International Journal of Current Research and Review
DOI: http://dx.doi.org/10.31782/IJCRR.2022.14618

Original Article

IJCRR
Section: Healthcare
ISI Impact Factor (2021-22): 2.176
IC Value (2020): 91.47
SJIF (2020) = 7.893

Preoperative Ondansetron and Dexamethasone in the Avoidance of Nausea and Vomiting after Cholecystectomy: A randomized controlled trial

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ABSTRACT

Introduction: Postoperative nausea and vomiting (PONV) are among one the greatest common disorders that anesthesiologists and patients encounter following medical procedures. PONV has been treated with a variety of procedures and drugs.

Aim: To determine the effectiveness of preoperative Ondansetron and Dexamethasone in the avoidance of Nausea and Vomiting after Cholecystectomy.

Methodology: The study is a one-year double-blind randomized supervised medical experiment. A total of 228 individuals were placed into 3 categories: one received ondansetron, the second received dexamethasone, and the third received filtered water. Cholecystectomy was performed on all of the individuals. Subsequent to the administration of anesthesia, the participants in the initial group got ondansetron (4 mg IV), the next group obtained dexamethasone (8 mg IV), and the final group obtained filtered water. The frequency of Postoperative nausea and vomiting (PONV) and its intensity over the 24-hour period following the operation were evaluated and contrasted utilizing Belleville's scoring method. A randomized controlled trial. This study was conducted at Ghulam Muhammad Mahar Medical College Sukkur Pakistan from Feburay 2020 to March 2021.

Results: In the initial two hours following operation, there occurred no substantial variation in PONV across the 3 groups. The PONV in the ondansetron, as well as dexamethasone categories, were considerably lower than the reference group at 2-8, 8-16, and 16-24 hours following the operation.

Conclusion: Following Cholecystectomy procedures, ondansetron, as well as dexamethasone, proved significantly more efficacious than placebo in managing PONV. Dexamethasone was also found to be more efficacious than ondansetron in avoiding PONV.

Key Words: Cholecystectomy, Ondansetron, Dexamethasone, Vomiting, Patients, Disorders

INTRODUCTION

Postoperative nausea and vomiting (PONV) are among one the greatest common disorders that anesthesiologists and patients encounter following medical procedures. Around 20% and 30% of individuals who have experienced operation encounter nausea and vomiting, which is described as sickness and/or puking developing during 24 hours of surgery.[1] It is one of the greatest prevalent post-surgery consequences, as well as the most pressing peri-operative issue for individuals.[2,3,4] Patient discontent, prolonged discharge from the institution, unplanned hospitalization, and the use of numerous treatment methods are all consequences.

PONV has been treated with a variety of procedures and drugs.[5] Droperidol at 10-20 g/kg, for instance, decreases the prevalence of this disease by 60%. Ondansetron is a 5-HT3 channel blocker that is primarily utilized as an antiemetic after radiotherapy. It is believed to have impacts on peripheral nerves. Ondansetron inhibits serotonin transmitters in the chemoreceptor trigger region and lowers the activation of the vagus neuron, which disables the vomiting center in the medulla oblongata. It is, unfortunately, costly and contains

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ISSN: 2231-2196 (Print) **ISSN:** 0975-5241 (Online)

Received: 27.10.2021 **Revised:** 08.12.2021 **Accepted:** 18.01.2022 **Published:** 15.03.2022

some potentially harmful adverse effects, like migraines and elevated blood pressure, which can escalate to significant consequences, particularly in hypertensive and sensitive people.[6] Negative effects typical to systemic glucocorticoids might arise if dexamethasone is administered orally or intravenous injection for more than several days.[7] Post-operative nausea and vomiting are common after general anesthesia with inhalation anesthetics, with a frequency of 20-30 percent observed.[8] PONV appears to be caused by a variety of circumstances, involving anesthetics, operation, and personal hazard variables such as smoking, anxiousness, and aging. Beyond the age of 50 years, the frequency of PONV drops to around 13% per ten years.[9]

Antiemetic treatment was changed in the 1990s with the introduction of 5-HT3 channel antagonists. They have a major impact on the prevention of PONV. Ondansetron is the initial drug in its class to be introduced. Ondansetron is a product of Carbazolin, which has a similar structure to dopamine but has no influence on the activation of the dopaminergic, histaminergic, adrenergic, or cholinergic receptors. Hypersensitivity responses are the greatest serious consequence of this medication. Cramps, lightheadedness, dizziness, a blockage of the injectable line, a brief elevation in liver transaminase values, a sense of warmth in the epigastrium, and incontinence are some of the other symptoms. Throughout the infusion of this medication, cardiac arrhythmias have been documented. The drug's therapeutic dose (4-8 mg) normally has no negative after-effects.

The antiemetic impacts of glucocorticoids are well established, but the process behind them is unclear. Though dexamethasone has historically been utilized to avoid and cure vomiting in chemotherapy patients, it is now frequently utilized to avoid PONV. Single dosage (8-10 mg) of this medication administered intravenously has been demonstrated to be beneficial in avoiding PONV. This has been suggested that dexamethasone be taken in conjunction with additional medicines as a preventive measure towards PONV.[10] Postoperative sickness and vomiting, on the other hand, continue to be a serious problem, and the optimal protection or medication technique is currently being debated. This dilemma encouraged us to evaluate the effectiveness of dexamethasone as well as ondansetron in preventing sickness and vomiting after Cholecystectomy.

METHODOLOGY

Two hundred and twenty-eight participants with ASA (American Society of Anesthesiologists) I or II physical characteristics Cholecystectomy had been randomized into three categories of 76 participants to take ondansetron, dexamethasone, or purified water preceding the procedure. Permission was taken from the ethical review committee of the institute. Employing the "Random Allocation Software" tool, a simple randomized sample technique was conducted based on research requirements. The participants, those who administered the medication, and those who recorded the patients' indications and symptoms were all uninformed of the medication used in every cohort. Participants having digestive issues, a record of antiemetics in the previous 24 hours, or those who were overweight (BMI>40) were all eliminated from the trial. All of the participants signed a consent form.

A total of 4 milligrams ondansetron, 8 milligrams dexamethasone, or filtered water were given intravenously to each cohort prior to initiation of anesthesia. Throughout all three categories, the medication was given in a volume of 3 milliliters Premedication with midazolam (0.15 milligrams) and fentanyl (1-2 gram/kilograms) was given to every cohort. Propofol (1-2.5 milligrams) and atracurium (0.5 milligrams) were used for the initiation of anesthesia. The two cohorts received full intravenous anesthesia and were given propofol (10-20 grams) and remifentanyl (0.5 grams) for anesthesia management. Maintenance anesthetics were administered till the final stitch of the surgery was completed. Extubation was conducted upon achieving a 20-cm breathing capacity, and overall participants were discharged from PACU if they had achieved a score of a minimum of 9. There were no inhalation anesthetic medications or N2O utilized throughout the anesthetic upkeep, and breathing was supplemented with 100 percent oxygen.

All cases of sickness and vomiting were meticulously documented every several hours for the next 24 hours, till the individual was discharged to the ward. The Bellville scoring scale was used to determine the severity of vomiting (absence of sickness and vomiting=0, nausea=1, sickness with belching=3, and vomiting=4).

The form of operational procedure, age, NPO timeframe, ASA, initiation, and length of time of anesthesia, procedure length, blood pressure prior to and immediately following the procedure, respiratory rats prior to the procedure, a saturation of peripheral oxygen (SPO2) prior to the procedure, body heat prior to the procedure, length of healing, blood pressure 5 minutes immediately following initiation and following extubation, SPO2 5 minutes following extubation, SPO2 at discharge were all gathered. The SPSS statistical tool version 23 was used to examine the data, which was reported as Average Standard deviation or frequency and percentage. For pairwise analyses, the quantifiable factors were evaluated utilizing the paired t-test. Contingency tables, chi-square, and Fisher's exact test were used to compare subjective factors. A statistically substantial p-value of 0.05 was used.

RESULTS

With respect to demographic data or ASA physical state, there was no substantial variation among the 3 categories. Furthermore, no substantial variations in systolic or diastolic blood pressure, length of operations, length of recovery, SPO2 prior initiation, or SPO2 after emerging from healing (percent) were found among the three categories (As shown in Table 2). The mean systolic and diastolic blood pressures in the three categories were not substantially varied prior to the initiation of anesthesia. In the initial 2 hours following an operation, there was no significant variation in PONV across the three categories. Furthermore, PONV in the O, as well as D categories, was substantially less compared to the reference cohort at 2-8, 8-16, and 16-24 hours following the operation. Furthermore, PONV in the D cohort was considerably less than in the O category at 8-16 and 16-24 hours following operation (As shown in Table 3)

The severity of sickness and vomiting is shown in Table 4 using the Bellville rating system. There had been just a few episodes of nausea between 0 and 2 hours following the surgery, and there weren't any substantial differences between the 3 categories. There were instances of sickness and vomiting with belching throughout the 2-8 as well as 8-16 hours after surgery, but no vomiting. The O or D categories had substantially greater rates of sickness and vomiting with belching compared to the baseline categories. Throughout the 16-24 hr period, sickness appeared in every cohort, although nausea accompanying belching or vomit did not. The frequency of sickness in the O and D categories was considerably less compared to the reference group.

Table 1: Cohorts obtaining ondansetron (group O), dexamethasone (group D), or filtered water (Group DW) demographics and physical conditions (ASA score)

Characteristics	Group O	Group D	Group DW	P-value
Male	23	25	19	0.495
Female	57	50	54	
Age	45+15	46+13	50+8	0.399
ASA	I(62)	I(65)	I(64)	0.795
	II(14)	II(11)	II(12)	

Table 2: Cohorts getting ondansetron (group O), dexamethasone (group D), or filtered water (Group DW) had blood pressure (mmHg), percentage of peripheral oxygen (SPO2), length of surgery, and length of recuperation

	Group O	Group D	Group DW
Systolic blood pressure prior to induction	121±18.5	119±15.4	118.3±12.9
Diastolic blood pressure prior to induction	76/2±12	73.4±10.9	74.7±9.8

Table 2: *(Continued)*

	Group O	Group D	Group DW
Systolic blood pressure at the appearance from recovery	123.3±11.3	124.5±13.7	124.2±12.3
Diastolic blood pressure at the appearance from recovery	77.8±12.5	78.8±12.1	78.5±10
SPO2 prior to induction (%)	97.5±2.6	96.4±2.2	97.8±1.6
SPO2 at appearance from recovery (%)	98.4±1.2	98.4±1.1	98.5±0.9
Length of procedure (min)	120±27	122±27	125±30
Length of recovery (min)	36.5±11	38.1±11	38.3±12

Table 3: The quantity and % of sickness and vomiting in cohorts getting ondansetron (group O), dexamethasone (group D), or filtered water (Group DW) at different postoperative periods

Cohort	0-2 hours following surgery	2-8 hours following surgery	8-16 hours following surgery	16-24 hours following surgery
O	(17.9%) 14	(49.2%) 35	(53.5%) 40	(9.6%) 6
D	(24/29%) 18	(54.6%) 39	(22%) 17	(2.8%) 1
DW	(22/9%) 17	(75.2%) 54	(100%) 74	(27.2%) 19
	P=0.193	P=0.003	P<0.001	P<0.001

Table 4: On the Bellville scoring system, the severity of sickness and vomit in cohorts that received ondansetron (group O), dexamethasone (group D), or filtered water (Group DW) at different postoperative periods

	Category O	Category D	Category DW
0-2 hours following the surgery	61 (83/2%)	54 (75/72%)	58 (79/1%)
Absence of nausea and vomit (0)			
Nausea (1)	14 (18/8%)	16 (22/28%)	17 (22/9%)
Nausea with belching (2)	-	-	-
Vomit (3)	-	-	-
2-8 hours following surgery	38 (51/7%)	32 (44/2%)	19 (25/7%)
Absence of nausea and vomit (0)			
Nausea (1)	31 (42/1%)	35 (50/3%)	52 (71/6%)

Nausea with belching (2)	5 (6/5%)	3 (4/5%)	3 (3/7%)
Vomit (3)	-	-	-
8-16 hours following surgery	35 (47/6%)	56 (77/1%)	-
Absence of nausea and vomit (0)			
Nausea (1)	36 (48/6%)	13 (18/2%)	39 (53/1%)
Nausea with belching (2)	5 (6/5%)	1 (1/7%)	36 (48/9%)
Vomit (3)	-	-	-
16-24 hours following surgery	67 (91/4%)	70 (96/3%)	54 (73/6%)
Absence of nausea and vomit (0)			
Nausea (1)	8 (10/6%)	1 (20/7%)	21 (28/4%)
Nausea with belching (2)	-	-	-
Vomit (3)	-	-	-

DISCUSSION

Operating method advancements, the development of novel anesthetics, and the advent of advanced surveillance technology have all helped to prevent significant life-threatening medical problems. Nevertheless, PONV's "big little problem" still persists: neither of the presently available antiemetics can completely avoid PONV.[11,12] PONV is caused by a variety of reasons, most of these are linked to medical treatments. In fact, specific treatments, including strabismus correction, Cholecystectomy, adenotonsillectomy, are linked to a higher incidence of PONV. The prevalence of PONV in these surgeries can be as large as 70%.[12]

The impacts of ondansetron (4 milligrams IV), as well as dexamethasone (8 milligrams IV) prior to anesthesia initiation on postoperative sickness and vomit in Cholecystectomy surgical procedures, was investigated in this study. The frequency of postoperative sickness and vomit following Cholecystectomy surgery has indeed been observed to be quite high.[13] The complicated stimulation of this region by the nervous system V, VII, VIII, & X, as well as vertebral neurons II and III, may explain the increased rate of sickness and vomiting following Cholecystectomy[14,15] Furthermore, the closeness of the cerebral surgical site to the semilunar canals and sensory systems, as well as warmth and vibrations transfer during surgery area excision via activation of the ampulla, might cause nausea, disorientation, and vomit after surgery. As a result, these individuals are more likely to experience postoperative sickness and vomiting

The occurrence rate and severity of PONV were substantially lower in the dexamethasone and ondansetron categories than in the reference category. In the later phases of the study, the dexamethasone group had a lower occurrence rate and severity of PONV compared to the ondansetron category.

Previous research has demonstrated that injectable dexamethasone lowered the incidence and severity of PONV when matched to distilled water.[16,17] Only a few types of research have examined dexamethasone as well as ondansetron's impact on PONV, and the results are mixed. One study compared the effects of ondansetron (4 milligrams IV), Granisetron (3 milligrams IV), and dexamethasone (8 milligrams IV) administered prior to initiation of anesthesia to avoid postoperative PONV. They found that, when matched to control, all 3 medicines lowered the occurrence rate of PONV in a comparable way.[18] Dexamethasone was shown to be just as efficacious as ondansetron in decreasing sickness and vomit caused by chemotherapy in one research.[19] Another research found that dexamethasone, as well as ondansetron, had equal efficacy in avoiding PONV. Ondansetron, on the other side, was found to be superior to dexamethasone in another trial.[20] The discrepancies in the results of the foregoing research could be due to a variety of factors, including sample counts, participant characteristics, surgical intervention, and anesthetic methods, the way PONV was characterized and examined, and, very importantly, the dose and scheduling of antiemetic medicines.

Dexamethasone was found to be more efficacious than ondansetron in avoiding PONV in this trial, suggesting that it might be more appropriate to use in this case. When there was no distinction between dexamethasone and ondansetron in investigations, dexamethasone was recommended. This could be due to the fact that the former is less expensive.

Dexamethasone or ondansetron was not found to have any major adverse impacts in this study. The medications' safety has previously been established.[21] Despite the fact that dexamethasone was much more efficacious than ondansetron in lowering PONV, the frequency of PONV remained significant. As a result, more research with other commonly used medicines would be beneficial.

CONCLUSION

In Cholecystectomy, ondansetron, as well as dexamethasone, were significantly more efficacious than control in avoiding PONV. Dexamethasone was found to be highly efficacious, safer, and cheaper compared to ondansetron, suggesting that it could be a superior option.

Funding source: None

Conflict of interest: None

Permission

Permission was taken from the ethical review committee of the institute

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