

Assessing the Effectiveness of Ondansetron and Dexamethasone in Reducing Nausea and Vomiting during Caesarean Section under Spinal Anaesthesia: A Systematic Descriptive Review

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ABSTRACT

Background: Elective cesarean sections are commonly treated with spinal anesthesia, which is the most commonly used analgesic method. Nausea and vomiting following cesarean section with spinal anesthesia are frequently reported concerns of patients. The purpose of this study was to assess the effectiveness of medications in reducing nausea and vomiting in women who have undergone a cesarean section and spinal anesthesia.

Methods: To conduct a systematic review, we searched the PubMed and Google Scholar databases for keywords such as nausea, vomiting, cesarean section, spinal anesthesia, ondansetron, and dexamethasone. The search for articles took place from 2014 to 2022.

Results: Six studies were included, which consisted of five randomized controlled trials (RCTs) and one non-randomized clinical trial (NRCT). Similar drugs were used in these studies with different dosages to prevent nausea and vomiting following a cesarean section. The use of intravenous dexamethasone, intravenous ondansetron, and their combination was a part of the interventions.

Conclusion: Dexamethasone's delayed effect on nausea and vomiting is not a concern, but given the findings, it could be a safe alternative to Ondansetron for postoperative nausea and vomiting prophylaxis. The preferred first-line agents seem to be Ondansetron, which is a 5-HT₃ receptor antagonist. Using Ondansetron and dexamethasone together has been shown to help decrease nausea and vomiting during and after a cesarean delivery using spinal anesthesia.

تقييم فعالية أوندانسيرون وديكساميثازون في تقليل الغثيان والقيء أثناء العملية القيصرية تحت التخدير الشوكي: مراجعة وصفية منهجية

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المخلص	الكلمات المفتاحية
الخلفية: تُعد العمليات القيصرية الاختيارية من أكثر العمليات الجراحية التي يُستخدم فيها التخدير النخاعي (Spinal Anesthesia)، باعتباره أكثر تقنيات التخدير شيوعاً في هذا النوع من الجراحات. ويُعد الغثيان والقيء أثناء وبعد العملية القيصرية تحت التخدير النخاعي من أكثر المضاعفات التي تُثير قلق المريضات. هدفت هذه الدراسة إلى تقييم فعالية الأدوية المستخدمة في الحد من الغثيان والقيء لدى النساء الخاضعات للولادة القيصرية تحت التخدير النخاعي. المنهجية: أُجريت مراجعة منهجية من خلال البحث في قاعدتي بيانات PubMed و Google Scholar باستخدام الكلمات المفتاحية: الغثيان، القيء، العملية القيصرية، التخدير النخاعي، الأوندانسيرون، والديكساميثازون. وشملت عملية البحث الدراسات المنشورة خلال الفترة من عام 2014 إلى عام 2022. النتائج: تم تضمين ست دراسات، منها خمس تجارب معشاة ذات شواهد (RCTs) ودراسة سريرية واحدة غير معشاة (NRCT). استخدمت هذه الدراسات أدوية متشابهة بجرعات مختلفة للوقاية من الغثيان والقيء المصاحبين للعملية القيصرية تحت التخدير النخاعي. وشملت التدخلات إعطاء الديكساميثازون عن طريق الوريد، أو الأوندانسيرون عن طريق الوريد، أو استخدامهما معاً. الاستنتاج: تشير الأدلة إلى أن الديكساميثازون يُعد خياراً آمناً وفعالاً للوقاية من الغثيان والقيء بعد الجراحة، رغم أن تأثيره يبدأ بشكل متأخر مقارنةً بالأوندانسيرون، الذي يُعد من أفضل خيارات العلاج الأولي. كما أن الجمع بين الأوندانسيرون والديكساميثازون يحقق فعالية أكبر في تقليل الغثيان والقيء أثناء وبعد العملية القيصرية تحت التخدير النخاعي.	الأوندانسيرون الديكساميثازون الغثيان القيء التخدير النخاعي العملية القيصرية

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Introduction

Postoperative nausea and vomiting (PONV) is one of the most frequent issues associated with surgery and anesthetic that occurs within the first 24 hours after surgery [1]. In the absence of pharmacological prevention, PONV occurs after general surgery in 20% and 30% of cases, but significantly increases to around 80% in those deemed at high risk for PONV [2]. PONV is a common long-standing post-operative problem in anesthesia and remains a challenge, especially in obstetrics populations, and occurs more often after cesarean operations under spinal anesthesia [3]. It has been demonstrated that nausea and vomiting are the main side effects of spinal anesthesia, which makes the experience unpleasant for these people. Spinal anesthetic has been used as a quick and safe cesarean delivery technique in recent decades [4]. The independent risk factors for PONV include being female, having had motion sickness or PONV in the past, and additional characteristics that are similar to those observed in other surgical patient types [1]. Intraoperative shivering, the administration of a volatile agent, intraoperative hypotension and hypoxemia, oxytocin for uterotonic usage, extended uterine exteriorization, emergency cases, and other conditions might further increase the risk of nausea and vomiting in obstetric patients [5]. recognizing risk factors and comprehending the pathophysiology of PONV and comparable conditions. can result in a more sensible approach to PONV management and prevention [6]. dexamethasone can decrease the incidence of PONV. Similarly, ondansetron is considered as an effective drug for prevention and treatment of nausea and vomiting that is well tolerated by the patients [7]. A study in Iranian colleagues for 120 patients having abdominal surgery with spinal anesthesia showed that nausea and vomiting occurred in a notable number of patients during 5 minutes after anesthesia, with no meaningful difference reported between either ondansetron or dexamethasone [8]. Study has shown that dexamethasone is a useful prophylactic medication for lowering nausea and vomiting. A single intravenous dosage of 5–10 mg is advised for pregnant patients having spinal anesthesia during cesarean sections [9]. According to an Iran study, ondansetron selectively inhibits the 5-hydroxytryptamine (serotonin) type 3 receptor (5-HT₃ receptor). It works incredibly well to prevent and manage nausea and vomiting both during and after surgery [10]. This medicine decreases nausea and vomiting after cesarean; but it cannot control it completely. Dexamethasone is well known for being a potent anti-inflammatory drug that also works well to stop nausea and vomiting [11]. in addition to these antiemetic therapies, an assessment for the detection and mitigation of risk factors that worsen PONV is warranted [12]. It is advised to apply techniques to lower the baseline risk of PONV development in surgical patients, such as using spinal anesthetic instead of general anesthesia [13]. PONV is a unique clinical issue for obstetric patients having cesarean sections. Obstetric patients might not be covered by the PONV guidelines and reviews, in contrast to general surgical populations [14]. Therefore, this descriptive review aims to summarize PONV prevention and management with cesarean deliveries. The article describes effective and safe methods to reduce nausea and vomiting in pregnant patients undergoing spinal anesthesia.

Methodology

Study setting and search strategies

We conducted this descriptive systematic review following well-known research guidelines, with the aim of

comprehensively organizing and reviewing the literature. We searched for appropriate studies through structured searches in online databases such as PubMed and Google Scholar. We used keywords such as nausea, vomiting, caesarean section, spinal anaesthesia, ondansetron and dexamethasone. We focused on studies published in English between 2014 and 2022. Eligible studies included five randomized controlled trials, one non-randomized clinical trial, and some important reviews focused on the prevention and treatment of postoperative nausea and vomiting in pregnant women. Articles were screened based on their relevance, the quality of the methodology used and the completeness of the reported results. The data were then collected in a systematic manner and summarized descriptively to highlight the patterns, the effectiveness of the treatment, and the factors that increase the associated risk.

Inclusion Criteria:

- Women who are undergoing a caesarean section.
- Use of dexamethasone, ondansetron, or a combination of both.
- Comparison of these treatments.
- Randomized controlled (RCT) or non-randomized studies (NRCT).

Exclusion criteria

- Research that doesn't focus exclusively on obstetrics and gynaecology, or whose full texts aren't available.

Data synthesis

The data we collected included the name of the first author, the year of publication of the article, and the location of study. We also looked at sample size, research type, participant selection criteria, and main results. We summarized the evidence in a descriptive manner, presenting the most important findings and characteristics of the study method in a simplified manner. What we did was a formal meta-analysis because of significant differences in clinical aspects between studies. The differences we observed were mainly in the dosages of the medications. That is there was a large variation in the amount of ondansetron and dexamethasone given intravenously, differences in the way the results are presented, differences in the timing of medication administration, and inconsistencies in the measurement and recording of cases of nausea and vomiting. Because of this great variety, it was not appropriate to combine the results in a digital way as they might give inaccurate or misleading results. The focus was on providing a comprehensive summary that clearly describes the available evidence. The results of each study were presented, with complications associated with the type of anesthesia used.

Critical appraisal

All included studies have been thoroughly evaluated and described in detail, with the aim of examining their methodological quality and bias. The evaluation focused on the study design, the randomization method, the sample size, how the results were measured, and the way the results were presented. The aim was to clearly demonstrate the reliability and validity of each study, without resorting to statistical data collection is presented in (table 1).

RESULTS

We searched online databases (PubMed = 20, Google Scholar = 10). After removing 12 duplicate records, 18 articles were screened, and 7 were excluded due to not involving obstetric patients or lack of full-text availability. Finally, 6 articles were included in this descriptive review. Among the included studies, 5 were randomized controlled trials (RCTs), and 1

Table 1: Risk of bias assessment

Study	Bias arising from the randomization process	Bias due to deviations from intended interventions	Bias due to missing outcome data	Bias in measurement of the outcome	Bias in the selection of the reported result	Overall
Study1	Low	Low	Low	Low	Low	Low
Study 2	Some concerns	Low	Low	Low	Low	Some concerns
Study 3	No information	Low	Some concerns	Low	Low	Some concerns
Study 4	Low	Low	Low	Low	Some concerns	Some concerns
Study 5	High	High	Low	Low	Some concerns	High
Study 6	Some concerns	Low	Low	Low	Some concerns	Some concerns

RoB: Low = low risk; Some concerns = moderate risk; No information = insufficient data. Robins-I: High = high risk.

was a non-randomized clinical trial. The studies were conducted in (1) Nigeria, (1) Egypt, (1) Pakistan, (3) Iran. All the studies were based on pharmacological interventions with dexamethasone, ondansetron, or a combination of the two drugs in the management of nausea and vomiting in patients undergoing caesarean sections. the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) criteria were applied for study selection, and the process is illustrated in (figure 1). A summary of the included studies is presented in (table 2).

DISCUSSION

PONV is still a frequent side effect that affects patient comfort and the overall surgical experience after caesarean sections performed under spinal anaesthesia. The purpose of this descriptive review was to assess how well dexamethasone and ondansetron, as well as their combination, work to prevent and treat nausea and vomiting during and after surgery. In this study [15], The incidence of PONV following a caesarean section under spinal anesthesia was shown to be successfully decreased by both dexamethasone and ondansetron. Compared with dexamethasone, ondansetron produced a rapid but sustained effect on nausea and vomiting immediately after surgery.

This study also confirmed dexamethasone and ondansetron, taken together, reduced nausea and vomiting more than either drug alone [16]. Additionally, this study It has been confirmed that the use of these drugs together is effective in

preventing nausea and vomiting in the operating room and in the recovery room [13]. These results align with research conducted in Iran and Pakistan Patients and surgeries related risk factors, such as primiparity, intraoperative hypotension, prolonged uterine exteriorization, and oxytocin use, were cited [9], [14]. even with these favourable results, the studies Pointed out certain limitations. These factors are associated with a high risk of bias, which is related to randomization, intervention, and data [9], [14]. There are also variations in sample size, dosage, and time of administration, which can affect the generalization of the study results. Ondansetron is recommended as a preferred choice in the immediate prevention and treatment of postoperative nausea and vomiting, while dexamethasone can be used as an alternative or adjuvant therapy to improve treatment outcomes in high-risk patients. as confirmed by these studies, the combined regimen is recommended in cases with a history of severe postoperative nausea and vomiting, as well as in cases where there are intraoperative risk factors present [8], [13]. This review has shown that a combination regimen of ondansetron and dexamethasone can be effective in controlling postoperative nausea and vomiting. This review's conclusions are also backed by a recent study conducted has shown that women who have a caesarean delivery with spinal anaesthesia have a considerable incidence of nausea and vomiting after surgery [17].

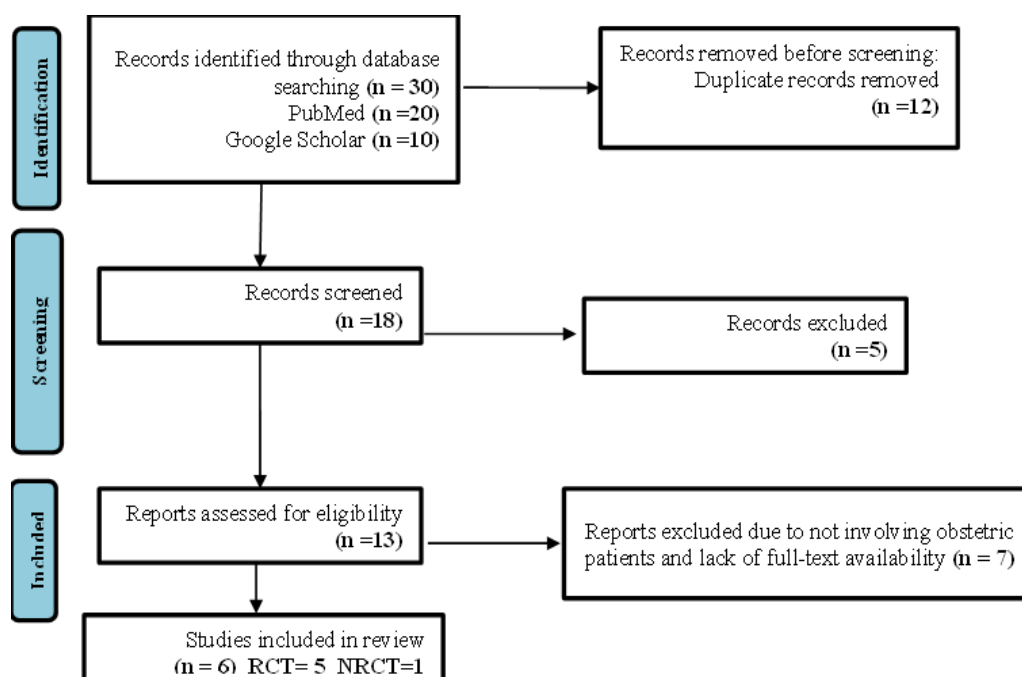
**Figure 1:** Flow chart selection of studies by PRISMA Diagram

Table 2: Description of included studies in the review.

S. N	Author (Year)	Country	Sample Size	Study Design	Intervention	Dosage	Main Findings	Risk of Bias Tool	Overall Risk
1	Navid Kalani et al. (2016)	Iran	120	RCT	DEX vs OND	DEX 8 mg IV / OND 4 mg IV	Both DEX and OND are equally effective in preventing PONV under spinal anaesthesia.	RoB 2	Low
2	Shahryar Sane et al. (2015)	Iran	90	RCT	DEX + OND vs single use	DEX 8 mg IV + OND 4 mg IV	Combination therapy reduced intra- and postoperative nausea and vomiting.	RoB 2	Some concerns
3	Akpan Imeh et al. (2014)	Nigeria	108	RCT	DEX + OND vs DEX alone	DEX 8 mg IV + OND 4 mg IV	Combination significantly reduced PONV.	RoB 2	Some concerns
4	Ahmed K. et al. (2020)	Egypt	150	RCT	OND + DEX	DEX 8 mg IV + OND 4 mg IV	Prophylactic antiemetic therapy significantly reduced PONV after caesarean section.	RoB 2	Some concerns
5	Nida Shahid et al. (2022)	Pakistan	93	NRCT	OND vs DEX	OND 4 mg IV vs DEX 8 mg IV	OND is more effective than DEX in reducing PONV.	ROBINS-I	Serious
6	Jahanbakhsh R. et al. (2020)	Iran	60	Double-blind RCT	DEX vs OND	DEX 8 mg IV vs OND 4 mg IV	OND significantly reduced PONV compared to DEX.	RoB 2	Some concerns

DEX: dexamethasone; OND: ondansetron

CONCLUSION

After caesarean sections performed under spinal anaesthesia, PONV is frequently experienced. Both ondansetron and dexamethasone are useful in lowering PONV; ondansetron acts quickly, while dexamethasone has a longer-lasting, delayed effect. The best prevention is provided by taking both medications together. To increase comfort and satisfaction, clinicians should take patient risk factors into account and may use both medications for high-risk cases.

The strengths and limitations of the review

Strengths

The study demonstrates strong methodological rigor and addresses a clinical problem that is extremely pertinent (post-caesarean nausea and vomiting). Its use of a methodological framework (PRISMA) is its strongest point. Using ROBINS-I for non-randomized studies and RoB 2 for randomized trials, the methodological quality of the included studies was evaluated critically.

Limitations

Study 1 demonstrated a high level of methodological quality and a low risk of bias. There were some issues with Studies 2, 3, 4, and 6, primarily because of the lack of prior trial registration and the incomplete reporting of randomization. Because of possible confounding variables and the lack of random assignment, Study 5 (which was not randomized) showed a significant risk of bias. Notwithstanding these restrictions, the data from various studies is still strong enough to substantiate the effectiveness of ondansetron and dexamethasone in preventing (PONV). Because study designs, intervention protocols, and levels of bias risk vary, these results support the use of a descriptive synthesis rather than a meta-analysis.

Recommendations

According to the findings, medical professionals should think about using both dexamethasone and ondansetron to prevent

nausea and vomiting in women undergoing spinal anaesthesia for caesarean sections. Because it can greatly improve their experience, this combination is especially important for women who are more vulnerable. Effectively constructed randomized controlled trials that focus on developing consistent intervention protocols are essential to advancing research. The optimal combination dosages must also be determined. Our findings will be more trustworthy as a result, and our body of evidence will be more robust going forward.

Author Contributions:

Nwerat: Conceptualization, literature search, study design, data extraction, quality assessment of the included studies, data analysis, manuscript drafting, and manuscript editing. **Alghazal:** Methodology development, scientific supervision, critical review of the manuscript, and final approval of the manuscript. **Hadia:** Study design, data validation, manuscript review, and final approval of the manuscript. **Hadia:** Overall supervision of the study, scientific guidance, final review of the manuscript, and approval of the final version for publication. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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