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Krishna Prasad T *

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Review Article

Subhypnotic doses of Propofol for Nausea and Vomiting

Kavin Adhitya, Krishna Prasad. T *, Preetha Tamilchelvan, Soundarya Priyadharsini. K

Shri Sathya Sai Medical College and RI, Ammapettai, Kanchipuram Dt-603108. INDIA

***Corresponding Author:** Krishna Prasad T, Professor, Dept of Anaesthesiology, Shri Sathya Sai Medical College and RI, Ammapettai, Deemed University, Kanchipuram Dt- 603108. India.

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Abstract

The second most frequent postoperative complication following wound infection is postoperative nausea and vomiting. Retching and vomiting can cause a wound to dehisce, extending hospital stays and increasing costs. Numerous clinical studies have revealed that propofol is equally efficient at lowering the incidence of nausea and vomiting after intrathecal morphine administration as it is at reducing pruritus.

Aim:

The aim of the study was to analyse the antiemetic effects of sub hypnotic dose of propofol in various surgical conditions.

Methods:

An extensive research of all materials related to the topic was carried out in the PubMed and Google scholar search engine .relevant research articles focusing on sub hypnotic doses of Propofol for nausea and vomiting published since 2019 were included in the review .several review articles were excluded, and studies related to anaesthesia were included from 241articles, narrowing it down to a total of 7 studies which implies the subhypnotic doses of the drug in various anaesthesia related clinical scenarios. A total of 7 studies similar to the current study objectives were included in the study and analyzed. keywords used in the searches included Propofol, sub hypnotic, nausea, vomiting.

Conclusion:

Sub hypnotic dose of Propofol (0.5mg-1.0mg/kg/hr) given pre operatively effectively reduce post-operative nausea and vomiting in various surgical operation. But the duration of its anti-emetic effect seems to be lower than other anti-emetic drugs in the market. Still it can be effectively used in reducing post op and intra op nausea and vomiting.

Keywords: propofol; sub hypnotic; nausea; vomiting

Introduction:

Because of its multiple aetiology, postoperative nausea and vomiting continues to be the most common surgical complication. Laparoscopic procedures contribute for a further increase in incidence, which now stands at around 40-75%. Various drugs have been tried to prevent delay in recovery room, aspiration increased intra cranial pressure .in addition to the above vomiting and retching can result in wound dehiscence, prolonging hospital stays and raising costs, postoperative nausea and vomiting can also result in problems such dyselectrolytemia, haemorrhage, and aspiration of gastrointestinal contents.

Among the variety of drugs tried, Low dosages of propofol have been shown to be an effective antiemetic in individuals undergoing cancer treatment and surgery. However, the exact mechanism of action is still unknown. A new intravenous anaesthetic inducing agent called propofol has direct antiemetic characteristics and is associated with significantly less postoperative nausea and vomiting than existing anaesthetic medications.[1]

Method:

An extensive research of all materials related to the topic was carried out in the PubMed and Google scholar search engine .relevant research articles focusing on sub hypnotic doses of Propofol for nausea and vomiting published since 2019 were included in the review .several review articles were excluded, and studies related to anaesthesia were included from 241articles, narrowing it down to a total of 7 studies which implies the subhypnotic doses of the drug in various anaesthesia related clinical scenarios. A total of 7 studies similar to the current study objectives were included in the study and analyzed. keywords used in the searches included Propofol, sub hypnotic, nausea, vomiting.

Review of literature:

1. **Sintayhu A et al.** Studied the performance of a low dose of propofol in preventing postoperative nausea and vomiting following gynecologic surgery in comparison to metoclopromide. Gynaecological surgical procedures are linked to a 60–83% higher risk of post-operative nausea and vomiting. Propofol was initially approved as an anaesthetic for induction and maintenance, despite the above. This study concentrated on how propofol differs from metoclopromide in terms of its antiemetic properties. This study shows there was no statistically significant difference between the propofol and metoclopromide groups in the overall incidence of postoperative nausea and vomiting in the first 24 postoperative hours (p=0.36). However, within the first six postoperative hours, the incidence of postoperative nausea and vomiting was lower in the propofol group (41% vs. 64.1% with a p value of 0.04) than in the metoclopromide group (64.1%), indicating that propofol significantly reduces postoperative nausea and vomiting during this period. There is no statistically significant difference between the propofol and metoclopromide groups in the incidence of postoperative nausea and vomiting at the 12-hour mark (p=0.49). At 24 postoperative hours, there was no difference between the two groups in the incidences of postoperative nausea and vomiting (p=0.63). Additionally, the incidence of nausea was significantly lower in the propofol group (41% vs. 64.1%) in the first 6 hours (P=0.04) but not significantly different at 12 or 24 postoperative hours. The findings of this study are consistent with research conducted in Turkey, which found that metoclopromide (0.2 mg/kg) and propofol (0.5 mg/kg) are equally effective in preventing postoperative nausea and vomiting. In this RCT study, the incidence of nausea was 6 (30%) in the propofol group, 9 (45%) in the metoclopromide group, and 16 (80%) in the placebo group, with a significant p value of 0.002; however, there was no statistically significant difference at 4-12 and 12 -24 hours. The antiemetics were administered at the conclusion of surgery in both studies, which is the most likely explanation for the similarities between the two studies. Our study's findings are also consistent with those of a study conducted in India that used metoclopramide (0.2 mg/kg) or ondansetron (0.1 mg/kg) in addition to propofol (0.5 mg/kg) to prevent postoperative nausea and vomiting following ENT surgery. The percentage of patients who received ondansetron, metoclopromide, or propofol who experienced postoperative nausea and vomiting within the first 24 hours was 20%, 70%, and 50%, respectively (p 0.05). The various types of surgery investigated and population demographics may help to explain slight variations in the incidence of postoperative nausea and vomiting reported. Due to direct or indirect vestibular system stimulation, middle ear surgery is specifically linked to a higher incidence of postoperative nausea and vomiting.. Based on findings, we advise using low-dose propofol rather than metoclopromide during the first six postoperative hours as it is a more effective antiemetic.[2]
2. **Kampo.S et al** studied that with using a sub-hypnotic dose of propofol in a caesarean delivery patient, postoperative nausea, vomiting, and pruritus caused by intrathecal morphine can be reduced. According to the data, there was incidence of post-operative nausea and vomiting in 108 (93.9%) parturient from the control group, 10 (8.7%) from the propofol group, and 8 (7.0%) from the metoclopramide group. The incidence of post-operative nausea and vomiting did not differ significantly between the propofol and metoclopramide groups. (P = 0.99; 0.31; and 0.35 respectively). From the control, propofol, and metoclopramide groups, respectively, 105 (97.2%), 1 (10.0%), and 3 (37.5%) of the pregnant women got antiemetic medications. When a pregnant woman is having a caesarean section while under spinal anaesthesia with intrathecal morphine, a sub-hypnotic dose of propofol is just as helpful as metoclopramide in preventing post-operative nausea and vomiting. Following intrathecal morphine administration, a sub-hypnotic dosage of propofol dramatically lowers the incidence of postoperative pruritus.[3]
3. **Tilahun Bantie A et al** studied the outcomes of Propofol vs. Dexamethasone for Post-surgical Vomiting and Nausea in Ear, Nose, and Throat Surgical procedures. High rates of postoperative nausea and vomiting following ENT surgery have been reported, particularly in patients who did not receive prophylactic antiemetics. During surgery, serotonin is released from enterochromaffin cells in the gastrointestinal tract and binds to visceral receptors of the 5-hydroxytryptamine 3 subtype, stimulating vagal afferents to conduct impulses to the chemosensory trigger zone, which is on the dorsal surface of the medulla oblongata at the caudal end of the fourth ventricle. Chemoreceptor Trigger Zone stimulation due to the arrived stimulus will lead to Postoperative Nausea and Vomiting. The requirement for rescue anti-emetics was relatively lower in dexamethasone group. Glucocorticoids have been widely used to prevent postoperative nausea and vomiting during chemotherapy use or general anesthesia. Research shows that dexamethasone decreases 5-hydroxytryptamine production and release and decreases permeability across the Blood-Brain Barrier, which lowers the amount of 5-hydroxytryptamine available to chemical sensors despite the fact that the antiemetic mechanism is not fully understood. Dexamethasone use, however, may be linked to an increased risk of infection, stalled healing of wounds, and interference with the function of the adrenal glands as a decrease in endogenous steroid synthesis brought on by negative feedback. While there were no participants experiencing nausea and vomiting in the latter period, the incidence of Postoperative Nausea and Vomiting was low in the dexamethasone group between the hours of 0 and 6 and between the hours of 12 and 24. (i.e., 12–24 hrs Dexamethasone's quick onset and protracted duration of action may explain why there is little to no postoperative nausea and vomiting when used as directed (i.e., 72 hours). Similarly, this study's ENT surgery patients who received a bolus dose of propofol experienced preventative antiemetic effects. Propofol still had a protective effect, but it started to wane over time when compared to the dexamethasone group. In accord with this finding, dexamethasone recipients required less rescue antiemetic therapy than propofol recipients over the course of a 24-hour period (5% versus 12.5%, p = 0.23). Statistically significant results were obtained at the 12th to 24th hour time period ($p < 0.044$). Studies indicate that Intravenous infusion infusions are preferable to bolus dosing for maintaining propofol's effective concentration in order to prevent Post-operative nausea and vomiting. The modulation of subcortical pathways to prevent nausea or its direct depressant action on the vomiting centre are thought to be the causes of propofol's antiemetic effects. The results of our study are consistent with other studies, conducted in different settings, in terms of antiemetic rescue therapy requirements and trends of dexamethasone preventive effect. In conclusion, dexamethasone produced better protection against Postoperative nausea and vomiting than propofol at all time frames. However, this study does have some shortcomings. For instance, the majority of the time intervals' values were not statistically significant, which may be due to the small sample sizes in both groups. Furthermore, neither the results of drug therapy nor those without therapy were evaluated using placebos. Therefore, we advise conducting studies with a placebo group and larger sample sizes in the future. To further validate these findings, we advise conducting a randomised controlled trial.[4]
4. **Hassani E et al** aimed to compare the propofol, dexamethasone, and ondansetron effects on nausea and vomiting in cesarean section. 120 women between the years of 15 and 35 who were

candidates for caesarean sections under spinal anaesthesia were participated in this double-blind, randomised clinical trial investigation. Patients were placed into four groups at random (three-drug groups and control group). Patients in group O received 0.05 mg/kg ondansetron, group D received 0.1 mg/kg dexamethasone, group P received 0.2 mg/kg propofol, and group C received normal saline (group C). Comparison of nausea and vomiting during recovery and 6 hours following surgery. Both nausea and vomiting were highest in group C during recovery and 6 hours following surgery, whereas they were lowest in group O. the frequency of nausea was 36.7% in both recovery and 6 hours after surgery, and the frequency of vomiting was 40% and 33.3% in the recovery and 6 hours after surgery respectively. Among three drug groups, nausea and vomiting were higher in group D in both the recovery room and 6 hours after surgery. The frequency of vomiting was 33.3% and 16.7% in recovery and 6 hours after surgery in group D, respectively. These differences were statistically significant between the four groups ($P<0.05$). The preventive effect of dexamethasone is not very useful in both periods. Therefore, it can be recommended that in the short period after surgery, propofol has a beneficial effect in preventing postoperative nausea and vomiting.[5]

5. **Acharya SA et al** Compared antiemetic properties of ondansetron (4 mg i.v; n = 40) and ramosetron (0.3 mg i.v; n = 40) with propofol (0.5 mg/kg i.v; n = 40) on 120 ASA I/II patients scheduled for laparoscopic cholecystectomy. Additionally compared were the side effects of study drug, anaesthesia recovery time, readiness for PACU release, and patient satisfaction. Ramosetron had the lowest incidence of vomiting and the greatest requirement for rescue antiemetics compared to the group receiving propofol. Time to recovery was more in Propofol group was statistically significant. Readiness for PACU discharge was comparable in all the three groups. Subhypnotic dose of propofol requires more rescue antiemetic than Ondansetron and Ramosetron because of its short duration of action. Between Ondansetron and Ramosetron the latter is more effective in postoperative nausea and vomiting prevention.[6]
6. **Nisarga R.** compared the efficacy of sub hypnotic dose of midazolam and propofol in decreasing nausea and vomiting in caesarean section under spinal anaesthesia. All of the trial participants received the prescribed intervention and were follow-up until the study's conclusion. There were no dropouts or exclusions. The demographic parameters of the patients were similar between the two groups. The proportion of patients in ASA classes I and II was evenly distributed among the groups .The mean surgery duration did not significantly differ between the groups. The mean value of SBP, DBP, RR, and SPO2 were consistent in both groups in all intervals and were not statistically significant. There was no statistically significant change in heart rate in either group at any of the intervals. There was no maternal respiratory depression in either group. When compared to Group M, Group P experienced a lower incidence of nausea and vomiting (IV). Group M members reported nausea (16.67% (5/30), retching (6/30), and vomiting (26.67%). In group P 16.67% (5/30) had nausea, 6.67% (2) had retching, and 10.00% (11/60) had vomiting. When combined symptoms, statistically significant decrease in nausea, retching and vomiting was found in group p compared to group M. During the first minute, the Apgar score had a mean value of 8.470±507 in group M and 8.400±498 in group P. With a p-value of 0.61, it was ruled that this was statistically insignificant. The mean value of Apgar score was 9.47 in group M and 9.40 in group P during the 5th minute with p-value of 0.651 which was not statistically significant. Sub hypnotic Dose of propofol significantly decreases intraoperative nausea and vomiting in caesarean section under spinal Anesthesia compared to sub hypnotic dose of midazolam.[7]
7. **Ray H et al** Studied Propofol and its used during a caesarian delivery under spinal anaesthesia to manage nausea and vomiting.The result of study indicates the incidence of intraoperative emetic episodes in caesarean delivery is very high. In the study 6% of patients in propofol group experienced intra-operative vomiting, while in placebo group it was 30%(p=0.004). 4% of patients in propofol group experienced intraoperative retching, while placebo group it was 26% (p=0.005). Also 4% of patient in propofol group experienced intraoperative nausea, while in placebo group it was 22% (p=0.01). emetic episodes are observed more intraoperatively than post operatively due to anxiety surgical manipulations, vagal activity, blood loss, uterotonic agents, antibiotics, vigorous movements etc. use of rescue antiemetics was 6% in propofol group while in placebo group it was 26% (p=0.01). Thus in the study we found that propofol at 1mg/kg/hr infusion, administered immediately after clamping the umbilical cord, significantly decreased the incidence and severity of nausea, retching and vomiting and the need for rescue antiemetic therapy compared with placebo. There were no clinically significant adverse effects among the group.[8]

Conclusion:

Sub hypnotic dose of Propofol (0.5mg-1.0mg/kg/hr) given pre operatively effectively reduce post-operative nausea and vomiting when given as infusion.

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