

# Efficacy of metoclopramide and dexamethasone for postoperative nausea and vomiting: a double-blind clinical trial

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نجاعة (كفاءة) الميتوكلوبراميد وديكساميثازون في معالجة الغثيان والقيء تلو العمليات الجراحية: دراسة سريرية (إكلينيكية) مزدوجة التعمية

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الخلاصة: يشيع حدوث الغثيان والقيء في مضاعفات التخدير. ويقيم الباحثون في هذه الدراسة السريرية (الإكلينيكية) المزدوجة التعمية، معدل حدوث الغثيان والقيء، بعد إجراء جراحة لعدس الساد (الكتاراكت) مع التخدير الوريدي لدى مئة مريض عينهم الباحثون عشوائياً لإعطائهم دواء عقل placebo (محلول ملحي) عند التحضير للتخدير، أو لإعطائهم 10 ميلي غرام من الميتوكلوبراميد أو 8 ميلي غرام من الديكساميثازون أو الدوائين معاً. وقد بلغ معدل حدوث الغثيان في غرفة الإفاقة لدى من أعطي الدواء العقل 44٪، ولدى من أعطي الميتوكلوبراميد 20٪، ولدى من أعطي الديكساميثازون 16٪. ولدى من أعطي الدوائين معاً 8٪. أما معدل حدوث القيء فكان لدى من أعطي الدواء العقل 20٪، ولدى من أعطي الميتوكلوبراميد 4٪، ولدى من أعطي الديكساميثازون 4٪. وهكذا اتضح أن إعطاء توليفة الميتوكلوبراميد والديكساميثازون يُنقص بمقدار يُعتدُّ به إحصائياً من حدوث الغثيان والقيء في غرفة الإفاقة وبعد 24 ساعة من ذلك، لذا يوصي باستعمال هذه التوليفة لدى المجموعة المعرضة لخطر مرتفع ولاسيما في الجراحات للمرضى الخارجيين.

ABSTRACT Postoperative nausea and vomiting are common complications of anaesthesia. This double-blind clinical trial assessed the incidence of nausea and vomiting after cataract surgery with intravenous anaesthesia in 100 patients randomly assigned to preinduction placebo (saline), metoclopramide (10 mg), dexamethasone (8 mg) or the 2 drugs combined. The incidence of nausea in the recovery room was 44% with placebo, 20% with metoclopramide, 16% with dexamethasone and 8% with the combination. The incidence of vomiting was 20%, 4%, 4% and 0% respectively in the 4 groups. Metoclopramide plus dexamethasone combination significantly decreased nausea and vomiting both in the recovery room and 24 hours afterwards and is recommended for high-risk groups, especially in outpatient surgeries.

**Efficacité du métoclopramide et de la dexaméthasone sur les nausées et vomissements postopératoires : une étude clinique en double aveugle**

RÉSUMÉ Les nausées et vomissements postopératoires sont des complications courantes de l'anesthésie. Cette étude clinique en double aveugle évaluait l'incidence des nausées et des vomissements après une chirurgie de la cataracte avec anesthésie par voie intraveineuse chez 100 patients auxquels un placebo (eau saline), du métoclopramide (10 mg), de la dexaméthasone (8 mg) ou les deux médicaments associés avaient été administrés de manière randomisée avant l'opération. L'incidence des nausées en salle de réveil était de 44 % avec le placebo, 20 % avec le métoclopramide, 16 % avec la dexaméthasone et 8 % avec l'association des deux médicaments. L'incidence des vomissements était de 20 %, 4 %, 4 % et 0 %, respectivement, dans les quatre groupes. L'association du métoclopramide et de la dexaméthasone a considérablement réduit les nausées et vomissements, non seulement en salle de réveil mais également dans les 24 heures qui suivent, et est recommandée pour les groupes à haut risque, notamment pour les patients opérés en ambulatoire.

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## Introduction

Postoperative nausea and vomiting (PONV) is one of the most common complications of anaesthesia [1]. Despite significant improvements in therapeutics and anaesthesia techniques, the rate of this complication still remains high. PONV afflicts around one-third of patients undergoing operation with general anaesthesia [2], and can lead to wound dehiscence, bleeding, aspiration of gastric contents, water and electrolyte abnormalities, prolonged hospitalization, rehospitalization and patients' low satisfaction with postoperative care [3]. It is so unpleasant that most patients would prefer to experience postoperative pain rather than nausea and vomiting [4].

Occurrence of PONV is influenced by various factors such as duration of anaesthesia, type of surgery, use of narcotics, patient's age and sex, and history of PONV, motion sickness or smoking [4]. Cataract surgery, however, has not been reported to increase postoperative nausea and vomiting. Evidence shows that PONV may be prevented by using prophylactic injection of certain drugs [5]. Dexamethasone and metoclopramide are commonly used separately for this purpose, and most studies have demonstrated their efficacy in decreasing PONV [6–8]. In the current study, the effect of preoperative injection of dexamethasone, metoclopramide and their combination on PONV was investigated.

## Methods

The study was a double-blind clinical trial. The study group was 100 patients referred to Alavi Hospital in Ardebil (northwest of Islamic Republic of Iran) for cataract surgery under general anaesthesia who met the American Society of Anesthesiologists' physical status classification class 1 (normal healthy patient) or 2 (patient with mild systemic disease).

The sample size was calculated based on probability of reducing PONV by 40%, with  $\alpha = 0.05$  and  $\beta = 20\%$ . The baseline exclusion criteria were: suffering from diabetes mellitus or other underlying disorders, use of antiemetics during the past 24 hours and a positive history of motion sickness or PONV.

Patients were enrolled 1 hour before going to the operating room and only if they agreed to participate in the study after it had been fully explained them and they signed an informed consent form. This was prepared by the ethical committee of Ardebil University of Medical Sciences and allowed participants to withdraw at any point in the study no explanation and without jeopardizing the quality of care they received.

The patients were randomly assigned by block randomization to one of 4 groups of 25 patients: placebo (2 mL normal saline); metoclopramide (10 mg); dexamethasone (8 mg); or metoclopramide plus dexamethasone (10 mg/8 mg). All the treatments were given intravenously 1 minute before induction of anaesthesia by injection of fentanyl (2  $\mu\text{g}/\text{kg}$ ), propofol (2 mg/kg) and atracurium (0.5 mg/kg). They were given by the anaesthetist who was unaware of the drug allocation. Following tracheal intubation, anaesthesia was continued with an infusion of propofol (50  $\mu\text{g}/\text{kg}/\text{min}$ ) while the patient breathed a combination of  $\text{O}_2$  (50%) and  $\text{N}_2\text{O}$  (50%). Local anaesthetics were not applied during surgery.

The duration of surgery was almost the same (i.e. range of 35–40 minutes) for all patients. Following surgery, patients were transferred to the recovery room, where the incidence of PONV and the frequency of those needing treatment for PONV were evaluated by nurses, who were blind to the patient's group as the drug administered was not recorded on the patient's anaesthesia chart. The occurrence of PONV was also recorded 24 hours following surgery. Nausea and vomiting were recorded by nurses as present or absent.

Pain intensity was assessed using a 10 cm visual analogue scale (0 = no pain to 10 = most severe pain). Since pain after cataract surgery is relatively slight, patients did not receive further analgesic treatment after discharge. Any patient experiencing moderate to severe pain (score  $\geq 5$ ) would receive 50 mg pethidine and be ineligible to finish the study; however no cases were reported.

The data were analysed using SPSS, version 13.0. A series of 1-way analyses of variance were conducted to examine differences between the 4 groups with respect to parametric variables. If a significant difference was found, the Bonferroni *t*-test was used to detect intergroup differences. Categorical variables were analysed by using a series of  $4 \times 2$  chi-squared tests to determine the differences between the 3 treatment groups versus placebo.

## Results

A total of 100 patients were included in the final analysis. There were no significant differences between the background characteristics of patients in the 4 groups in terms of age, sex, duration of surgery or history of smoking (Table 1).

The incidence of nausea and vomiting in the recovery room and 24 hours after the operation is shown in Table 2. Patients in the metoclopramide, dexamethasone and combination groups had a lower incidence of nausea (20%, 16% and 8% respectively) in the recovery room when compared with the placebo group (44%). The incidence of vomiting in the recovery room was 4%, 4% and 0% respectively compared with 20% in the placebo group. Although both metoclopramide and dexamethasone separately were effective in reducing the symptoms of PONV, the difference was only statistically significant for the combination. Similar results were found after 24 hours (Table 2).

**Table 1 Age, sex, duration of surgery and history of smoking in the 4 patient groups**

Variable	Placebo (n = 25)	Metoclopramide (n = 25)	Dexamethasone (n = 25)	Metoclopramide + dexamethasone (n = 25)	P-value <sup>a</sup>
Age [mean (SD) years] <sup>b</sup>	67.1 (9.3)	61.5 (10.1)	65.9 (11.4)	71 (5.9)	0.80
Sex [no. (%)]					
Female	13 (52)	10 (40)	11 (44)	14 (56)	0.70
Male	12 (48)	15 (60)	14 (56)	11 (44)	
Duration of surgery [mean (SD) min]	36.2 (2.3)	38.5 (1.8)	35.4 (1.1)	37.2 (2.4)	0.65
History of smoking [no. (%)]	3 (12)	5 (20)	3 (12)	3 (12)	0.09

<sup>a</sup>Chi-squared test and ANOVA; <sup>b</sup>Range 50 to 80 years. SD = standard deviation.

There was no significant difference in the incidence of nausea and vomiting between males and females in the 4 study groups (data not shown,  $P = 0.76$ ).

The intensity of postoperative pain was relatively minor, with patients in the 4 groups reporting similar low/median pain scores: placebo 1.7; metoclopramide 2.3; dexamethasone 2.4; combination 1.9. Furthermore, when compared with the placebo group, no significant difference was observed in any of the 3 treatment groups (i.e. metoclopramide, dexamethasone or combination) in terms of the frequency of need for postoperative analgesics.

## Discussion

PONV is still among the most common and troublesome complications

of surgery, causing delays in patient discharge from hospital, especially in outpatient surgeries. Therefore, therapeutic strategies preventing this complication are of utmost importance [9]. Replacing nitrous oxide with intravenous propofol has reduced, but not eliminated, the incidence of PONV [10,11]. In the current study, the preventive effect of metoclopramide, dexamethasone and their combination in decreasing PONV in elderly people undergoing cataract surgery was investigated. The results of this study showed that although patients given metoclopramide or dexamethasone alone had a lower incidence of PONV, the effect was not statistically significant whereas their combined use had a significant effect. The incidence of nausea with metoclopramide plus dexamethasone was 8% versus 44% with placebo and the incidence of vomiting was 0% versus 20% with placebo. This

underlines the beneficial effect of combined use of these 2 drugs.

Some previous placebo-controlled studies have also demonstrated the preventive effect of preoperative use of dexamethasone (especially in combination with metoclopramide) on PONV. In 204 patients undergoing lumbar disc surgery, Wallenborn et al. showed that while the incidence of nausea and vomiting was 35.8% in the placebo group, the preoperative use of combined metoclopramide and dexamethasone decreased the incidence of postoperative nausea to 10% and vomiting to 3% [12]. In another study by Feo et al. on laparoscopic surgery patients, the incidence of nausea and vomiting was 46% in the placebo group and 14% in the dexamethasone group [13]. Laiq et al., in a study on 100 patients undergoing gynaecological surgery, found that nausea and vomiting decreased from 30% and 24%

**Table 2 Incidence of nausea and vomiting in the recovery room, and after 24 hours in the 4 patient groups**

Group	Placebo (n = 25)	Metoclopramide (n = 25)		Dexamethasone (n = 25)		Metoclopramide + dexamethasone (n = 25)	
	%	%	P-value <sup>a</sup>	%	P-value <sup>a</sup>	%	P-value <sup>a</sup>
<b>In recovery room</b>							
Nausea	44	20	0.72	16	0.65	8	0.01
Vomiting	20	4	0.55	4	0.55	0	0.02
<b>After 24 hours</b>							
Nausea	52	20	0.68	20	0.68	8	0.008
Vomiting	20	4	0.55	4	0.55	0	0.02

<sup>a</sup>Compared with the placebo group by the chi-squared test.

respectively with placebo to 20% and 6% with dexamethasone [14]. According to Huang et al., 5 mg dexamethasone significantly decreased the incidence of PONV from 70% to 28% [15], while Wang et al. showed dexamethasone decreased nausea and vomiting from 63% to 23% in patients having laparoscopic cholecystectomy [16].

In contrast, Chekman et al., comparing the effect of dexamethasone and metoclopramide (injected 10 minutes before anaesthesia) in 45 patients divided into 3 groups, showed that

PONV incidence was not significantly different between the dexamethasone and metoclopramide groups [17]. The difference between our results and theirs was probably due to the time of drug injection, since its effect on PONV might be diminished due to the short half-life of the drug. The limited number of patients in Chekman's study was their main limitation.

Our study has some limitations that might have influenced the findings. First, our sample size was small. Second, the study was conducted only

in patients undergoing cataract surgery. Third, it was conducted only in older patients. However, our study protocol was a strong point.

In conclusion, although prophylactic injection of 10 mg metoclopramide or 8 mg dexamethasone separately can decrease the incidence of PONV, the combined use of these drugs has a more marked and significant effect. In view of the low cost of these drugs, their combined prophylactic use is recommended in the groups at risk for PONV, especially in outpatient surgeries.

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