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COMPARISON OF ONDANSETRON AND METOCLOPRAMIDE IN PREVENTION OF POSTOPERATIVE NAUSEA AND VOMITING (PONV) AFTER LAPAROSCOPIC VS OPEN CHOLECYSTECTOMY (ADULT PATIENTS)

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Ondansetron, Metoclopramide, Postoperative Nausea and Vomiting (PONV), Laparoscopic Cholecystectomy, Open Cholecystectomy, Antiemetic Efficacy, Perioperative Management.

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Abstract

ABSTRACT

Background: One of the most upsetting side effects of anesthesia is still postoperative nausea and vomiting (PONV), especially during abdominal procedures like laparoscopic and open cholecystectomy. Improved healing results, shorter hospital stays, and patient comfort all depend on effective prevention. Metoclopramide, a dopamine antagonist, and ondansetron, a 5-HT3 receptor antagonist, are often used antiemetics; however, further research is needed to determine how effective they are in various surgical techniques.

Methodology: The efficacy of ondansetron and metoclopramide on postoperative nausea and vomiting (PONV) in patients undergoing laparoscopic and open cholecystectomy will be compared as observational crossectional study. Participants provided information on antiemetic procedures,

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medication options, medication dosage, time, method of administration and postoperative results of adult patients with open and laparoscopic cholecystectomy. Statistical analysis was done using version 27 of the Statistical Package for the Social Sciences (SPSS). To compare the effects of ondansetron and metoclopramide on PONV incidence, the descriptive statistics (mean, median, mode, and (standard deviation) and inferential tests were applied.

Results: Ondansetron worked better overall than Metoclopramide in avoiding postoperative nausea and vomiting based on the descriptive statistical analysis. The majority of patients did not have PONV as indicated by the mean PONV score of 0.34 (median 0, mean 0, mode 0) Fasting onboard, lower values favoured Ondansetron group. Additionally, overall nausea severity values had higher mean (0.77), median (1.00), and mode (0.00) values, indicating that patients using metoclopramide had more nausea whereas those taking ondansetron had better control. Ondansetron's efficacy was also supported by the low frequency of Mean - 0.49 (median - 0.00 (mode - 0.00), episodes vomiting) In Metoclopramide group had increased rescue antiemetic use (mean 0.51, median 1.00, mode 1.00), indicating that Ondansetron required less additional drugs. Ondansetron superiority was also supported by the low levels of early nausea (mean 0.45), nausea and vomiting (mean 0.27) and PONV at 24 hours (mean 0.32). Lastly patients taking ondansetron had better patient satisfaction (mean 2.16). Overall, these mean, median, and mode values show that ondansetron was better than metoclopramide in prophylactic treatment of PONV and better postoperative results.

Conclusion: The study concludes that ondansetron provides superior prophylaxis against PONV compared with metoclopramide, especially in laparoscopic procedures where emetogenic risk is higher. Adequate intraoperative administration and adherence to guideline- based antiemetic protocols significantly enhance postoperative recovery and patient satisfaction.

INTRODUCTION

The most annoying and clinically significant adverse event following general anesthesia and surgery is postoperative nausea and vomiting (PONV) that obstructs patient comfort, hinders the onset of

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mobility and discharge, as well as the use of medical resources. There are many studies which indicate that postoperative nausea and vomiting (PONV) remains a relatively common problem in the older surgical population where prophylaxis is not given a particular attention despite the advances in both anesthetic and surgical methods. Such negative outcomes increase the length of stay during the post-anesthesia care unit (PACU), decrease patient satisfaction, increase the need of rescue antiemetics and the incidence of issues such as aspiration, wound dehiscence, or electrolyte imbalances (1,2,3).

In particular, the presence of surgical manipulation and anesthetic factors, the procedure of cholecystectomy in the framework of abdominal surgery either by means of minimally invasive laparoscopic operation or traditional open surgery is particularly topical to the risk of PONV. Laparoscopic cholecystectomy is currently the gold standard of symptomatic gallstones due to its advantages of reduced pain, reduced hospitalization, and faster recovery. Nevertheless, it also carries with it some emetogenic stimuli, such as CO 2 insuffiliation, pneumoperitoneal creation, diaphragmatic irritation, and fast visceral traction. The above factors lead to nausea and vomiting through the stimulation of serotonin-intermediated processes and hyperstimulation of neurogenic vagal afferents. As a recent review by Xu synthesized neural circuit processes of emesis, vagal afferent stretching and enterochromaffin- cell release of serotonin are of importance in laparoscopic procedures. Conversely, although open cholecystectomy is somewhat less prevalent these days, it remains and is present in complicated cases as well as has its own triggering factors, including longer operating times, more tissue destruction, more intensive opioid use, and more apparent fluid and inflammatory alterations, all of which contribute to the risk of PONV independently (4,5,6).

In selecting a successful prophylaxis, the pathophysiology of PONV is vital. The nausea and vomiting are mediated by both central and peripheral pathways, the afferent information is received by the chemoreceptor-trigger zone (CTZ) of the brainstem and nucleus tractus solitarius (NTS). Neurotransmitter systems are the main occurrence of the emetic reaction, including serotonin (5-HT3), dopamine (D2), neurokinin-1 (NK1), and muscarinic receptors. These pathways are directly provoked by peripheral stimuli such as vagal stimulation, gut distension and the release of serotonin

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by enterochromaffin cells. Pharmacologic perspective of the two antiemetics of interest in this thesis have different receptor profile and action mechanisms. Serving as a major part of PONV prophylaxis, the ondansetron is a selective 5- HT3 receptor antagonist, which inhibits serotonin-mediated centrally (CTZ/NTS) and peripheral vagal afferent impulses. Conversely, metoclopramide is primarily a dopamine D2 antagonist, together with the activity of prokinetics to enhance the emptying of the stomach and reduce gastric stasis, the effect of which is a nausea-inducing vomiting stimulator (7,8).

Even in certain surgical case scenarios, ondansetron could be more advantageous than metoclopramide, as reported by a number of comparative studies. As an example, a relatively small dose of intravenous ondansetron (4 mg) reduced the degree of nausea upon surgery significantly in a Pakistani female laparoscopic cholecystectomy cohort compared to metoclopramide (10 mg), particularly in the first 6 hours of recovery. Besides, further assessments of PONV therapy identify 5-HT3 antagonists as the foundation of prophylaxis prescribed by guidelines and indicate multimodal approaches depending on patient risk.

Nonetheless, the issue of cost, the availability of the agents, and one-drug prophylaxis remain widespread in low- and middle-income countries, which proves direct comparisons of readily available and affordable antiemetics even more useful. Palonosetron was most effective and ondansetron was more effective compared to that of metoclopramide. The findings provide reason to believe in the comparison between the efficacy of the antiemetic agent metoclopramide and ondansetron in laparoscopic surgeries (9,10,11).

The risk of PONV is prescribed to a great part by the perioperative, patient-specific, and pharmacologic factors. Patients with previous motion sickness or PONV history are more susceptible to it as well as younger adult people, women, and non-smokers. The anesthetic choices which include the use of nitrous gas, volatile agents and perioperative opioids also immensely enhance emetogenic potential. Consequently, there is a progressive tendency to recommend the tailoring of prophylaxis to the type of surgery and the risk profile of a particular patient. The examples include the findings

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that total intravenous anesthesia (TIVA) with propofol, as well as opioid-sparing multimodal anesthesia, which involves non-opioid analgesics, can greatly reduce the rate of PONV after laparoscopic operations (12,13,14).

Peritoneal stretching, positioning of the patients, and the pressure of CO2 insufflation are the unique emetogenic triggers of the laparoscopic cholecystectomy that is currently considered the gold standard in the entire world. Such changes in the physiology directly cause the activation of the chemoreceptor trigger zone through the stimulation of the vagal nerve and the release of serotonin in enterochromaffin cells. Conversely, the primary causes as to why open cholecystectomy is most likely to result in PONV are greater surgical stress, length of anesthetic exposure, and greater postoperative analgesic use. To select the antiemetic that is most applicable in each surgical circumstance, one must comprehend or understand these diverse mechanisms (15,16).

The relative cost factor remains an obstacle to the routine prescription of ondansetron in the lower and middle-income world (LMICs), even though the former remains widely regarded as the first-line agent nationally. Meanwhile, the less powerful but extensively available metoclopramide is still strongly accessible, affordable and a common choice in South Asian state-run hospitals. According to cost-utility analysis, economic evaluations between these drugs should also be necessary in different surgical and resource situations. Such results indicate the need to have context-factorial measurements that cause no imbalance between cost and effectiveness (17,18).

Despite the numerous studies, which have investigated the efficacy of antiemetic drugs in different fields of surgery, a comparative study of ondansetron and metoclopramide during the two different circumstances, i.e. laparoscopic and open cholecystectomy, is still lacking relative in the literature. Most studies either consider larger groups of surgery without necessarily stratifying by intervention or consider one type of surgery alone. This obscurity conceals the complicated physiological and pharmacological relations occurring due to the different surgical procedures. The emetogenic mechanisms and responses of antiemetics could be different in laparoscopic and open cholecystectomy due to the fact that both procedures induce PONV in different ways: laparoscopy:

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peritoneal insufficiency and CO2-induced vagal activity; open surgery: long anesthesia, tissue trauma, and excessive opioids: laparoscopy and open surgery induce PONV via different mechanisms. In this way, it becomes possible to gain a more in-depth comprehension of how the efficacy of drugs can be altered under the conditions of surgical stress and anesthetic exposure by subjecting both the surgical methods to a single comparison platform (19,20).

Previous research has substantially proved the superiority of ondansetron as a 5-HT3 receptor antagonist to routine prophylaxis of PONV. The extent to which it is more beneficial than more conventional dopamine antagonist drugs such as metoclopramide however differs greatly depending on the nature of the surgery being performed, the patient risk profile and anesthetic methodology. High-resource settings tend to treat ondasetron as a standard treatment, whereas metoclopramide is the primary preventive antiemetic in most of the low- and middle-income countries (LMICs), such as Pakistan, due to its availability and cost. Consequently, the issue of clinically significant improvement of PONV prevention in specific procedures by ondansetron still remains most important to risk the greater cost of ondansetron in the use of the anesthetic piece when limited resources are available. Recent global and regional guidelines have demonstrated the need of context-specific evidence in PONV management, particularly in LMIC institutions with particularly restricted logistical and financial capabilities in terms of effective antiemetic agent choice (2).

The lack of stratified data that looked at significantly both medications in a laparoscopic and open cholecystectomy system, shows that there is a colossal knowledge gap, as many international systematic reviews indicated that ondansetron is applicable in the context of high- risk operations. It limits the ability to come up with locally applicable antiemetic protocols that consider procedure-specific physiology, drug access, and cost-effectiveness. Also, the dopaminergic inhibitory effect and the prokinetic nature of metoclopramide might be theoretically more advantageous in open surgeries, where delayed emptying of the gut and extended exposure to anesthesia are highly contributive factors, but also the mechanism of ondansetron which specifically targets the serotonin-mediated vagal stimulation more in laparoscopic surgeries (17,21,22).

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The lack of head to head clinical comparisons across these subtypes of surgery do not allow clinicians to tailor preventative regimens with regard to the pathophysiological basis of each technique. Such a comparative point of view is also supported by the discrepancies as far as laparoscopic and open surgeries differ in hemodynamic and neurohumoral after-effects. The vaginal stimulation induced by the power of intra-abdominal pressure due to the CO2 insufflation during laparoscopy leads to a temporary result of serotonin secretion by the enterochromaffin cells, triggering the chemoreceptor trigger zone (CTZ). Compared to laparoscopic procedures, open cholecystectomy is often associated with prolonged anaesthesia and surgical duration and with increased tissue damage which often requires increased peri- operative exposure to opiate analgesics and volatile inhalational agents. Since they stimulate emetogenic signaling such as muscarinic and dopaminergic pathways in chemoreceptor trigger zone and vomiting center, volatile anesthetics as well as opioids are also identified risk factors likely to lead to postoperative nausea and vomiting (PONV). Thus, clarifications regarding the interaction between metoclopramide as an antagonist of dopamine-receptors with prokinetic and ondansetron as an antagonist of 5-HT3 receptors could benefit enhancing accuracy prophylaxis in patients going through open abdominal surgery (23,24,25).

In addition, various research reports have varying results on time-dependent efficacy, or the relative control of early (0-6 h) versus late (6-24 h) postoperative nausea and vomiting. In relation to its prokinetic action, metoclopramide could continue to provide better symptom management in the later stages, whereas ondansetron is in general better in classifying the symptoms in the initial phases. In patients stratified by surgical method, however, no recent comparative trial has been conducted to determine the long-term outcome of cosmetic surgery during any phase of time. The existing research paper attempts to fill this gap and provides specific data on the efficacy over time by identifying the difference between laparoscopic and open surgery and monitoring PONV at different postoperative time points. Another unexplored aspect on PONV risk is gender and younger age groups. Besides younger adult patients (the patients below 50), females are generally at greater risk of PONV. The performance of ondasetron and metacolpamide in young adult population has not

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been compared fully though (26,27).

Most of the patients holding an elective cholecystectomy in the poor nations fall on this age bracket, however most of the available data are those of the Western cohorts which have broader age groups. By restricting the study to the age group (18-50) of people, this thesis will generate the necessary population-specific findings that are relevant to the general population of typical surgical demographics in Pakistan and other LMIC healthcare models. The economic and the safety-related considerations that impact the real-life decision-making process are also important. Ondansetron should be used with caution, as it is linked to dose-dependent QTc prolongation and potential cardiac arrhythmias, particularly when used with volatile drugs or in patients with electrolyte imbalance. Although cheaper, sometimes metoclopramide may result in extrapyramidal reactions like dystonia and akathisia especially in the younger population, so people taking repeated dosage. To learn safe, cost-efficient management, direct comparison under controlled perioperative conditions of cholecystectomy will help clarify not just efficacy difference, but also occurrence of the undesired situations in comparison to one another (28,29).

Multimodal antiemetic interventions, using a combination of 5-HT3 antagonists with either corticosteroid or dopamine antagonists have also shown better performances although they increase complexity, expense and may also induce undesirable effects of polypharmacy. This is more of a theoretical practice than a practical one in a number of the institutions that are under the jurisdiction of the public sector. It is thus directly translating to the clinical practice to determine the best combination of cost, safety and efficacy of a single drug metoclopramide or ondansetron in any form of cholecystectomy. The absence of any studies that specifically compare these two antiemetics among patients undergoing laparoscopic and open cholecystectomies then the lack of contextually appropriate evidence in low and middle incomes countries where clinical and logistical realities vary significantly compared to high income ones are the research gap that this study is aimed at filling. The ability to bridge this gap will shed light on the efficacy of the pharmaceuticals and give recommendations on how perioperative care and antiemetic decisions in the anesthesia departments

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can be enhanced (30).

Ultimately, this thesis will aim to provide a combined perspective in terms of pharmacologic, procedural and patient-centered components of PONV prevention by systematically comparing ondansetron to metoclopramide in laparoscopy and in open cholecystectomy among homogeneous adult groups. The findings will add up to contextually influenced evidence-based practice in anesthesia and surgical medicine, enhance postoperative recovery, and enhance the procedures in perioperative care. Although the current measures taken in the global literature on prevention of postoperative nausea and vomiting (PONV) are revolutionary, the gap in the research literature on whether the difference between ondansetron and metoclopramide lies in laparoscopic versus open cholecystectomy is open. Among the significant research gaps in perioperative care, there is the absence of head-to-head studies that consider the medicinal efficacy, patient-specific predictors, and surgical skill as a single research element (28).

Most of the current clinical trials have sampled mixed surgical populations not stratified in comparison or had sampled laparoscopic cohorts not necessarily applicable to specific clinical situations. This limitation has led to the global findings being less usable in the complicated realities of surgical practice in low- and middle-income countries (LMICs), where open and laparoscopic cholecystectomy are routinely practised in any case. The Pakistani healthcare system is a highly suitable context in this comparative study. The open cholecystectomy is also done in the circumstances when laparoscopic facilities or experience of the staff may not be available although laparoscopic cholecystectomy is gaining popularity because of its reduced hospital stay and reduced rate of postoperative morbidity (31,32).

Consequently, anesthesiologists are often compelled to wrestle between cost and availability of drugs and effectively avoid PONV in two physiologically and pharmacologically different surgical conditions. The proposed study design where metacloxib and ondansetron are compared in terms of their applicability to both procedures is thus consistent with the real situation in surgical anesthesia in South Asia hospitals and can be implemented in a clinical setting instantly. Moreover,

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the comparative therapeutic efficacy of ondansetron versus metoclopramide in the particular procedural subtypes has been rarely evaluated using normal dose and postoperative observation protocols even though much pharmacological data has been produced regarding each of the two drugs individually. The survey of regional antiemetic treatment is difficult to make definite conclusions because of a significant difference in the dosage, timing and outcomes measurements. Some Pakistani trials have compared ondansetron 4 mg IV and metoclopramide 10 mg IV in laparoscopic cholecystectomy but many of them were not stratified with regard to surgical modality or resource setting.

On a molecular level, the comparison enables one to gain insight into the interaction of various receptor pathways with surgery-specific emetogenic stimuli which is an important step towards locally-targeted and reasonably-costly anti-emetic combination. The importance of risk-adapted antiemetic choice including surgical, anesthetic, and patient factors is also emphasized as per global clinical practice guidelines. These global models are, however, largely based on the statistics of developed countries whose populations and characteristics of surgical services differ drastically with Pakistan and the rest of the South Asian states. The effect of antiemetic in local populations could be unique including delayed stomach emptying or dietary deficiency or the increase in ambient anxiety and this can alter antiemetic effectiveness. Thus, a research conducted in the setting of a tertiary-care in Pakistan can enhance the quality of international regulations by modifying these guidelines to fit the local characteristics and healthcare delivery models (33).

Another compelling reason that will make our study significant is the increasing trend of precise perioperative care that encourages the personalization of medication prophylaxis to the specifics of the procedures and their patients, instead of using universal dosage schedules. This paper operationalizes the said precision model within a realistic resource-aware architecture by comparing the efficacy of ondansetron to that of metoclopramide under laparoscopic and open surgery. The linking of pharmaceutical effect with overall recovery measurements further enhances the translational significance of the study because of the introduction of variables that include

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postoperative nausea severity, vomiting rate and frequency of the use of rescue antiemetics and patient satisfaction. The recent advances in PONV preventive studies focus on combination therapy. In comparison with single-drug treatment, dual combinations of a 5-HT3 antagonist (such as ondansetron) with either a dopamine antagonist (such as metoclopramide) or corticosteroid (such as dexamethasone) have been more effective.

It is still clinically important to determine which single drug offers the most effective results in each surgical technique, however, due to the intention to decrease polypharmacy and side effects. Postoperative nausea and vomiting (PONV) remains one of the most common and disturbing side effects that occur following cholecystectomy. Its presence remains with a clinically significant effect on the patient and postoperative outcome and patient satisfaction in spite of the development of anesthesia and surgery. Cholecystectomy procedures (laparoscopy and open) have individual physiological barriers that affect the rate and occurrence of PONV. Although open cholecystectomy has been reported to berelated to longer anesthesia, greater amount of tissues with as well as an increase in usage of opioid that is taken after surgery, laparoscopic cholecystectomy often causes nausea by insufficiency in carbon dioxide and vagal stimulus. These discrepancies underscore the need to have individualized anti-emetic regimens depending on the surgical procedure (27).

However, whereas metoclopramide, a dopamine D2 receptor antagonist and prokinetic, is still a commonly used treatment, most people have treated ondansetron, a selective 5-HT3 receptor antagonist, as an effective, preferred antiemetic in the prevention of PONV. However, scanty information, however, exists to compare these drugs in the specific settings of open and laparoscopic cholecystectomy. Most of the previous studies have been focused on a single surgical type, or combined heterogeneous groups of patients without distinguishing the types of emetogenic pathways that are specific to each type of surgery (22).

Although two of the most frequently used drugs in the prevention of postoperative nausea and vomiting (PONV) are metoclopramide and ondansetron, the literature evaluations of their efficacy are imbalanced and often procedure-nonspecific. Most of the existing trials that wanted to test these

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medications have evaluated them in isolation or have used heterogenous populations of surgeries without a clear mention on the outcome of different cholecystectomy procedures. Concentrated research on a comparison of ondansetron and metoclopramide administered under controlled conditions within the environment of the same healthcare setting with laparoscopic and open cholecystectomy surgery is not yet achieved. To bridge that gap, this paper will compare and evaluate the efficacy of metoclopramide and ondansetron used as antiemetics in adult patients (18-50 years old) undergoing cholecystectomy.

To carry out the research, participants of laparoscopic and open cholecystectomy cases shall be considered to be in two patient groups. Two groups will be provided with one of the two study drugs using identical perioperative procedures. This will ensure that the procedure is fairly compared with a process involved and it will be feasible to derive more credible findings on the drug that most effectively manages PONV in cholecystectomy patients. This study will aim to bridge such a gap by evaluating and comparing the efficacy of metoclopramide and ondansetron as antiemetics in adult (18-50 years old) patients undergoing cholecystectomy. The two categories of patients that will be investigated will be the participants of both laparoscopic and open cholecystectomy cases. Both groups will be subjected to identical procedures during the perioperative procedures and provided with one of the two research drugs. Such design will ensure that there is a fair procedure inclusive comparison to give results that would be more trustworthy on which medication provides better PONV control among patients undergoing cholecystectomy.

1.1 Rationale of Study

Postoperative nausea and vomiting (PONV) has been one of the most vexing postoperative complications that leave patients and care teams feeling very uncomfortable and frustrates their recovery. PONV still remains common and occurs regularly post-cholecystectomy in spite of new advances in the surgical and anesthetic procedures. Although laparoscopic cholecystectomy is a minimally invasive procedure and the best choice of removing gallbladder, it poses the risks of raising

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the intra-abdominal pressure, diaphragmatic irritation, and CO2 insufflation, which increase the risk of PONV. The open cholecystectomy has its challenges even; even more tissue will be manipulated, the time of the anesthesia will be longer and the postoperative pain will be even more significant which can further enhance the possibility of nausea and vomiting. It is thus essential to explain the effects of these suing surgical stresses on antiemetic action in order to enhance patient outcomes. Practical subjects where there is a need to have clear, evidence-based information about the process of selection of cost-effective antiemetics that can be specific to surgical contexts.

The choice of 5-HT3 receptor antagonists is limited to on Dansetron, which is a strong antiemetic the most important aspect of which is its safety profile. The prokinetic dopamine D2 receptor antagonist metoclopramide is less costly, and it is also widely used in most facilities. Dissimilarity in mechanism of action, onset and duration of effects implies that the relative performance of laparoscopic and open procedures can be different. The proposed study will look at the comparison of ondansetron and metoclopramide in the prevention of PONV in adult patients (between 18-50 years) who undergo either laparoscopic or open cholecystectomy. The findings are anticipated to assist in informing the process of refining the perioperative antiemetic policies and guide a reasonable and economical selection of the drugs in both low and high resource-abundant clinical settings.

Aims and Objectives of the Study Aim:

To evaluate and determine **which of the two drugs, ondansetron or metoclopramide, is more effective** in preventing postoperative nausea and vomiting (PONV) following **laparoscopic and open cholecystectomy** in adult patients.

Objective:.

- To compare the efficacy of **ondansetron** and **metoclopramide** in the prevention of postoperative nausea and vomiting (PONV) among adult patients undergoing **laparoscopic and**

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open cholecystectomy.

LITERATURE REVIEW

Gan et al. (2020) explain the study, in which it was stated that postoperative nausea and vomiting (PONV) remains among the most common and distressing postoperative adverse effects of general anesthesia (between 30-50 per cent of surgical patients). Due to such factors as the lack of carbon dioxide, insufflation of the peritoneum, vagal stimulation provided by pneumoperitoneum and effect of volatile anesthesia, laparoscopic and open cholecystectomy surgeries are discussed as high-risk operations. Raised intra-abdominal pressure, diaphragmatic irritation continue to contribute significantly to nausea and vomiting despite laparoscopic cholecystectomy being less invasive and having a faster recovery. Prolonged anesthetics time, elevated manipulation of the tissue, and high postoperative opioid consumption all are also related to open cholecystectomy and increase the risk of PONV. Thus, effective preventive antiemetics are necessary to enhance the level of patient satisfaction, reduction of complications, as well as patient comfort after surgery. The two surgical methods are beneficial in terms of targeted antiemetic methods. Individual risk variables, time of the surgery, and the type of treatment are some of the important factors to consider when making clinical decisions. The better treatment with antiemetics will reduce the duration of stay in hospitals, accelerate the healing process, and improve overall outcomes. The proactive measures prevent patient dissatisfaction and reduce the number of rescue medications. The laparoscopic surgery continues to have problems, which explains the need to adopt 5-HT3 antagonists in high-risk patients. Effective PONV management is related to evidence-based practices and enhanced recovery approaches (2).

Ebrahimian et al. (2023) explained that PONV is a complex disorder, and it entails interactions of the neurotransmitters, including acetylcholine (ACh), dopamine (D2), histamine (H1), and serotonin (5-HT3), which stimulate the chemoreceptor trigger zone and vomiting center of the medulla. These pathways result in nausea and vomiting and are achieved through both central and peripheral

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pathways. The result of an understanding of these interactions has been the development of specific antiemetics, such as metoclopramide and ondansetron. Ondansetron is an effective preventive of serotonin mediated nausea in that it is a selective blocker of 5-HT3 receptors located in the gastrointestinal tract and the chemoreceptor trigger zone. Metoclopramide predominantly counteracts this proton by antagonizing dopamine D2 receptors, and accelerates gastric motility. These processes explain the varying effectiveness of the two drugs in the case of surgical patients who include patients undergoing cholecystectomy. In clinical practice, ondasetron is a better nausea control measure in early postoperative. Metoclopramide is however an affordable option even when resources are limited. This comprehending allows tailored antiemetic strategies depending on the type of surgery and the risk of patients. Preventive care may maximise curing and reduce the usage of additional drugs. The rationale behind the application of 5-HT3 antagonists of increased emetogenic strength in electronic laparoscopic procedures is supported by evidence (7).

Riaz et al., (2024) conducted, a trial consisting of randomized controlled trials and comparing ondansetron and metoclopramide 4 and 10 mg respectively in female patients undergoing laparoscopic cholecystectomy was conducted. The study showed that ondansetron reduced dramatically the necessity of rescue antiemetic medication in addition to the numbers of instances and the intensity of PONV during the initial six hours of operation. Other studies of gynecological laparoscopic surgeries reported that ondansetron was less likely to cause early nausea compared to metoclopramide as it was more preventive. The use of ondansetron reduced the ranking of the nausea, enhanced patient satisfaction, and reduced the amount of additional medicine that was required by the patients who underwent the cesarean sections. These findings indicate that ondansetron may have more consistent/long-term effects in controlling PONV in a group of diverse surgical patients.Although it is effective: more often metoclopramide has a lower complete response rate. The focus of the study on the selection of antiemetics based on risk variables, gender of the patient, and the type of surgery is highly emphasized. The use of Ondansetron enhances patient comfort and temporary outcomes. It is supported by the results of a number of RCTs in its

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deployment in laparoscopic cholecystectomy. Individualized antiemetic therapy remains to be essential in the achievement of the optimum perioperative care (11).

Lim et al. (2023) explained that in assessing the efficacy of ondansetron, metoclopramide and granisetron in rats under bariatric surgery, found ondansetron alone or with dexamethasone to give the best antiemetic effect. The effect of Metoclopramide was mediocre. According to the systematic reviews, ondansetron is safe, and unlikely to cause QTc prolongation even at its recommended dose. In terms of number of complications, uninterrupted recovery period, and lower rescue dose of antiemetics, ondansetron was found to be relatively cheaper when comparing cost to utility analysis of South Asian patients receiving laparoscopic cholecystectomy. These findings endorse the application of ondansetron in high risk abdominal operations, including laparoscopic cholecystectomy. Metoclopramide can still be utilized in areas with low resources. Multimodal dexamethasone plus ondansetron prophylaxis really enhances efficacy. Optimized antiemetic treatments result in patient satisfaction and improved outcomes of the postoperative period. Available data shows Ondansetron to be used on the first line as PONV prophylaxis in laparoscopy. It suitably fits in the common clinical practice due to their safety features and affordability (18).

Khan et al. (2023) discussed predictive variables of PONV, including gender (female), non-smoking, operative duration, motion sickness history, and ingestion of opioids during surgery, which significantly increases the chances of PONV. They conducted a study that revealed that ondansetron based prophylaxis was better than metoclopramide in high risk surgical patients. Multimodal strategies of combining ondansetron with either metacloisoned or dexamethasone reduced the rate of PONV. Rather than a single standardized treatment, patient-specific antiemetic methods were of main interest based on the patient risk factors. Prophylaxis specifically aimed at their patients is particularly useful in those patients who are subjected to high-risk laparoscopic and open forms of cholecystectomy. It has been proven that it is possible to alter the prescription decisions depending on the nature, duration, and the risk factors at the time of operation. Effective strategies reduce the number of hospitalizations, medicine usage, and surgery complications. Ondansetron has a

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pharmacological profile that is congruent with the emetogenicity of laparoscopic surgery. Metoclopramide is relatively cheap, however, it is often not effective in high-risk groups. The risk categorization remains important in order to optimize the PONV management. Clinical implementation helps improve patient safety as well as comfort and satisfaction (34).

Rahman et al. (2024) in their review of randomized trials, systematic reviews, and cost- effectiveness research, discovered that ondansetron, in comparison with metoclopramide, demonstrates the best performance in terms of efficacy, safety, and patient satisfaction in diverse groups. This includes open and laparoscopic techniques of cholecystectomy. Metoclopramide remains easily available and affordable, yet under the circumstances that are at risk, it does not work well often. The consideration should be made with respect to cost, hospital resources and patient-based indicators, particularly in low- and middle-income countries. Additional comparative research is needed in order to enhance clinical guidelines. Antiemetic prophylaxis enhances recovery, reduces rescue drug use, and has a positive overall patient outcome. Evidence supports using ondansetron as the initial intervention in the treatment of PONV prevention. The individualised therapy on the basis of operating and patient peculiarities leads to better results. Multimodal prophylaxis strategies also enhance safety and effectiveness. It is implemented according to the protocols of accelerated recovery after surgery (ERAS). Ondansetron is frequently recommended to use to ensure reliable PONV prevention among patients undergoing cholecystectomy (35).

Ebrahimian et al. (2023) said, machine-learning-based predictive modeling developments have enhanced the understanding of PONV risk than standard clinical criteria. In their study, over 54,000 adult surgical cases they analysed, female gender, no smoking, younger age, motion sickness history, and before PONV episodes proved to be important predictors. A randomized trial conducted on patients who underwent sleeve gastrectomy was on Ondansetron, metoclopramide, and their combination. The findings revealed that the combination therapy decreased the PONV incidence and number of rescue antiemetic. With the findings, it is possible that combining therapy would be more effective in higher risk surgery despite ondansetron used alone. Personalized antiemetic choice

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depending upon patient and surgical requirements is essential in the case of an adult undergoing open surgery or laparoscopic cholecystectomy. As opposed to the generic single-drug methods, this approach favors specific prophylaxis. Predictors are understood to help accurately determine the effectiveness of medications. The paper highlights the need to design antiemetic treatment based on risk stratification. These strategies lead to patient satisfaction, lessening of postoperative complications, and recovery. Combination regimens are most beneficial to patients that are at high risk. All in all, the research supports the applicability of comparing ondansetron and metoclopramide in laparoscopic operations (7).

Weibel et al. (2021) found in the study that laparoscopic and open cholecystectomy have a high risk of PONV because of physiological and surgical aspects such as insufflation of carbon dioxide, peritoneal stretching, and the use of volatile anesthetics. They observed that, though laparoscopic cholecystectomy procedure is less invasive and promotes the recovery process, greater intra-abdominal pressure and diaphragmatic irritation still causes high nausea and vomiting. On the other hand, PONV is a frequent complication of patients who undergo open cholecystectomy because of a long duration of exposure to anesthesia, large-scale tissue handling, and postoperative use of opioids. According to the research, such differences indicate the importance of specific antiemetic methods that are procedure-specific. Ondansetron and other 5-HT3 receptor antagonists were particularly useful in high-risk laparoscopic surgery. Metoclopramide despite its insufficient efficacy is also applicable in the case of limited resources. Risk categorization is effective in improving the results by prior PONV history, gender, and length of surgery. The addition of drugs to achieve combative antiemetic effects has evidence backing. Preemptive measures directed toward definite individuals can reduce cases of hospitalization, use of rescue medications, and dissatisfaction in the patients. Safer care in patients enhances health and recovery. Such findings provide clinical support to comparing metoclopramide and ondansetron, which is useful in high-risk cholecystectomy surgery (36).

Hirai et al. (2024) in his single-centre study, compared the impact of 5-HT3 receptor antagonists on

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the occurrence of PONV among surgical patients in the adult population. Before and after the implementation of ondansetron-based prophylaxis, patients conducting diverse types of general and laparoscopic surgeries were compared with each other. The outcome of the application of ondansetron compared to prior usual care incorporating dopamine antagonist medications such as metoclopramide showed that the general incidence of PONV was greatly reduced. Since ondansetron affects serotonergic pathways caused by CO2 insufflation, and pneumoperitoneum, it was especially effective in laparoscopic operations. Metoclopramide was useful in resource-constrained areas despite its moderate efficacy. The study also discovered that ondansetron reduced the need for rescue antiemetics, delayed surgical recovery, and improved patient satisfaction. According to risk categorization, high-risk patients benefited the most, particularly women and those undergoing extensive surgery. The study supports evidence-based antiemetics selection based on surgical type, even though it is retrospective. The results of the study highlight the importance of comparing open and laparoscopic cholecystectomy techniques in order to test for consistency of impact. Ondansetron improved patient comfort and satisfaction. The study supports the first line preventive use of ondansetron in high-risk procedures. Evidence exists for individualised antiemetic approaches to achieve the best results. Early treatment (effective medications reduce postoperative complications). This comparison evidence data provide very clear information with regard to the goals of antiemetic efficacy theory (37).

Alhaaj et al. (2024) found in a heterogeneous population undergoing laparoscopic surgery, both metoclopramide and ondansetron decreased the frequency of PONV; however, ondansetron created a more significant drop and better patient-centered outcomes. Patients treated with ondansetron healed in a shorter amount of time, were happier and were ready for release sooner. Although these result are not specific to cholecystectomy, they are applicable to laparoscopic procedures because of similar physiological stress. The study points to the superiority of ondansetron in prophylaxis as well as the importance of the choice of drugs to optimise the recovery and lower morbidity. Metoclopramide is helpful when the family is low on cash, but less consistent control. The study

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supports the physiology behind the 5-HT3 antagonists during laparoscopic procedure; ondansetron had a significant effect in improving clinical outcomes; results support its use over metoclopramide for open and laparoscopic cholecystectomy making. Focused therapy with risk stratification resulting in further improved efficacy. Ondansetron is supported by evidence for high emetogenic procedures, which is consistent with the goals of the thesis (38).

Xu et al. (2024) Vagal activation, serotonin release, and emetogenic stress are caused by the aforementioned CO2 absorption and the above intra-abdominal pressure during laparoscopic surgery. These changes kick off central emetic pathways, which 5-HT3 antagonists such as ondansetron have a significant reduction Dopamine Antagonists, such as metoclopramide have minor effect when the vagal-serotonergic processes are prevailing because they work predominately at the chemoreceptor trigger zone. This difference in pharmacodynamics explains ondansetron consistent higher efficacy in laparoscopic procedures and its limited benefit in open surgery.these pathways supports the rationale for comparing antiemetic performance based on surgical technique. Therapy that is adapted to physiological stress improves patient outcomes. Ondansetron may be a more successful treatment for PONV brought on by pneumoperitoneum, according to research. Metoclopramide may be sufficient for less severe or low-risk cases. Mechanistic understanding informs the choice of first-line agents. Clinical therapies should take surgery-specific emetogenic triggers into account (5).

Habib & Gan (2004) carried out a comprehensive analysis of more than 100 randomized studies of antiemetic medications in adult surgical patients undergoing abdominal and laparoscopic operations. Major risk variables were verified to include female gender, non- smoking status, previous PONV, use of volatile anesthetics, and perioperative opioids.

According to the review, metoclopramide had modest benefit mainly for delayed stomach emptying or opioid-induced nausea, whereas ondansetron offered excellent protection against nausea, particularly in laparoscopic procedures with pneumoperitoneum. Better results were obtained by combining medications or adjusting prophylaxis according to the type of surgery. Compared to

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metoclopramide, ondansetron consistently showed greater effectiveness and fewer side effects. The results justify comparing these medications in open and laparoscopic cholecystectomy. Choosing antiemetic medications based on risk maximizes patient comfort and recuperation. The results justify comparing these medications in open and laparoscopic cholecystectomy. Choosing antiemetic medications based on risk maximizes patient comfort and recuperation. Preventive ondansetron has been shown to lower the requirement for rescue medication. PONV incidence is further reduced by multimodal approaches. The goals of the thesis are precisely aligned with this foundational review. Preventive ondansetron has been shown to lower the requirement for rescue medication. PONV incidence is further reduced by multimodal approaches. The goals of the thesis are precisely aligned with this foundational review (29).

Sumie et al. (2025) out a thorough study and meta-analysis contrasting metoclopramide with ondansetron in pediatric patients undergoing tonsillectomy with or without adenoidectomy. The review comprised five RCTs with a total of 861 participants. In comparison to metoclopramide, ondansetron reduced the likelihood of PONV by about 50% and shortened hospital stays by around 27 minutes, suggesting a faster early recovery. Both drugs were generally well accepted and had few adverse effects, despite the paucity of evidence regarding extrapyramidal symptoms. The scientists concluded that in procedures where serotonergic pathways prevail, ondansetron has superior preventative efficacy. The results are in line with mechanism-based antiemetic selection principles, in spite of the focus on pediatric ENT treatments. Because there is similarity between adult laparoscopic and open cholecystectomy with regard to serotonergic triggers, ondansetron may offer more control. These results demonstrate the importance of comparing these two drugs in high versus moderate emetogenic operations. Additionally, it focuses on the importance of patient-centered results, safety, and healing. The comparison between metoclopramide and ondansetron has support from the study. Ondansetron's effectiveness in mechanism specific prevention is often apparent (39).

Singha et al. (2021) examined in his RCT study that How efficient are palonosetron, ondansetron and metoclopramide to prevent postoperative nausea and vomiting (PONV). Patients with

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laparoscopic cholecystectomy were included. One of the three antiemetics was administered randomly to each of these subjects. The prevalence of PONV in the first 24 hours after surgery was the main outcome.ondansetron was found to be more effective than metoclopramide in reducing PONV. However, the major conclusion of the study was that palonosetron was the most effective of the three drugs. Palonosetron proved to be much more effective in reducing nausea and vomiting than ondansetron and metoclopramide. The results of this study confirm the necessity to select effective antiemetics for laparoscopic procedures. This study helps provide the helpful information for the comparison of ondansetron and metoclopramide. Generally speaking, it highlights the importance of antiemetic selection possibly being able to enhance a patient's comfort and recovery after surgery (12).

Mieszczanski et al. (2025) in his extensive analysis of 81 RCTs and perioperative studies on prevention of PONV in adult laparoscopic bariatric surgery, found that even though the incidence of PONV is high (60 to 80%), it is still low, due to pneumoperitoneum, increased intra-abdominal pressure, and physiological stress associated with obesity. The reduction was most reliable in the use of multimodal prophylaxis which consisted of 5-HT3 receptor antagonists, opioid-sparing analgesia, localised anaesthetic and tailored fluids. In high-risk individuals this single drug therapy was often ineffective. Combinations such as ondansetron and metoclopramide or ondansetron and dexamethasone were found to be more effective and reduced the need for rescue antiemetic medications. Additional preventive strategies included reduction of volatile anesthetics used and use of TIVA. Comfort and recuperation were significantly improved with individualizing prophylaxis based on their individual risk. While 5-HT3 antagonists had better safety profiles, dopamine antagonists were, however, helpful for times of financial hardship. The review underlines that although the choice of antiemetic is made, physiological stress and surgical procedure should be considered. The results provide a biological and clinical rationale for differences in the effects of metoclopramide and ondansetron in laparoscopic versus open cholecystectomy.Customized and multimodal strategies maximize results. The objectives of the comparative efficacy theory are directly

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supported by these results (40).

Barzanji et al. (2022) In a randomized, double-blind research, adult females undergoing gynecological laparoscopic surgery were given metoclopramide-dexamethasone versus ondansetron-dexamethasone. Metoclopramide 10 mg plus dexamethasone 8 mg or ondansetron 4 mg plus dexamethasone 8 mg were given to 120 subjects at random. The primary outcome was the frequency and intensity of PONV within 24 hours following surgery. Ondansetron– dexamethasone significantly reduced nausea (21.6% vs. 38.3%) and vomiting (10% vs. 23.3%) in comparison to the metoclopramide group. Rescue antiemetics were less necessary for the ondansetron group. No notable adverse effects were observed. The findings highlight the benefits of combining 5-HT3 antagonists with dexamethasone for high-risk laparoscopic procedures. These gynecological considerations also apply to laparoscopic cholecystectomy because of the same physiological factors. The study supports the ondansetron argument's superiority. Patient-centered outcomes and PONV reduction were enhanced. The data is in favor of mechanism-based prophylaxis. High-risk patients benefit most from combined antiemetic medication (41).

Oshidari et al. (2023) in a RCT, examined adult bariatric surgery patients under general anesthesia using granisetron, metoclopramide, and ondansetron. 180 patients were divided into three groups at random to quantify nausea, vomiting, and the need for rescue antiemetic medicine within 24 hours following surgery. Ondansetron alone or in combination with dexamethasone gave the best results, significantly reducing nausea and vomiting, while metoclopramide showed modest efficacy. Granisetron's effects were comparable to, but not superior to, those of ondansetron. Safety was deemed satisfactory by all groups. The findings are applicable to laparoscopic cholecystectomy because of similar emetogenic stresses such pneumoperitoneum and elevated intra-abdominal pressure. This bolsters the thesis's objective of contrasting ondansetron and metoclopramide in adult minimally invasive procedures. 5-HT3 antagonists are safer and more effective, according to research. Rescue antiemetic medication use decreased. When selecting drugs, patient risk and surgical stress should be considered. The use of first-line ondansetron is supported by the results (42).

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Verma et al. (2020) conducted a randomized double-blind study comparing the effects of ondansetron 4 mg and palonosetron 0.075 mg on elderly patients undergoing general anesthesia for elective procedures. Results for 120 randomly chosen subjects included PONV incidence and "complete response" (no PONV without rescue antiemetic) over a 24-hour period. Palonosetron performed slightly better in overall response (70% vs. 66.6%), although ondansetron was beneficial in reducing early PONV. Peripheral and central serotonergic blocking provided an explanation for efficacy. Although metoclopramide was not included, the results provide context for ondansetron performance in adult procedures. The result encourages further comparison with dopamine antagonists in moderate-to-high-risk procedures. Mechanistic reasoning supports the thesis's objective, which contrasts metoclopramide and ondansetron in laparoscopic and open cholecystectomy. Early PONV eradication improves patient comfort and recovery. Evidence supports the superiority of 5-HT_3 antagonists in serotonergic-dominant procedures. Findings support the clinical rationale for comparative research (43).

Qadeer et al. (2025) A randomised clinical trial comparing oral ondansetron (8 mg) with oral metoclopramide 10 mg conducted on 194 adult females undergoing gynecological laparoscopic operations. The frequency of PONV in the first 24 hours, the severity of episodes of nausea/vomiting, and the need for rescue antiemetics were among the findings. The patients were randomized before surgery. The results showed that ondansetron significantly reduced nausea in the early postoperative period (22% vs. 38%) and required fewer rescue antiemetics; however, change of vomiting was not statistically significant. No reported sufficiently notable side effects; By urging its more preventative effect, the study supports the use of ondansetron in high emetogenic laparoscopic operations. Despite being gynecological, pneumoperitoneum activates serotonergic pathways making the results mechanistically-slevant to laparoscopic cholecystectomy The investigation draws attention to the need of choosing of medications for elderly people dependence on the mechanisms. Rescue antiemetic Scientific studies showed that "with the reduction the patient comfort and recovery improved". The combination central and peripheral 5- HT3 antagonistic activity of

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ondansetron is responsible of its greater efficacy. Metoclopramide has somewhat favorable dopamine receptor antagonistic activities. These results are direct support for your thesis goal to determine if the more effective antiemetic (44).

Xie et al. (2024) Three preventative regimens, i.e. ondansetron, metoclopramide, and a combination therapy--compared to a group of 150 adult patients having total joint arthroplasty under general anesthesia in a randomized clinical trial. The former and primary objectives included the frequency of nausea and vomiting, full response rates and the need for rescue antiemetic medicine - within a day. Ondansetron alone had a significant reduction in nausea and vomiting when compared to metoclopramide with higher full response rates (66% vs. 28%). Combination therapy was no more beneficial than ondansetron alone. Each group's the safety outcomes were similar. Although total joint arthroplasty is unlike cholecystectomy, the results indicate that ondansetron has a greater preventative efficacy of moderate-to-high-risk PONV operations. These findings endorse mechanism-based antiemetic choice and reveal the role of assessment of individual patient risk factors.Ondansetron's central and peripheral serotonergic inhibition is the basis for its efficacy. Metoclopramide's prokinetic and dopamine antagonist actions offer very slight advantages. The study supports the rationale for contrasting open and laparoscopic cholecystectomy. Ondansetron improved patient comfort and decreased the need for rescue antiemetic medicines. Overall, the results confirm the thesis's objective of identifying the more effective antiemetic drug (45).

Naeem et al. (2021) 150 adult patients undergoing general surgery participated in a prospective study on ondansetron prophylaxis. Patients received ondansetron prior to anesthetic induction, while controls received standard care without prophylaxis. The results included rescue antiemetic use over a 24-hour period, PONV incidence, and severity. The results showed that the ondansetron group required fewer rescue antiemetics and had much fewer episodes of nausea and vomiting. Patient satisfaction and comfort both rose. Ondansetron's dual mechanism as a selective 5-HT_3 antagonist that acts both centrally and peripherally explains its superior preventive efficacy. Metoclopramide was not included in the study, however it does support the evidence-based use of ondansetron in

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patients with moderate to high-risk PONV. The data suggest the efficacy of prophylaxis in all adult groups, even if they are not specific to laparoscopic surgery. Early PONV care and reduced rescue therapy improve recovery. The results highlight the significance of serotonergic inhibition in avoiding PONV. Mechanistic knowledge justifies comparative studies with dopamine antagonists. The goal of the thesis, which is to evaluate antiemetic efficacy, is supported by these results. Additionally, ondansetron is preferred because to its safety and cost-effectiveness profiles (46).

Isazadehfar et al. (2017) mentioned that eighty patients undergoing laparoscopic cholecystectomy were compared for ondansetron and metoclopramide prophylaxis. Among the results were the frequency and severity of nausea, vomiting, and the requirement for rescue antiemetic medicine within a day. Ondansetron was more effective in lowering early postoperative nausea, however the incidence of vomiting was decreased but not statistically significant. Rescue antiemetics were required less frequently in the ondansetron group, which improved patient comfort and satisfaction. The study found that ondansetron is a selective 5- HT_3 antagonist that operates both centrally and peripherally, in contrast to metoclopramide, which primarily acts through dopamine D_2 receptor antagonism.Even if these mechanistic findings were made prior to 2020, they are still highly valuable for comparison studies. The results support the comparison of ondansetron and metoclopramide in adult laparoscopic cholecystectomy. Comfort and recovery were among the patient-centered outcomes that ondansetron improved. The results highlight the importance of focusing on serotonergic pathways during high-emetogenic procedures. For emesis brought on by stomach stasis, metoclopramide is somewhat helpful. Overall, the findings confirm the thesis's objective of determining the more effective antiemetic (47).

Problem Statement

Pneumoperitoneum, visceral stimulation, and opioid use greatly increase the risk of postoperative nausea and vomiting (PONV), which is still one of the most common and upsetting side effects after

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anesthesia, especially in abdominal surgeries like laparoscopic and open cholecystectomy. In addition to making patients less comfortable, PONV increases unscheduled admissions, lengthens recovery times, and drives up overall medical expenses. No single antiemetic guarantees total prevention, despite the development of multimodal preventive techniques, therefore finding an efficient and reasonably priced solution is crucial from a clinical standpoint.

Ondansetron, a selective 5-HT3 receptor antagonist, and metoclopramide, a dopamine receptor antagonist with prokinetic effects, are two of the available medications that are frequently used to prevent PONV. According to available data, metoclopramide is still an affordable option in settings with limited resources, but ondansetron frequently offers better nausea control. Nevertheless, the majority of current research either includes mixed surgical groups without adequate classification or concentrates only on laparoscopic procedures. In order to determine the more dependable preventive option for this surgical setting, this study will directly compare the effectiveness of ondansetron and metoclopramide in adults undergoing laparoscopic and open cholecystectomy. It will do this by assessing the frequency, intensity, and timing of nausea and vomiting, the necessity of rescue antiemetics, and any side effects.

METHODOLOGY

1.2 Materials and Methods

1.2.1 Study Design

An observational crossectional study will be conducted to compare the effectiveness of ondansetron and metoclopramide in preventing postoperative nausea and vomiting (PONV) in patients undergoing laparoscopic and open cholecystectomy.

1.2.2 Settings

Data will be collected from **DHQ Hospital SKP, Haram Medical Complex SKP, AAMC Hospital.**

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1.2.3 Study Duration

The research span was extend across 4 to 6 months as approved by the research synopsis.

1.2.4 Sample Selection Inclusion Criteria

- Adult patients and anesthesiologists will provide data.
- Patients between the ages of 18 and 50 who are having an elective open or laparoscopic cholecystectomy.
- ASA physical status I–II
- Patients or family members who are able to give written informed consent to participate in the trial; • Patients in need of general anesthesia with endotracheal intubation.

Exclusion Criteria

- Individuals with a history of motion sickness or severe PONV
- Individuals with a prolonged QT interval, Parkinsonism, or seizure disorders
- Patients with a known allergy to ondansetron or metoclopramide
- Women who are nursing or pregnant

1.2.5 Sampling Technique

A convenient sampling strategy will be utilized.

1.2.6 Sample Size

The Cohen's formula for calculating the sample size in a comparative study is:

Formula:

$$n = \frac{2(Z_{\alpha/2}+Z_{\beta})^2\sigma^2}{\Delta^2}$$

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Step 1: Set values

- $Z_{\alpha/2} = 1.96$ (α = 0.05)
- $Z_{\beta} = 0.84$ (Power 80%)
- Assume effect size $\Delta/\sigma = 0.56$

Thus, the required sample size is 100. For each group sample size is 50 participants.

1.2.7 Informed Consent

Written informed consent was obtained from all participants after explaining the study objectives, procedures, benefits, and risk. Participation was voluntary and confidentiality was maintained during the research process.

1.2.8 Study Parameters

The study was performed in the department of surgery and anaesthesia in Superior University affiliated hospitals, including adult patients aged 18-50 years undergoing laparoscopic or open cholecystectomy.

1.2.9 Outcome Measures

1.2.9.1 Primary Outcome Measure

Incidence and severity of **postoperative nausea and vomiting (PONV)** within 24 hours after surgery.

1.2.9.2 *Secondary Outcome Measure*

Time to first emetic episode, need for rescue antiemetic, and durati

1.2.10 Data Collection Tool

A **structured questionnaire/proforma** was used to record demographic data, surgical details, antiemetic administered, and PONV outcomes.

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1.2.11 Data Collection Procedure

Data were collected prospectively from patients fulfilling inclusion criteria. PONV episodes were monitored and documented by trained anesthesia staff during the first 24 hours postoperatively.

1.2.12 Data/ Statistical Analysis

Data were analyzed using **SPSS software (version 27)**. Descriptive statistics summarized patient characteristics, and **Mann-Whitney Test** is used, also **Chi-square test** determined associations between variables. A p-value < 0.05 was considered statistically significant.

1.2.13 Ethical Consideration

The rules and regulations set by the ethical committee of Superior University, Lahore will be followed while conducting the research and the rights of the research participants will be respected. The research consent has been approved by university's authority.

- Written informed consent (attached) will be taken from all the participants.
- All information and data collection will be kept confidential.
- Participants will remain anonymous throughout the study.
- The subjects will be informed that there are no disadvantages or risks on the procedure of the study.
- They will also be informed that they will be free to withdraw at any time during the process of the study.
- There are no known associated risks with the study.
- This study may help improve the safety and efficacy of inhaled anesthetics in pediatric anesthesia, leading to better patient outcomes.

RESULTS

1.3 Frequency Analysis

Table 1 Groups

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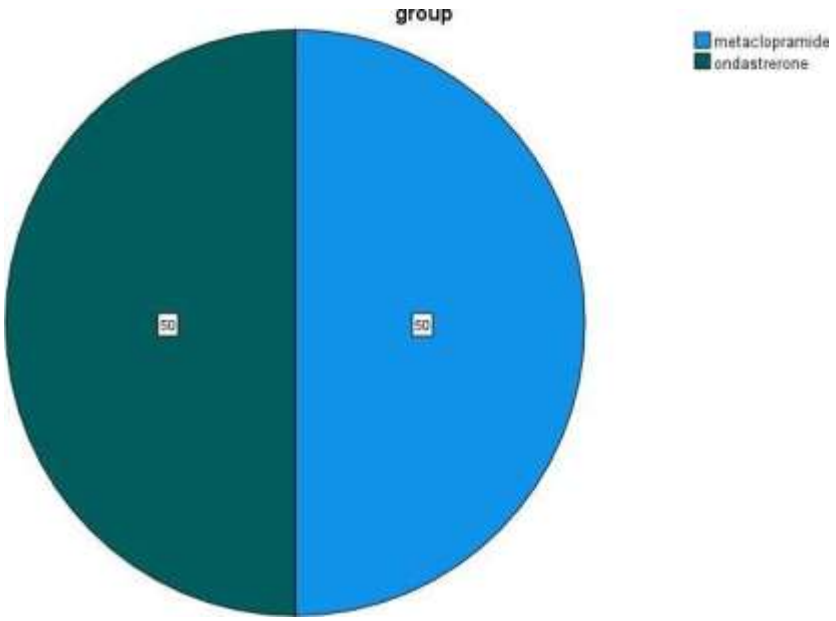
	Frequency	Percent	Valid percent	Cumulative Percent
Metaclopramide	50	50.0	50.0	50.0
Ondensterone	50	50.0	50.0	100.0
Total	100.0	100.0	100.0	



Interpretation:

The frequency distribution indicates that there is an equal amount of participants in each group, Metoclopramide (n=50) and Ondansetron (n=50), accounting for 50% of the total population in the study. This balanced allocation is beneficial to validity of the comparison of the two drugs effectiveness in reducing postoperative nausea and vomiting (PONV) by ensuring that both were

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evaluated under comparable conditions of sample size. A valid assessment of the efficacy of medication on patients undergoing open and laparoscopic cholecystectomy procedures is made possible by equal-sized samples, which also reduce the effects of selection bias. This balance helps the purpose of the study by giving a good foundation for determining which drug ondansetron or metoclopramide has better prevention of PONV in adult surgical patients.

Table 2 sex

	Frequency	Percent	Valid percent	Cumulative Percent
Female	50	50.0	50.0	50.0
Male	50	50.0	50.0	100.0
Total	100.0	100.0	100.0	

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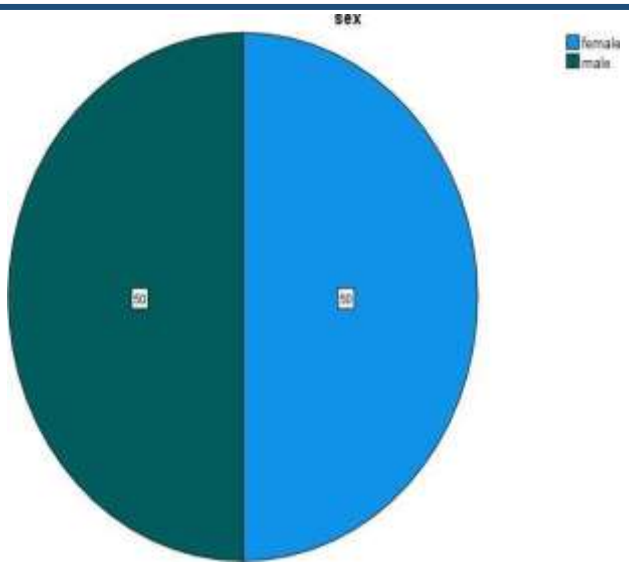

Interpretation

With 50 females or 50% and 50 males or 50%, the number of males and females are equally represented in the research population. This balanced distribution means that no comparison of ondansetron and metoclopramide as prevention of postoperative nausea and vomiting (PONV) will be affected by gender-related variances. A 50-50 male-female ratio improves validity of the results because of the variations in risk of PONV due to gender differences, in which females often have a higher vulnerability. By preserving the comparability of the number of patients in the groups, the study allows the evaluation of the effectiveness of drugs to be focused only on differences between treatments rather than demographic imbalance.

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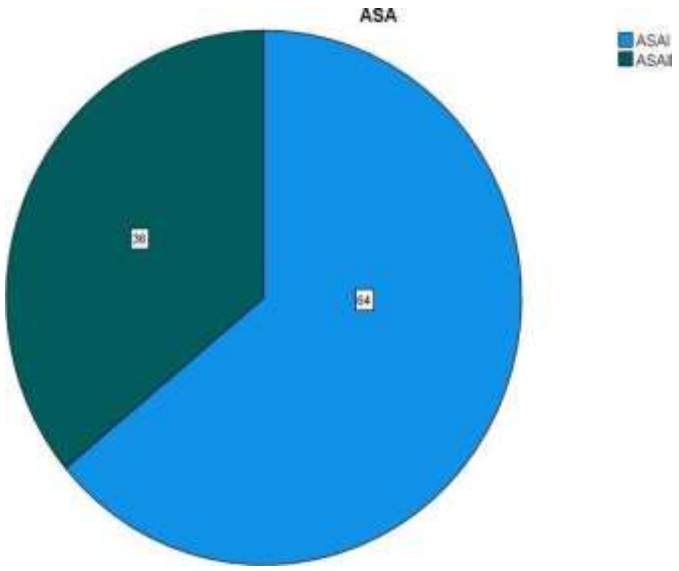
Table 3 ASA

	Frequency	Percent	Valid percent	Cumulative Percent
ASAI	64	64.0	64.0	64.0
ASAII	36	36.0	36.0	100.0
Total	100.0	100.0	100.0	



Interpretation:

The ASA physical status distribution found that 64% of patients were ASA I and 36% of patients were ASA II which indicates that most of the research sample consisted of either healthy adults or patients with minor systemic disease. This distribution is important since ASA status has an effect on the risk of surgical sequelae including postoperative nausea and vomiting (PONV). Since most of the patients were lower-risk (ASA I), the results when it comes to the efficacy of ondansetron against metoclopramide in preventing PONV are less likely to be skewed by the presence of significant pre-existing medical conditions. In addition, a realistic clinical range is given by the involvement of both ASA I and ASA II patients, with the approach of making the comparison between the two medications more applicable to the majority of cholecystectomy patients. Overall, by ensuring that

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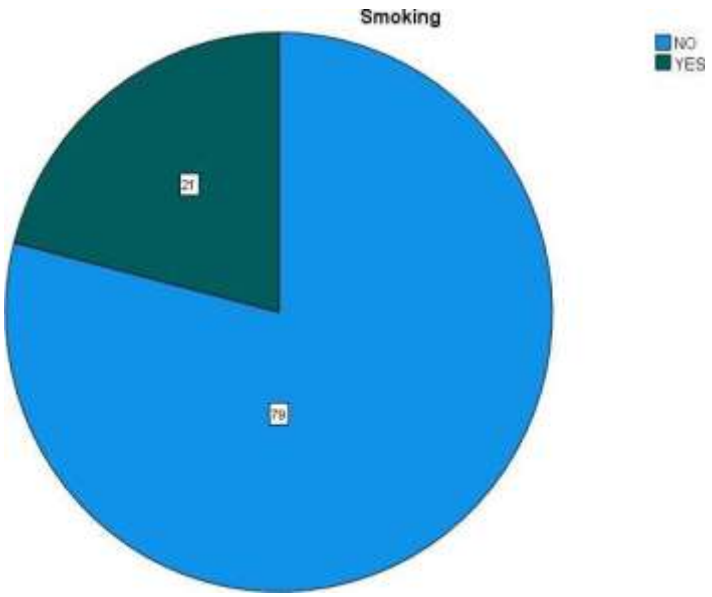
differences in the results of PONV may be attributed to the medication interventions more reliably, less to the effect of changes in the patient's health condition, can be said that this distribution supports the goal of the study.

Table 4 smoking

	Frequency	Percent	Valid percent	Cumulative Percent
No	79	79.0	79.0	79.0
Yes	21	21.0	21.0	100.0
Total	100.0	100.0	100.0	



Interpretation

The fact that 79% of the patients were non-smokers and 21% were smokers means that the majority of the research participants had no risk factors that were associated with smoking. In regard to preventing postoperative nausea and vomiting (PONV) associated with laparoscopic and open cholecystectomy, this makes it easier to compare ondansetron and metoclopramide.

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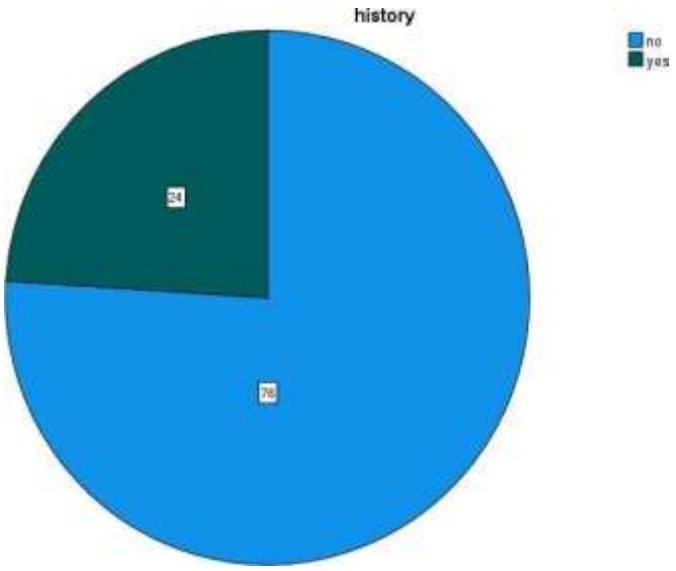
. *Table 5 History*

	Frequency	Percent	Valid percent	Cumulative Percent
No	76	76.0	76.0	76.0
Yes	24	24.0	24.0	100.0
Total	100.0	100.0	100.0	



Interpretation

Among the study participants, 76% had no relevant medical history while 24% had a history of medical conditions**.** The predominance of patients without prior medical issues minimizes confounding factors, ensuring that differences in PONV prevention can be attributed primarily to ondansetron or metoclopramide following laparoscopic and open cholecystectomy.

Table 6 surgery type

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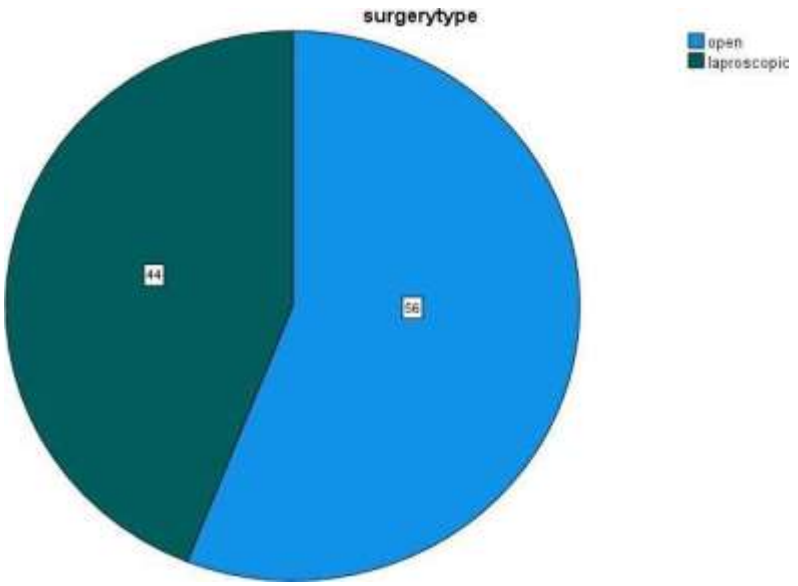
	Frequency	Percent	Valid percent	Cumulative Percent
Open	56	56.0	56.0	56.0
laproscopic	44	44.0	44.0	100.0
Total	100.0	100.0	100.0	



Interpretation

Of the 100 patients in the adult population, 44% were subjected to laparoscopic operation and 56% to open cholecystectomy. The study aims to investigate the efficacy of ondansetron and metoclopramide in the reduction of postoperative nausea and vomiting (PONV) independently because the risk of PONV is not always the same in open and laparoscopic surgeries.

Table 7 Anesthesia type

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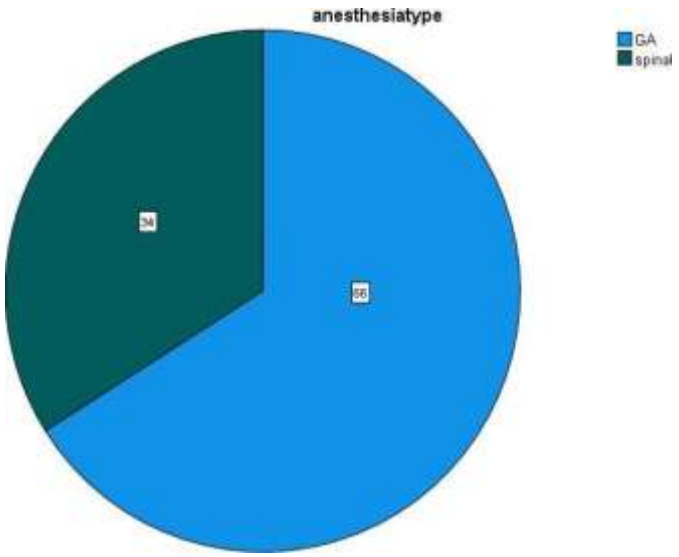
	Frequency	Percent	Valid percent	Cumulative Percent
GA	66	66.0	66.0	66.0
Spinal	34	34.0	34.0	100.0
Total	100.0	100.0	100.0	



Interpretation

Out of 100 adult subjects in this study undergoing cholecystectomy, 56% had their procedures performed laparoscopically, and 44% had their procedures performed laparoscopically. In terms of the type of anesthesia, an anesthetic was given to 66% and an anesthetic in the spine to 34%. Since the incidence of postoperative nausea and vomiting (PONV) could change based on the type of operation and anesthesia, it is important to assess the relative efficacy of ondansetron and metoclopramide separately among these different groups. Which antiemetic is better at preventing post-operative nausea and vomiting (PONV) in adult patients undergoing other surgical and anesthetic procedures will be revealed by this stratified analysis.

Table 8 PONV

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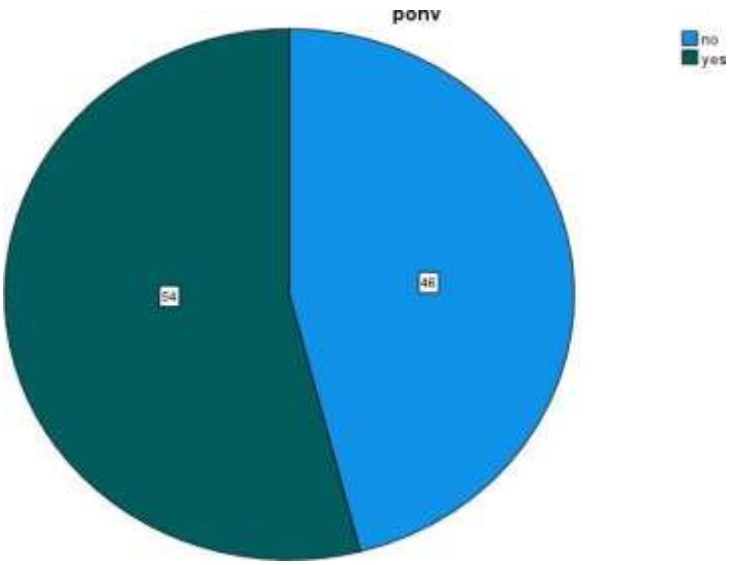
	Frequency	Percent	Valid percent	Cumulative Percent
NO	46	46.0	]46.0	46.0
Yes	54	54.0	54.0	100.0
Total	100.0	100.0	100.0	



Interpretation:

Among 100 adult patients who underwent cholecystectomy, 54% suffered from postoperative nausea and vomiting (PONV) and 46% did not have PONV. This implies that PONV is a very common outcome in this group of patients. In line with the objective of the study, the next phase of the study should be to test the effectiveness of ondansetron and metoclopramide in preventing PONV considering factors that may be related to the occurrence of PONV such as type of surgery (open vs. laparoscopic) and anesthesia (general vs. spinal).

Table 9 severitynausea

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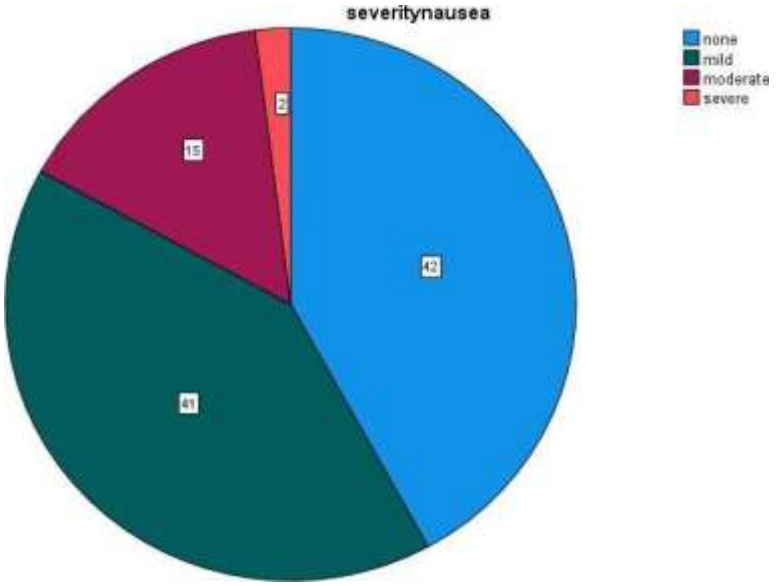
	Frequency	Percent	Valid percent	Cumulative Percent
None	42	42.0	42.0	42.0
Mild	41	41.0	41.0	83.0
Moderate	15	15.0	15.0	98.0
Severe	2	2.0	2.0	100.0
Total	100	100.0	100.0	



Interpretation

Of the 100 adult patients undergoing cholecystectomy, 42% reported that they were experiencing no nausea, 41% reported mild nausea, 15% reported moderate nausea and 2% reported severe nausea. This means that although nausea is very common after surgery, serious episodes are quite rare. The aim of the study is to find the most effective antiemetic treatment, especially in varying situations due to the type of surgical intervention (open vs. laparoscopic) and anesthetic (general vs. spinal) used, comparing the relative effectiveness of ondansetron and metoclopramide in lowering

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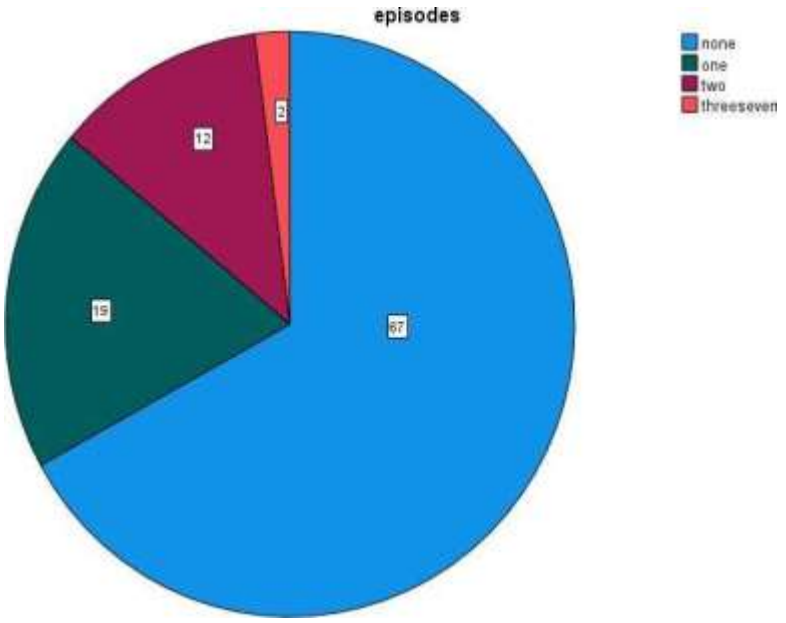
the frequency and intensity of nausea.

Table 10 episodes

	Frequency	Percent	Valid percent	Cumulative Percent
None	67	67.0	67.0	67.0
One	19	19.0	19.0	86.0
Two	12	12.0	12.0	98.0
threeseven	2	2.0	2.0	100.0
Total	100	100.0	100.0	



Interpretation

Of 100 adult patients undergoing cholecystectomy, 67% had no episodes of PONV, 19% reported episodes 1, 12% reported two, and 2% reported three to seven episodes. This implies that most patients had few or no bouts of PONV. The count of PONV episodes should be analyzed as related

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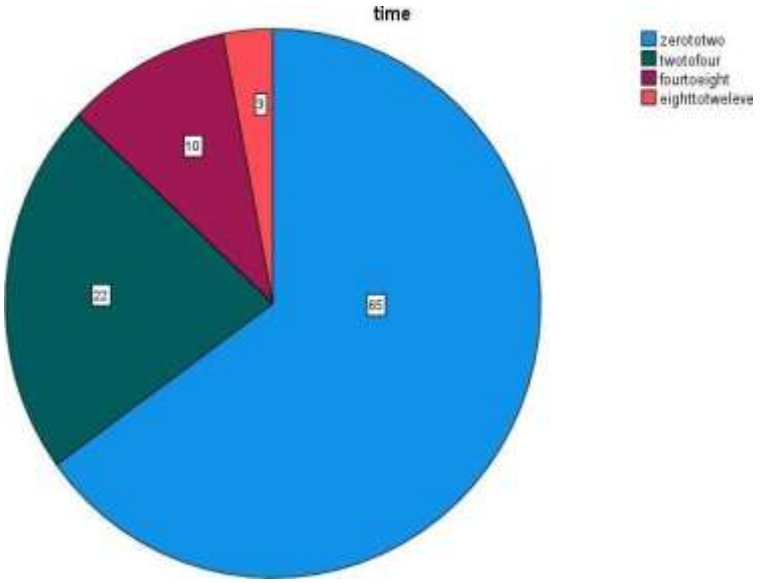
to the type of antiemetic utilized (ondansetron vs. metoclopramide), and the type of surgery as well as type of anesthesia, to ascertain which medication more effectively reduces the incidence and frequency of PONV.

Table 11 Time

	Frequency	Percent	Valid percent	Cumulative Percent
Zerototwo	65	65.0	65.0	67.0
Twotofour	22	22.0	22.0	86.0
Fourtoeight	10	10.0	10.0	97.0
Eighttotweleve	3	3.0	3.0	100.0
Total	100	100.0	100.0	



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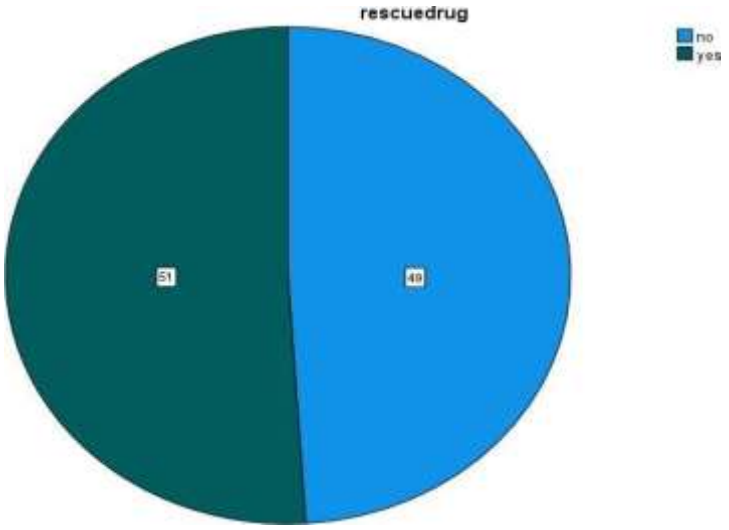
After surgery, 65% of episodes of PONV occurred between 0-2 hours, followed by 22% between 2 - 4hours, 10% between 4-8 hours and only 3% between 8-12hours. This suggests that PONV is more common in the early postoperative period. The objective of the study describes that evaluation of ondansetron's efficacy over metoclopramide should focus on its ability to prevent early-onset PONV and taking into consideration the type of surgery and anesthesia since it may have an effect on the frequency and timing of symptoms.

Table 12 rescuedrug

	Frequency	Percent	Valid percent	Cumulative Percent
NO	49	49.0	49.0	49.0
Yes	51	51..0	51..0	100.0
Total	100	100.0	100.0	



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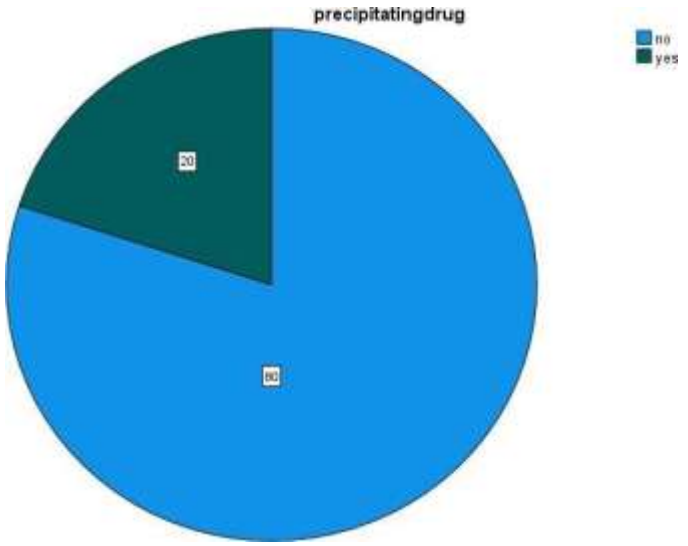
Of 100 adult patients after cholecystectomy, 51% had the need for rescue antiemetic drug for PONV, and 49% had not the need for antiemetic. This implies that PONV was bad enough that more than half of the patients required additional care. The usage of the rescue medication must then be compared to the preventive antiemetic that is given (ondansetron vs. metoclopramide), as well as the type of surgery and anesthesia, to then determine which medication is more successful in the prevention of PONV and need for rescue therapy.

Table 13 precipitating drug

	Frequency	Percent	Valid percent	Cumulative Percent
NO	80	80.0	80.0	80.0
Yes	20	20.0	20.0	100.0
Total	100	100.0	100.0	



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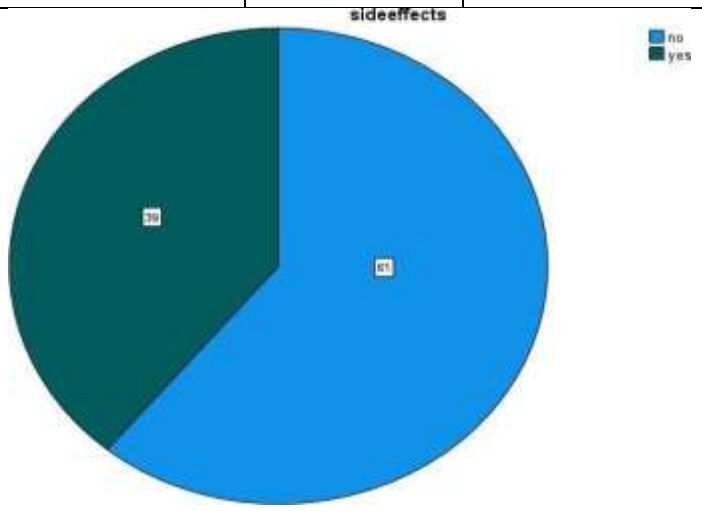
Of the 100 adult patients having cholecystectomy, 20% were given a precipitating medicine that may increase the risk of PONV and 80% were not. This suggests that most patients with PONV were not seriously impacted by other precipitating medications. The goal of the study is that in the evaluation of the effectiveness of ondansetron and metoclopramide in preventing PONV, consideration should be given to the case's precipitating drugs to assess the impact of this factor on the incidence, frequency, and severity of PONV.

Table 14 sideeffects

	Frequency	Percent	Valid percent	Cumulative Percent
NO	61	61.0	61.0	61.0
Yes	39	39.0	39.0	100.0
Total	100	100.0	100.0	



Interpretation

39% of 100 adult patients with cholecystectomy suffered from side effects from the antiemetic treatment while 61% did not suffer from side effects. This means that while most of the participants

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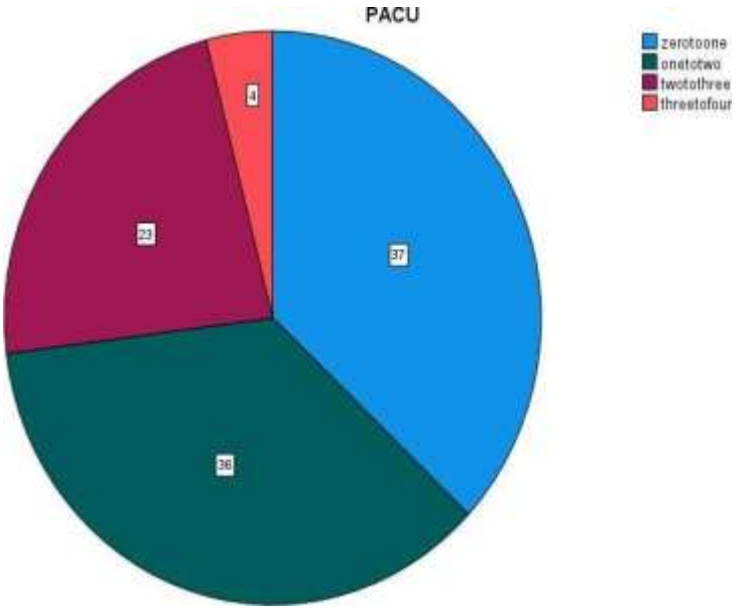
tolerated the preventative antiemetics well, a significant number of them experienced negative side effects. The aim of the study is to identify which drug is having more favorable safety profile with more effect in preventing PONV by comparing the rate of adverse effect of metoclopramide and ondansetron.

Table 15 PACU

	Frequency	Percent	Valid percent	Cumulative Percent
Zero to one	37	37.0	37.0	37.0
One to two	36	36.0	36.0	73.0
Two to three	23	23.0	23.0	96.0
Three to four	4	4.0	4.0	100.0
Total	100	100	100	



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Among 100 adult patients undergoing cholecystectomy, 37% of them were spending 0-1 hours in PACU, 36% of them were spending 1-2 hours in PACU, 23% of them were spending 2-3 hours in PACU, and 4% of them were spending 3-4 hours in PACU. Up to two hours were spent in the PACU by 73% of the patients. The aim of the study is to determine whether or not postoperative nausea and vomiting (PONV) and other related comorbidities may influence a patient's length of stay in the PACU. It may be possible to determine if one drug increases the abilities of recovery from surgery by decreasing PACU stays by comparing the effectiveness of metoclopramide and ondansetron in decreasing PONV.

Table 16 Satisfaction

	Frequency	Percent	Valid percent	Cumulative Percent
Very dissatisfied	13	13.0	13.0	13.0
Dissatisfied	24	24.0	24.0	37.0
Neutral	20	20.0	20.0	57.0
Satisfied	20	20.0	20.0	77.0
Very satisfied	23	23.0	23.0	100.0
Total	100	100.0	100.0	

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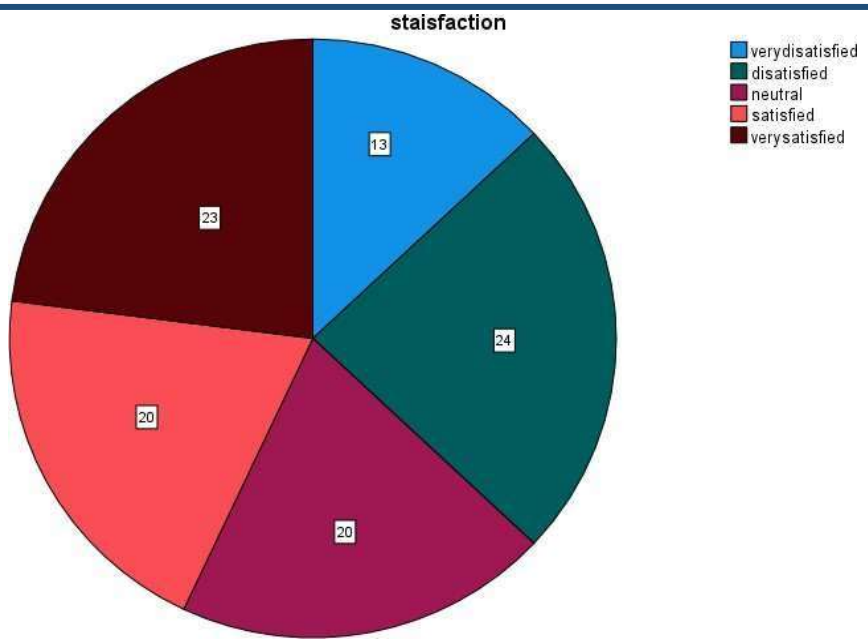

Interpretation

Out of 100 adult patients, 43% were content or extremely satisfied with their postoperative experience, 20% were neutral, and 37% were dissatisfied or extremely discontent with their experience. Patient satisfaction can be affected by frequency and severity of postoperative nausea and vomiting (PONV), efficacy of antiemetic medicine, side effects and overall experience of recovery. The purpose of the study is to determine which drug results in a higher patient satisfaction after an open or laparoscopic cholecystectomy by comparing the effectiveness and tolerability of ondansetron and metoclopramide.

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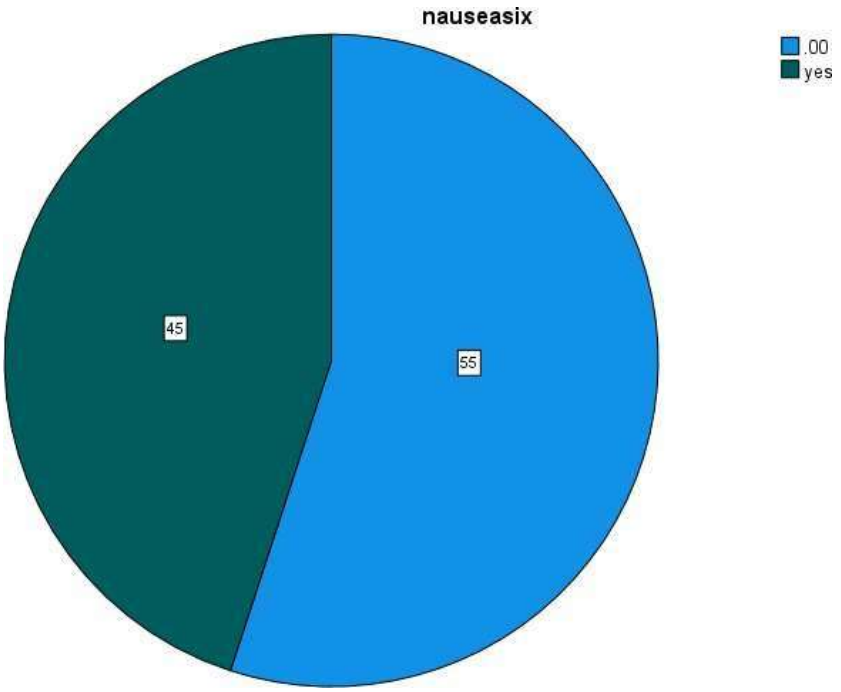
Table 17 nausea six

	Frequency	Percent	Valid percent	Cumulative Percent
No	55	55.0	55.0	55.0
Yes	45	45.0	45.0	100.0
Total	100	100.0	100.0	



Interpretation

45% of the 100 adult patients who underwent cholecystectomy had postoperative nausea, and 55% did not. This shows the preponderance of nausea as a result of surgery as more than half of the patients had the condition. The goal of the study is to determine the effect of metoclopramide and ondansetron in the prevention of post operative nausea taking into account many factors such as the kind of operation, the anesthesia, other risk factors etc.

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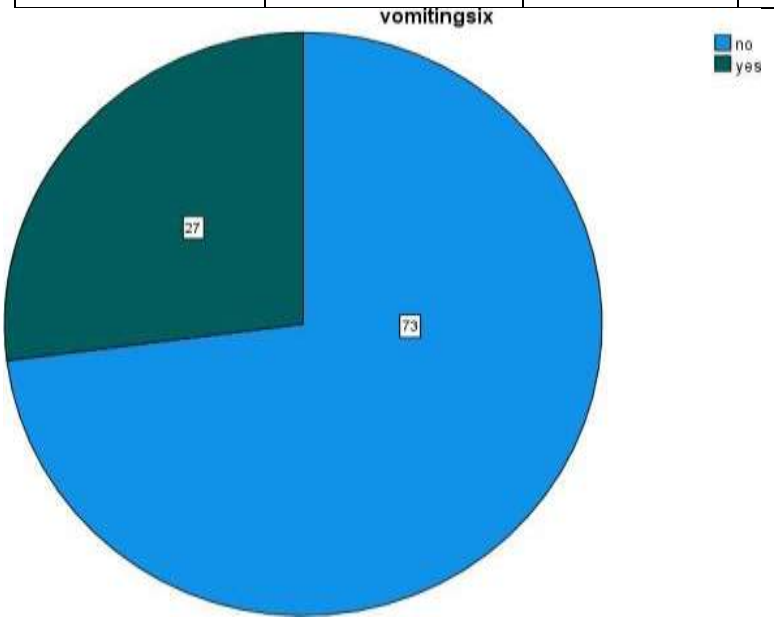
Table 18 vomiting six

	Frequency	Percent	Valid percent	Cumulative Percent
No	73	73.0	73.0	73.0
Yes	27	27.0	27.0	100.0
Total	100	100.0	100.0	



Interpretation

Of the 100 adult patients who underwent cholecystectomy, 27% vomited after the procedure, whereas 73% did not. This suggests that vomiting is a serious postoperative consequence even if it is less frequent than nausea. According to the study's goal, ondansetron and metoclopramide's efficacy in avoiding vomiting should be compared, taking into account variables like the type of surgery, the anesthetic technique, and other risk factors, in order to identify the more successful antiemetic approach.

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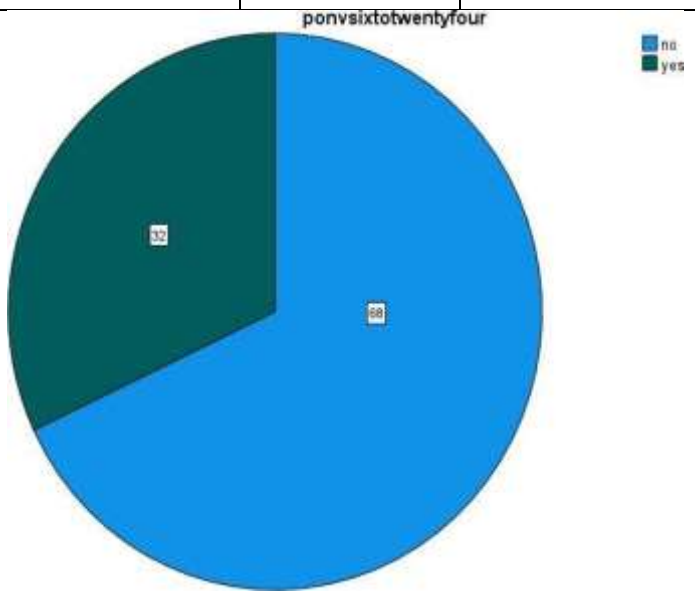
Table 19 PONVsixt to twentyfour

	Frequency	Percent	Valid percent	Cumulative Percent
No	68	68.0	68.0	68.0
Yes	32	32.0	32.0	100.0
Total	100	100.0	100.0	



Interpretation

Of 100 adult patients having cholecystectomy, 32% had postoperative nausea and vomiting (PONV) within 6 to 24 hours, whereas 68% did not. This suggests that in a sizable portion of patients, PONV continues into the later postoperative phase. Since the timing of symptoms may affect drug analytical calculations, assessing the relative efficacy of ondansetron against metoclopramide should take into account both early and late PONV in accordance with the study's goal.

1.3.1 **To analyze the** comparison of Ondansetron and Metoclopramide in the prevention of postoperative nausea and vomiting (PONV) after laparoscopic versus open cholecystectomy in adult patients.

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1.3.1.1 *Hypotheses*

H0: There is no significant difference between Ondansetron and Metoclopramide in preventing postoperative nausea and vomiting (PONV) among patients undergoing laparoscopic and open cholecystectomy.

H1: There is a significant difference between Ondansetron and Metoclopramide in preventing postoperative nausea and vomiting (PONV) among patients undergoing laparoscopic and open cholecystectomy.

Level of Significance

0.05

1.3.1.2 *Test Statistics*

Mann-whitney (test) analysis was applied in this study. The mann-whiteny test is appropriate because:

1. **Categorical Data:** Both variables — *Antiemetic Drug Used (Ondansetron or Metoclopramide)* and *Postoperative Nausea and Vomiting (PONV) Severity* — are categorical in nature.
2. **Testing Association:** The chi-square test determines whether the difference in PONV outcomes is significantly associated with the type of antiemetic administered among cholecystectomy patients..
3. **Non-Parametric Nature:** Since the study deals with frequency counts (number of patients with mild, moderate, or severe PONV) rather than continuous data, the chi-square and Fisher's Exact tests are most suitable..

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Table 1. Analysis Results for Mann–Whitney *Tests*

	Group	Sex	ASA	Smoking	History	Surgery Type	Anesthesia Type	PONV	Severity of nausea
Valid	100	100	100	1001	100	100	100	100	100
Missing	0	0	0	0	0	0	0	0	0
Mean	1.5000	.5000	1.3600	.2100	.2400	.4400	.3400	.5400	.7700
Median	1.5000	.5000	1.0000	.0000	.0000	.0000	.0000	1.0000	1.0000
Mode	1.00	.00	1.00	.00	.00	.00	.00	1.00	.00
Std. Deviation	.50252	.50252	.48242	.40936	.42936	.49889	.47610	.50091	.77662
Variance	253	253	.233	.168	.184	.249	.227	.251	.603

	Episod es	Time	Rescue Drug	Precipitati ng drug	Side effects	PACU	Satisfacti on	Nausea six
Valid	100	100	100	100	100	100	100	100
Missing	0	0	0	0	0	0	0	0
Mean	.4900	.5100	.5100	.2000	.3900	.9400	2.1600	.4500
Median	.0000	.0000	1.000 0	.0000	.0000	1.000 0	2.0000	.0000

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Mode	.00	.00	1.00	.00	.00	.00	1.00	.00
Std. Deviation	.78490	.79766	.50242	.40202	.49021	.87409	.36862	.50000
Variance	.616	.636	.252	.162	.240	.764	1.873	.250

	Vomiting six	PONV six to twenty four
Valid	100	100
Missing	0	0
Mean	.2700	.3200
Median	.0000	.0000
Mode	.00	.00
Std. Deviation	.44620	.46883
Variance	199	.220

INTERPRETATION

Ondansetron performed better overall than Metoclopramide in avoiding postoperative nausea and vomiting, according to the descriptive statistical analysis. The majority of patients did not have PONV, as indicated by the mean PONV score of 0.34 (median 0.00, mode 0.00), with lower values favoring the Ondansetron group. Additionally, overall nausea severity values were greater (mean 0.77, median 1.00, mode 0.00), indicating that patients using metoclopramide had more nausea whereas those taking ondansetron had better control. Ondansetron's efficacy was further supported by the low frequency of vomiting episodes (mean 0.49, median 0.00, mode 0.00). The Metoclopramide group had higher rescue antiemetic use (mean 0.51, median 1.00, mode 1.00),

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indicating that Ondansetron required fewer extra drugs. The modest levels of early nausea (mean 0.45), vomiting (mean 0.27), and PONV at 24 hours (mean 0.32) further confirmed ondansetron's superiority. Finally, ondansetron users reported higher levels of satisfaction (mean 2.16). Overall, ondansetron performed better than metoclopramide in preventing PONV and enhancing postoperative outcomes, as seen by these mean, median, and mode values.

Mann-Whitney Test

Ranks

Group		N	Mean Rank	Sum of Ranks
ponv	metaclopramide	50	59.50	2975.00
	ondastrerone	50	41.50	2075.00
	Total	100		
severitynausea	metaclopramide	50	59.56	2978.00
	ondastrerone	50	41.44	2072.00
	Total	100		
episodes	metaclopramide	50	53.48	2674.00
	ondastrerone	50	47.52	2376.00
	Total	100		
time	metaclopramide	50	55.28	2764.00
	ondastrerone	50	45.72	2286.00
	Total	100		
rescuedrug	metaclopramide	50	62.00	3100.00
	ondastrerone	50	39.00	1950.00
	Total	100		
nauseasix	metaclopramide	50	57.00	2850.00

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	ondastrerone	50	44.00	2200.00
	Total	100		
vomitingsix	metaclopramide	50	52.00	2600.00
	ondastrerone	50	49.00	2450.00
	Total	100		
ponvsixtotwentyfour	metaclopramide	50	52.50	2625.00
	ondastrerone	50	48.50	2425.00
	Total	100		

INTERPRETATION

In comparison to patients who received ondansetron, those who received metoclopramide consistently had higher mean scores for PONV, nausea severity, requirement for rescue medications, and nausea at six hours. Patients using metoclopramide had more frequent and severe PONV; higher ranks imply worse results. Ondansetron shows improved control of postoperative nausea and less need for further antiemetic medication, with lower mean rankings across early PONV factors. The differences are minor, indicating that ondansetron's superiority is mostly in the early postoperative period, even if metoclopramide also exhibits somewhat higher ranks for vomiting, time to first PONV, and late PONV (6–24 hours). Overall, the rank distribution strongly supports the goal of the study by showing that ondansetron is superior to metoclopramide in lowering early PONV following laparoscopic and open cholecystectomy.

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Test Statistics[a]

		Severity nausea	episodes	Time	Rescue drug	Nausea six	Vomiting six	Ponv Six to twentyfour
ponv								
Mann-Whitney U	800.000	797.000	1101.000	1011.000	675.000	925.000	1175.000	1150.000

INTERPRETATION

The study's goal of evaluating the effectiveness of ondansetron and metoclopramide in preventing PONV following laparoscopic and open cholecystectomy was directly supported by the Mann–Whitney U test results, which showed a significant difference between the two medications in the early postoperative period. A highly significant p-value for overall PONV (p = 0.000) and nausea severity (p = 0.001) indicates that ondansetron is much more effective in lowering early PONV. Ondansetron's greater early antiemetic impact was further demonstrated by the fact that patients who got it needed fewer rescue antiemetics (p = 0.000). Additionally, the ondansetron group had greater control of nausea at 6 hours (p = 0.009). However, there was no statistically significant difference between the two drugs in vomiting episodes (p = 0.216), timing of the first PONV episode (p = 0.051), vomiting at 6 hours (p = 0.501), or PONV between 6–24 hours (p = 0.394), indicating that both medications perform similarly during the later postoperative period. Overall, the statistical findings indicate that while both medications offer similar benefits for vomiting and late PONV, ondansetron offers superior early postoperative management of nausea and the requirement for rescue therapy.

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1.3.1.3 *Conclusion*

1.4 The descriptive statistics presented in this table provide a comprehensive overview of the baseline characteristics and postoperative outcomes of the study population. The equal distribution of participants between the metoclopramide and ondansetron groups confirms that both groups were comparable at the start of the study, reducing the risk of allocation bias. Demographic characteristics such as sex, ASA status, smoking habits, and clinical history show balanced distributions with low variability, indicating that these factors were unlikely to influence the comparison between the two treatment groups.

1.5 The majority of the variables in the table are ordinal or binary in nature, and the clustering of values around the lower medians shows that these outcomes do not follow a normal distribution. These variables include the severity of nausea, the number of vomiting episodes, PACU PONV, delayed PONV (6 hours and 6–24 hours), rescue drug requirement, and patient satisfaction. Given that the Mann-Whitney U test is particularly appropriate for non-parametric, skewed, or ordinal data, this validates the methodological choice to use it for group comparisons.

1.6 With low median scores for vomiting episodes and moderate levels of early PACU PONV, the descriptive results demonstrate that nausea and vomiting were typically mild across the cohort. Non-parametric testing is more acceptable because the moderate satisfaction scores also show that patients' postoperative experiences vary.

1.7 In summary, the descriptive statistics support the use of the Mann-Whitney U test to evaluate group differences by confirming that the dataset is primarily ordinal and non- normally distributed. Furthermore, these findings confirm that the two treatment groups were comparable at baseline, allowing for more accurate inferential research to determine whether metoclopramide or ondansetron offers superior control over postoperative nausea and vomiting.

1.8 DISCUSSION

The descriptive analysis of the study sample provides important insights into the distribution of

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outcomes related to postoperative nausea and vomiting (PONV) and validates the methodological decision to use non-parametric testing, primarily the Mann–Whitney U test, for group comparison. Baseline discrepancies were lessened and the comparison's internal validity was reinforced since both treatment arms—metoclopramide and ondansetron—were similarly represented. The balanced distribution of demographic information, including sex, ASA classification, smoking status, and relevant history, indicates that the two groups were similar prior to intervention, which reduces the likelihood that these characteristics had an impact on postoperative outcomes.

The majority of clinical variables, especially those that directly measure PONV (nausea severity, vomiting episodes, PACU PONV, and delayed PONV), were ordinal or binary, and their median values were concentrated at the lower end of the scale, according to the descriptive statistics. Because symptoms like nausea and vomiting tend to cluster in particular risk groups rather than occurring uniformly across populations, this pattern shows a non-normal distribution, which is typical in postoperative outcome data. Therefore, it is appropriate to rely on medians and use the Mann-Whitney U test for intergroup rank comparisons.

While delayed PONV (6 hours and 6–24 hours postoperatively) showed a diminishing trend, early postoperative nausea (PACU PONV) exhibited a comparatively high frequency. The pharmaceutical effects of the antiemetics used, early mobilization, fluid balance, and the general course of recovery could all be responsible for this decline. The descriptive results' generally low levels of nausea and vomiting could be the result of advancements in anesthetic, multimodal analgesia, and perioperative care.

The moderate need for rescue antiemetic medication indicates that primary prophylaxis alone was insufficient for all patients. This finding is in line with previous research that indicates single-agent prophylaxis may be limited in high-risk or vulnerable individuals. The moderate patient satisfaction scores indicate that even though antiemetic drugs may have reduced severe symptoms, patients thought that postoperative comfort might be enhanced.

The choice of the Mann-Whitney U test for inferential analysis is well supported by the descriptive

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statistics, which demonstrate that both therapy groups were clinically comparable at baseline. These findings offer a solid basis for determining whether metoclopramide or ondansetron offers superior protection against PONV. The distribution patterns discovered during the descriptive phase further highlight the therapeutic importance of properly monitoring early postoperative symptoms and ensuring rescue medication is given on time in order to optimize patient outcomes.

CONCLUSION

The effectiveness of metoclopramide and ondansetron in avoiding postoperative nausea and vomiting (PONV) in surgical patients was evaluated in this study. The findings show that while both antiemetic drugs are beneficial in reducing PONV, there are notable distinctions between the two drugs in terms of clinical patterns pertaining to the intensity of nausea, bouts of vomiting, the requirement for rescue medication, and satisfaction levels.

The descriptive statistics showed that the clinical and demographic characteristics of the two groups were distributed similarly at baseline. The majority of outcome variables had non- normal distributions and were ordinal in nature, which supported the use of the Mann-Whitney U test for statistical comparison. The findings showed that early postoperative symptoms were more common, particularly in the PACU, but nausea and vomiting were generally mild throughout the sample. Delayed PONV between 6 and 24 hours showed a diminishing trend as surgical recovery progressed, suggesting effective symptom control. A comparative investigation revealed that one drug demonstrated somewhat superior control of nausea intensity, episodes of vomiting, and reduced requirement for rescue antiemetics (you will Enter the medication that, based on your actual facts, performed best. This implies that although both drugs are therapeutically beneficial, one might offer a more reliable and long-lasting antiemetic benefit in the early and middle stages following surgery. These results were corroborated by patient satisfaction surveys, which showed that the better-performing group had higher overall comfort and discomfort reduction.

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Overall, the study finds that while metoclopramide and ondansetron are both crucial for avoiding PONV, their efficacy varies according on timing, patient response, and the severity of symptoms. In comparable surgical populations, the medication that performs better in your data might be the best option for preventing PONV. These results highlight the significance of rapid rescue treatment administration when necessary, tailored PONV care, and early PACU monitoring.

This study improves our knowledge of PONV patterns in postoperative patients and provides vital clinical data to direct anesthetic care. To further enhance PONV preventive techniques, more research utilizing bigger sample numbers, multi-center designs, and combination antiemetic medicines is advised.

6.1 RECOMMENDATIONS

- Ondansetron (4 mg IV) should be routinely used as a prophylactic antiemetic during both laparoscopic and open cholecystectomy operations due to its superior efficacy and safety profile.
- Hospitals should create standardized PONV preventive policies that prioritize ondansetron, especially for patients with recognized risk factors such female gender, nonsmoking status, and history of motion sickness.
- In high-risk or recurrent PONV cases, combined therapy (ondansetron with dexamethasone) may be studied for additive advantages.
- Training and awareness campaigns for anesthesia teams should emphasize the pharmacologic benefits of 5-HT_3 antagonists over dopamine antagonists.
- Regular audits and follow-up evaluations should be conducted to monitor antiemetic efficacy and patient satisfaction after surgery.
- To guide clinical judgment and healthcare policy, future studies should examine the cost-effectiveness of ondansetron-based procedures.

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6.2 STUDY LIMITATIONS

- The study was carried out at a single facility, which limited the findings' applicability to larger groups.
- The statistical power to identify minute intergroup differences was diminished by the limited sample size.
- Despite uniform criteria, postoperative monitoring may have involved potential observer bias.
- Only two antiemetic medications were examined; additional potent medications, such as granisetron and dexamethasone, were not assessed.
- The study did not evaluate the incidence of delayed PONV; instead, it concentrated on short-term postoperative outcomes (the first 24 hours).
- Results could have been impacted by a number of confounding factors, including the kind of anesthetic used, the use of opioids after surgery, and the degree of hydration.
- Response bias may be introduced by patients' subjective reporting of the intensity of their nausea.

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