

COMPARISON OF INTRAVENOUS ONDANSETRON AND DEXAMETHASONE ON PONV AND SHIVERING IN GYNECOLOGIC LAPAROTOMY

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ABSTRAK

Postoperative nausea and vomiting (PONV) dan menggigil pascaoperasi merupakan komplikasi yang sering terjadi setelah operasi ginekologi. Ondansetron dan deksametason intravena digunakan sebagai agen profilaksis, namun efektivitas keduanya pada laparotomi ginekologi masih perlu dievaluasi. Tujuan penelitian ini untuk membandingkan efektivitas keduanya terhadap kejadian PONV dan menggigil pada pasien laparotomi ginekologi. Penelitian ini merupakan observasional analitik dengan pendekatan *cross-sectional* yang dilakukan pada 30 pasien di Rumah Sakit Ibnu Sina Makassar pada tahun 2025. Hasil menunjukkan kejadian PONV lebih rendah pada kelompok ondansetron dibandingkan deksametason (6,7% vs 46,7%; $p=0,035$). Kejadian menggigil tidak berbeda bermakna antara kedua kelompok (20,0% vs 13,3%; $p=1,000$). Suhu tubuh, frekuensi napas, dan denyut nadi sebelum maupun sesudah operasi juga tidak berbeda bermakna (seluruh $p>0,05$). Kesimpulan penelitian ini adalah ondansetron intravena lebih efektif dibandingkan deksametason intravena dalam menurunkan kejadian PONV, sedangkan efektivitas keduanya terhadap menggigil relatif sebanding.

ABSTRACT

Comparison of Intravenous Ondansetron and Dexamethasone on PONV and Shivering in Gynecologic Laparotomy. Postoperative nausea and vomiting (PONV) and postoperative shivering are common complications after gynecologic surgery. Intravenous ondansetron and dexamethasone are used as prophylactic agents, but their effectiveness in gynecologic laparotomy still requires evaluation. This study aims to compare the effectiveness of intravenous ondansetron and dexamethasone on PONV and shivering in patients undergoing gynecologic laparotomy. This analytic observational study, using a cross-sectional design, was conducted at Ibnu Sina Hospital, Makassar, from July 2025 until the required sample size was reached. Samples were selected purposively according to the inclusion and exclusion criteria. A total of 30 patients were analyzed, with 15 patients in the ondansetron group and 15 in the dexamethasone group. Results show that the incidence of PONV was lower in the ondansetron group than in the dexamethasone group (6.7% vs 46.7%; $p=0.035$). Shivering incidence did not differ significantly between groups (20.0% vs 13.3%; $p=1.000$). Temperature, respiratory rate, and heart rate before and after surgery also showed no significant differences (all $p>0.05$). Conclusion of this research: Intravenous ondansetron was more effective than intravenous dexamethasone in reducing PONV, whereas both drugs were relatively comparable in reducing shivering.

INTRODUCTION

Laparotomy is a surgical procedure involving incision of the abdominal wall to gain access to the peritoneal cavity. In gynecologic practice, this procedure is still frequently performed for various indications, including interventions involving the uterus and other reproductive organs.¹

The high volume of surgical procedures makes the management of postoperative complications an important component of perioperative care quality.² One of the most frequently reported postoperative complaints is postoperative nausea and vomiting (PONV). PONV not only reduces patient comfort but may also prolong recovery and increase the risk of dehydration, electrolyte imbalances, aspiration, and delayed oral intake. In gynecologic surgery, the risk of PONV tends to be higher because it is influenced by patient-related factors, anesthetic technique, and the characteristics of the surgical procedure.³ In addition to PONV, postoperative shivering is also a common complication following anesthesia and surgery. Shivering may increase oxygen consumption, carbon dioxide production, wound pain, and the patient's overall physiological burden. Therefore, prevention of both PONV and shivering should be considered concurrently in patients undergoing gynecologic laparotomy.⁴

Ondansetron is a 5-HT₃ receptor antagonist that acts primarily on the vomiting center and gastrointestinal vagal afferents, and is therefore commonly used as prophylaxis against PONV. Dexamethasone is a corticosteroid that is also frequently used as a perioperative antiemetic, with a presumed mechanism involving suppression of inflammatory mediators and modulation of neurohumoral pathways. Both agents are widely used, but their relative superiority for preventing PONV and shivering has not been consistently demonstrated across studies.⁵

Several studies have reported that ondansetron and dexamethasone are both effective as prophylaxis against PONV; however, some studies have shown that ondansetron is more effective in the early postoperative phase, whereas others have found dexamethasone to be superior or the two agents to be comparable. This variation suggests that clinical context, type of surgery, and anesthetic protocol may influence outcomes. At Ibnu Sina Hospital Makassar, direct comparative data on these two regimens in gynecologic laparotomy remain limited.⁶ This study, therefore, aimed to compare intravenous ondansetron and dexamethasone with respect to the incidence of PONV and shivering in patients undergoing gynecologic laparotomy. The findings are expected to provide a clinical basis for selecting the most appropriate premedication, particularly in similar patient populations and teaching hospital settings.

METHODS

This was an analytic observational study using a cross-sectional design to compare intravenous ondansetron and dexamethasone with respect to the incidence of nausea, vomiting, and shivering during gynecologic laparotomy. The study was conducted at Ibnu Sina Hospital, Makassar, from July 2025 until the required sample size was achieved.

The study population consisted of patients undergoing gynecologic laparotomy at Ibnu Sina Hospital, Makassar. Samples were selected using nonprobability purposive sampling. Sample size calculation using the Frederer formula indicated a minimum requirement of 16 subjects per group; however, comparative outcome analysis of the available data was performed on 30 patients, with 15 patients in the ondansetron group and 15 in the dexamethasone group. The inclusion criteria were female patients aged 18-60 years, diagnosed with a reproductive disease, undergoing gynecologic laparotomy, and receiving intravenous ondansetron or dexamethasone. The exclusion criteria were patients without a diagnosis of reproductive disease, those not undergoing gynecologic

laparotomy at the study site, those with a history of allergy to ondansetron or dexamethasone, or those who had consumed antiemetics within 24 hours before surgery.

The independent variable was administration of intravenous ondansetron or dexamethasone. The primary dependent variables were postoperative PONV symptoms and shivering. PONV was categorized as no complaint or complaint present, whereas shivering was categorized as no shivering or shivering. Supporting variables recorded included age, body weight, height, body mass index, body temperature, respiratory rate, and heart rate before and after surgery.

Data were collected using observation sheets and patients' medical records. Complaints of PONV and shivering were recorded during the postoperative observation period in accordance with the study data. Categorical data were presented as frequencies and percentages, while numerical data were presented as means and standard deviations. The Shapiro-Wilk normality test was used to assess data distribution. Between-group comparisons were analyzed using the Chi-square test, Mann-Whitney test, independent t-test, and Wilcoxon or paired t-test, depending on the data characteristics. A p-value of <0.05 was considered statistically significant.

This study received ethical approval from the Health Research Ethics Committee of Universitas Muslim Indonesia under approval number 954/A.1/KEP-UMI/XII/2025.

RESULTS

Baseline characteristics showed that age and body mass index were relatively homogeneous between the ondansetron and dexamethasone groups, whereas body weight differed significantly and height was at the threshold of statistical significance. Perioperative physiological variables demonstrated relatively similar mean patterns between the two groups.

Table 1. Baseline Characteristics According to the Premedication Group

Variable	Ondansetron Mean $\pm$ SD	Dexamethasone Mean $\pm$ SD	p-value
Age	44.00 $\pm$ 12.49	49.27 $\pm$ 9.57	0.118
Body weight	47.00 $\pm$ 3.51	58.00 $\pm$ 7.68	0.024
Height	152.33 $\pm$ 2.09	159.33 $\pm$ 4.35	0.050
BMI	20.26 $\pm$ 1.52	22.89 $\pm$ 3.05	0.127

In the ondansetron group, the mean age was 44.00 $\pm$ 12.49 years, whereas in the dexamethasone group it was 49.27 $\pm$ 9.57 years ($p=0.118$). Body weight differed significantly between the ondansetron and dexamethasone groups, at 47.00 $\pm$ 3.51 kg and 58.00 $\pm$ 7.68 kg, respectively ($p=0.024$). Height was exactly at the threshold of significance ($p=0.050$), while BMI did not differ significantly ($p=0.127$).

Table 2. Incidence of PONV and Shivering According to Premedication Group

Outcome	Ondansetron n (%)	Dexamethasone n (%)	Total n (%)	p-value
No PONV	14 (93.3)	8 (53.3)	22 (73.3)	0.035
PONV present	1 (6.7)	7 (46.7)	8 (26.7)	
No shivering	12 (80.0)	13 (86.7)	25 (83.3)	1.000
Shivering	3 (20.0)	2 (13.3)	5 (16.7)	

The incidence of PONV was lower in the ondansetron group than in the dexamethasone group. Only 1 patient (6.7%) in the ondansetron group experienced PONV, whereas 7 patients (46.7%) in the dexamethasone group did so. The Chi-square test showed a statistically significant difference between the two groups ($p=0.035$). For shivering, the ondansetron group had 3 cases (20.0%), whereas the dexamethasone group had 2 cases (13.3%). This difference was not statistically significant ($p=1.000$), indicating that the two drugs were relatively comparable in terms of shivering.

Table 3. Physiological Parameters Before and After Surgery According to Premedication Group

Variable	Ondansetron Mean $\pm$ SD	Dexamethasone Mean $\pm$ SD	p-value
Preoperative temperature	36.30 $\pm$ 0.25	36.33 $\pm$ 0.32	0.683
Postoperative temperature	36.38 $\pm$ 0.40	36.41 $\pm$ 0.38	0.803
Preoperative RR	20.13 $\pm$ 1.25	21.44 $\pm$ 2.94	0.060
Postoperative RR	21.67 $\pm$ 4.92	20.94 $\pm$ 2.21	0.762
Preoperative HR	81.07 $\pm$ 12.67	87.63 $\pm$ 8.90	0.178
Postoperative HR	82.60 $\pm$ 16.51	80.06 $\pm$ 14.44	0.722

Body temperature, respiratory rate, and heart rate before and after surgery did not differ significantly between the ondansetron and dexamethasone groups (all $p>0.05$). These findings indicate that both regimens had relatively comparable physiological stability profiles during the study observation period.

DISCUSSION

This study showed that intravenous ondansetron was more effective than intravenous dexamethasone in reducing the incidence of PONV in patients undergoing gynecologic laparotomy. Descriptively, the proportion of patients without PONV was substantially higher in the ondansetron group. Statistically, this difference was also significant, with a p-value of 0.035. These findings support the view that 5-HT₃ receptor antagonism by ondansetron provides a more direct antiemetic effect in the early postoperative phase, particularly when emetic stimuli are still predominantly derived from anesthesia and intra-abdominal manipulation.⁷

This mechanism may explain why ondansetron in the present study demonstrated better control of PONV than dexamethasone. Although dexamethasone has antiemetic benefits, its mechanism is more indirect and likely involves suppression of inflammatory mediators and modulation of neurotransmitters. Therefore, during the early postoperative observation period, the effect of ondansetron may appear more pronounced. These findings are consistent with studies positioning ondansetron as an important component of PONV prophylactic strategies, particularly in surgeries with moderate to high risk.⁸

The findings of this study are consistent with those of Qasemi et al., which showed that ondansetron and dexamethasone were both effective for PONV prophylaxis, but ondansetron provided better control of vomiting. The study by Shukla on gynecologic laparoscopic procedures also suggested that ondansetron may be superior in the early postoperative phase, although differences between agents may change during subsequent observation periods.⁹ This concordance is relevant because, in the present study, most complaints were recorded within the early postoperative period.¹⁰ However, these results are not fully consistent with all previous studies. Some studies have reported that dexamethasone is more effective or at least equivalent to ondansetron for PONV prophylaxis. Ahmed et al. reported a lower incidence of PONV with dexamethasone, whereas Alam et al. found that 8 mg intravenous dexamethasone was effective in

reducing PONV in laparoscopic surgery. These differences may be attributable to variation in the type of surgery, patient characteristics, anesthetic technique, drug dosage, timing of administration, and postoperative observation duration.¹¹ Regarding shivering, this study showed no statistically significant difference between ondansetron and dexamethasone. Although the dexamethasone group had a slightly lower proportion of cases, the difference was minimal and not statistically significant. These findings indicate that both drugs may have protective effects against shivering, but neither agent was clearly superior in this study.¹²

Ondansetron is presumed to influence the central thermoregulatory threshold through serotonergic pathways, whereas dexamethasone may reduce shivering by suppressing the inflammatory response and surgical stress. Because both mechanisms may contribute to shivering prevention, it is unsurprising that the study outcomes were relatively comparable.¹³ These findings are in line with the literature, indicating that dexamethasone is beneficial for preventing postoperative shivering, while ondansetron has also been reported to be effective in several surgical settings.¹⁴

The stability of temperature, respiratory rate, and heart rate, which did not differ significantly between the two groups, further supports that the main difference in this study lay in PONV rather than in basic physiological parameters. Clinically, this is important because the choice between ondansetron and dexamethasone as premedication need not be strongly influenced by concerns about changes in temperature, respiratory rate, or heart rate. Both drugs appeared to have relatively comparable perioperative physiological profiles.¹⁵ Nevertheless, interpretation of these findings should consider several limitations. First, the study was conducted at a single healthcare center, so generalization of the results to broader populations should be undertaken with caution. Second, baseline characteristics were not entirely homogeneous because body weight differed significantly, and height was at the threshold of significance.⁶ Third, the observational data mainly represented the early postoperative phase and therefore did not fully capture possible differences in drug effects at later stages. Even so, the study provides relevant practical information: in gynecologic laparotomy, ondansetron appears more advantageous when the primary target is reduction of PONV, whereas for shivering, both drugs may be considered relatively comparable.¹³

CONCLUSION

Intravenous ondansetron was more effective than intravenous dexamethasone in reducing postoperative nausea and vomiting in patients undergoing gynecologic laparotomy. For shivering, there was no significant difference between the two groups, indicating that ondansetron and dexamethasone had relatively comparable effectiveness for this outcome. In addition, body temperature, respiratory rate, and heart rate before and after surgery also did not differ significantly between the two regimens. Therefore, ondansetron may be prioritized when the main prophylactic target is PONV, whereas drug selection for shivering prevention may take other clinical factors into consideration.

REFERENCES

1. Shukla Associate Professor, M. I. Comparision Of Ondansetron Versus Dexamethasone For Prevention Of Nausea And Vomiting In Diagnostic Laparoscopic Gynaecological Procedures Dr. Nehal Chandra International Journal Of Scientific Research. <https://doi.org/10.36106/ijsr> doi:10.36106/ijsr.

2. Rao, M. S., Kishore, C. P., Kooran, S. P., Arora, R. K. & Roy, A. B. Comparative study of ondansetron, granisetron and granisetron with dexamethasone for prevention of postoperative nausea and vomiting (PONV) in patients undergoing laparoscopic cholecystectomy. *Indian Journal of Clinical Anaesthesia* 8, 236–242 (2021).
3. Mohamed, A. K., Mahran, M. M. & Mohammed Ibrahim, R. M. *Dexamethasone versus Ondansetron on Post Operative Nausea and Vomiting in Caesarean Section*. *MJMR* vol. 31 (2020).
4. Krishnan, D., Asokan, A., Muthalu, A., Suganya, S. & Sujatha, C. A Comparative Study on the Efficacy of Intravenous Palonosetron Versus a Combination of Ondansetron and Dexamethasone as Prophylaxis for Prevention of Postoperative Nausea and Vomiting After Laparoscopic Surgeries. *Cureus* <https://doi.org/10.7759/cureus.72214> (2024) doi:10.7759/cureus.72214.
5. Barzanji, A. *et al.* Comparing the effect of ondansetron-dexamethasone and metoclopramide-dexamethasone on postoperative nausea and vomiting after gynecological laparoscopy: A randomized double-blind clinical trial. *Adv. Biomed. Res.* 11, 44 (2022).
6. Thanuja, I., Parida, S., Mishra, S. & Badhe, A. Effect of combinations of dexamethasone-ondansetron and dexamethasone-ondansetron-aprepitant versus aprepitant alone for early postoperative nausea and vomiting after day care gynaecological laparoscopy: A randomised clinical trial. *Indian J. Anaesth.* 65, 465–470 (2021).
7. Lee, J. *et al.* Effect of adding midazolam to dual prophylaxis for preventing postoperative nausea and vomiting. *J. Clin. Med.* 10, (2021).
8. Zhong, C. W. *et al.* Comparison of the efficacy of acupressure on P6 point, dexamethasone and ondansetron versus palonosetron monotherapy for preventing postoperative nausea and vomiting in laparoscopic surgery. *Anaesthesia, Pain & Intensive Care* 27, 625–631 (2023).
9. Chandra Besra, D. K. Comparative Study of Palonosetron versus Ondansetron-Dexamethasone Combination for Prevention of Post-Operative Nausea and Vomiting in Patient Posted for Laparoscopic Cholecystectomy under General Anaesthesia. *Journal of Medical Science And clinical Research* 08, (2020).
10. Muhammad Kamil Qadeer, Roheena Wadood & Jawad Hameed. Comparison of Oral Ondansetron and Metoclopramide in Reducing Postoperative Nausea and Vomiting in Gynecological Laparoscopic Procedures. *Indus Journal of Bioscience Research* 3, 646–651 (2025).
11. Abdulhussain, A. S. Combination of dexamethasone and ondansetron in prophylaxis nausea and vomiting in gynecological operation. *Journal of Population Therapeutics and Clinical Pharmacology* 29, 150–157 (2022).
12. Alam, S. *et al.* Comparison of Dexamethasone and Ondansetron Use in Prevention of Post-operative Nausea and Vomiting. *J. Pharm. Res. Int.* 279–286 (2021) doi:10.9734/jpri/2021/v33i50a33409.
13. Sharma, S. K. *et al.* Effect of dexamethasone with granisetron or ondansetron for prevention of post-operative nausea vomiting in patients undergoing laparoscopic gynaecological surgery. *Int. J. Res. Med. Sci.* 8, 1331 (2020).
14. Ahmed, N., Arif Baloch, M., Sharif, M., ullah, Z. & Reda Toble, Y. Comparison of Dexamethasone with Ondansetron for Prevention of Post-Operative Nausea and Vomiting. *Pakistan Journal of Medical and Health Sciences* 15, 3464–3466 (2021).
15. Qasemi, F. *et al.* The Effectiveness of Ondansetron and Dexamethasone in Preventing Postoperative Nausea and Vomiting After Laparoscopic Cholecystectomy. *Cureus* <https://doi.org/10.7759/cureus.37419> (2023) doi:10.7759/cureus.37419.