall, the combination of the PONV intensity scale and the assessment of anti-emetic drug effects provided a comprehensive and detailed examination of PONV in our study.

PROPHYLAXIS AND POST OPERATIVE ANTIEMETIC ADMINISTRATION

In a group of 50 patients with regional anesthesia, 92% received Inj. Ondansetron as a preventive, antiemetic, and 8% got Inj. Dexamethasone for prophylactic use in a separate group of 50 patients with general anesthesia, 82% were given Inj. Ondansetron for prophylactic antiemesis, while 18% received Inj. Dexamethasone as a preventive measure against nausea and vomiting. Dexamethasone injections were administered to patients with a high-risk score, with a higher prevalence among female patients. In contrast, ondansetron was commonly given

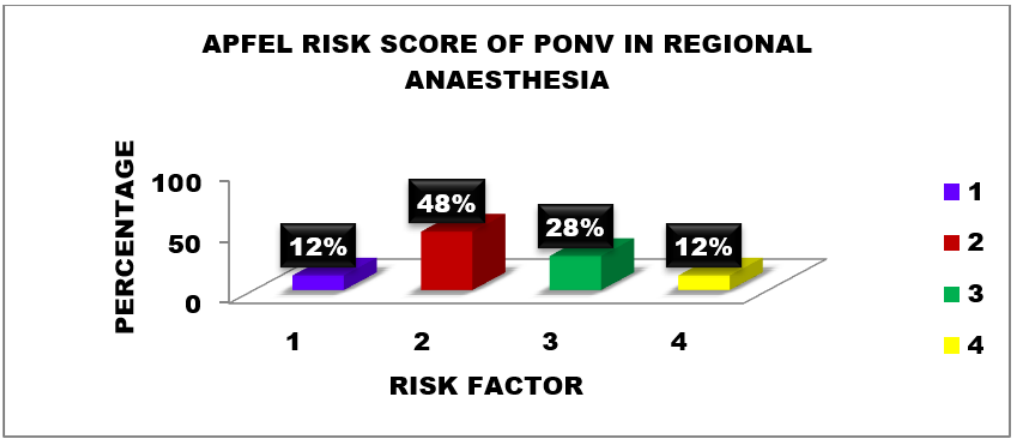

Figure 2: Apfel Risk Score of PONV In Regional Anaesthesia.

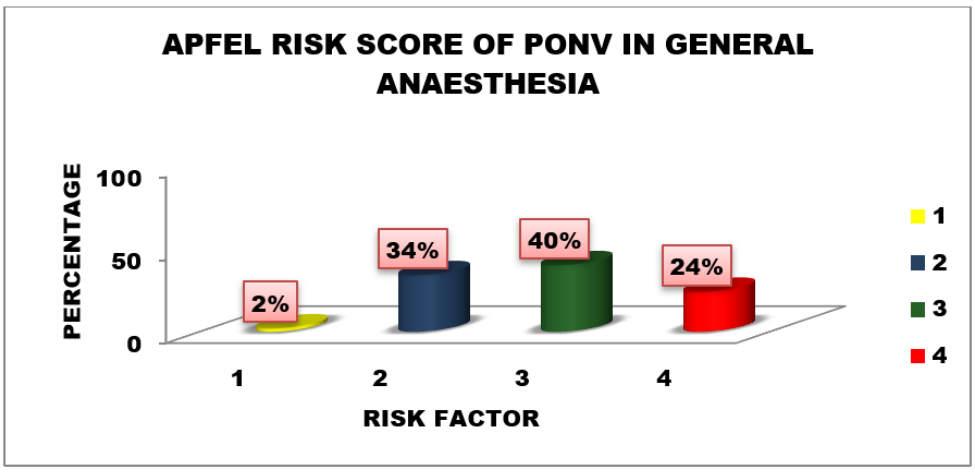

Figure 3: Apfel Risk Score of PONV in General Anaesthesia.

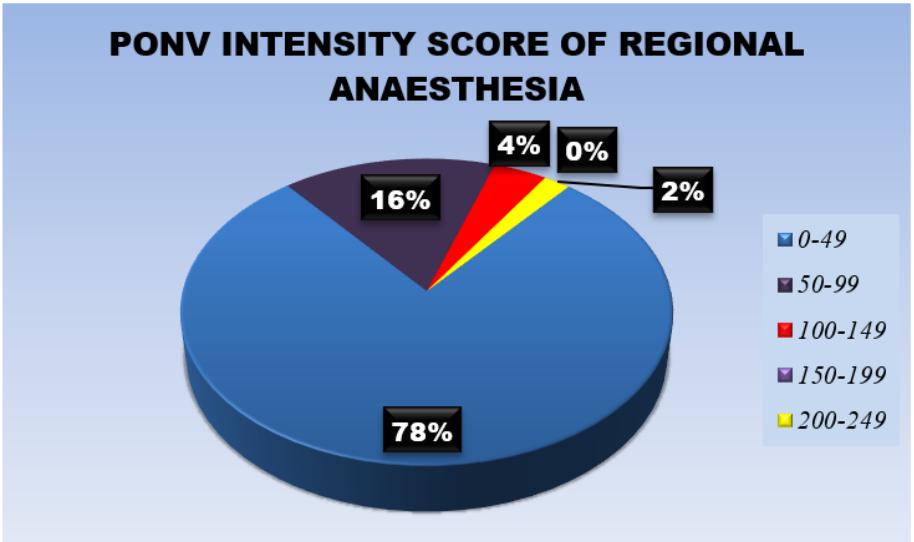

Figure 4: PONV Intensity Score of Regional Anaesthesia.

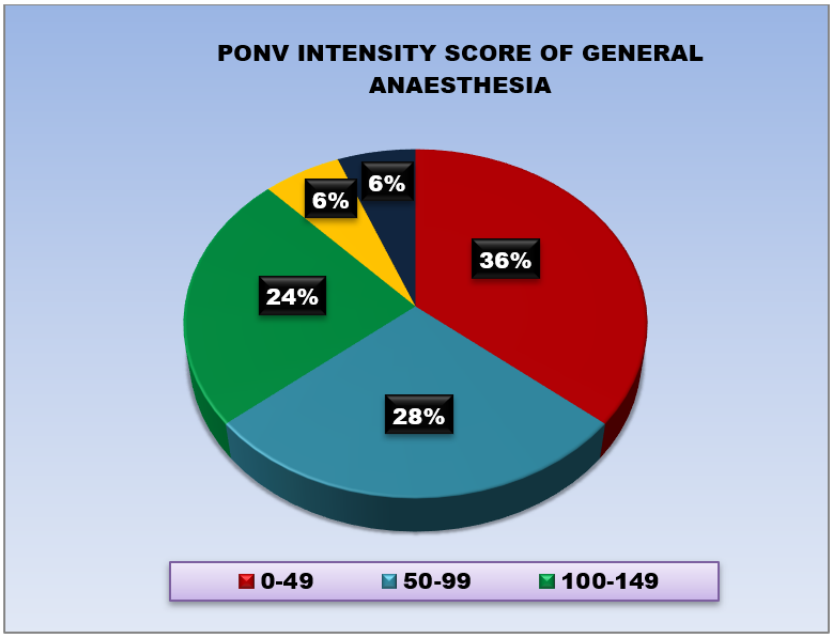

Figure 5: PONV Intensity Score of General Anaesthesia.

to all patients. Patients received prophylactic and post-operative antiemetic medications based on the risk scores determined using the Apfel Simplified Risk Score in the study population, including those who underwent surgery with both general anesthesia and regional anesthesia. Sam Jenkins Stephenson *et al.*, 2021 the risk of Post-Operative Nausea and Vomiting (PONV) for each participant was evaluated using the Apfel grading method. During surgery, a conventional PONV prophylaxis strategy was applied.[17]

CONCLUSION

Post Operative Nausea and Vomiting (PONV) is a major concern in surgical recovery, as it can delay a patient's return to normal activities and increase healthcare costs by extending hospital stays. Research has shown that the incidence of PONV is significantly higher in patients who undergo general anesthesia compared to those who receive regional anesthesia. Furthermore, the study identified a gender-related trend, with female patients consistently experiencing higher rates of PONV than male patients, regardless of the type of anesthesia used. These insights emphasize the impact of anesthesia choice and gender on postoperative recovery.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

PONV: Post Operative Nausea and Vomiting.

ETHICS APPROVAL

The Institutional Ethics Committee of Vivekanandha Medical Care Hospital gave its approval for this study (Ref. No. SVCP/IEC/MAR/2023/23). The consent was taken from the patient to participate in the study.

SUMMARY

In this study, all 100 patients undergoing surgery were given prophylactic antiemetic therapy to minimize the risk of Post Operative Nausea and Vomiting (PONV), with an even distribution of 50 patients each in the general and regional anesthesia groups. Within the regional anesthesia group, 92% of patients received Inj. Ondansetron and 8% received Inj. Dexamethasone. In comparison, the general anesthesia group saw 82% of patients administered Inj. Ondansetron, while 18% were given Inj. Dexamethasone. These findings indicate a consistent reliance on Ondansetron as the primary antiemetic in both anesthesia types, with a relatively greater use of Dexamethasone in the general anesthesia group. The universal use of prophylactic antiemetics underscores a proactive approach to managing PONV and enhancing the quality of postoperative recovery.

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