ORIGINAL RESEARCH ARTICLE

The Effect of Intravenous Dextrose Administration For Prevention of Post-Operative Nausea and Vomiting After Laparoscopic Cholecystectomy: A Double-Blind, Randomised Controlled Trial

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DOI: http://dx.doi.org/10.21276/ijcmsr.2020.5.3.18

How to cite this article: Syed Ali Aasim, Kiran Kayyam, Angadi Janaki. The effect of intravenous dextrose administration for prevention of post-operative nausea and vomiting after laparoscopic cholecystectomy: a double-blind, randomised controlled trial. International Journal of Contemporary Medicine Surgery and Radiology. 2020;5(3):C70-C74.

A B S T R A C T

Introduction: Perioperative administration of carbohydrates is considered as one of the non- pharmacological strategies to decrease post-operative nausea and vomiting (PONV). Study aimed to appraise the outcome of IV dextrose administration for the prophylaxis of PONV after laparoscopic cholecystectomy.

Material and methods: Our study included a total of 100 female patients. The subjects were randomly categorized into two groups A and B (each group, n = 50). Patients of group A received an infusion of 500 mL lactated Ringer's solution and group B received 5% dextrose in lactated Ringer's solution over a period of 30 minutes, before induction of anaesthesia. The incidence and intensity of PONV was measured at various intervals.

Results: The observed values of the pre- and post-operation nausea scores showed a statistically significant difference between the T1 and T2 scores among the groups ($P < 0.05$). Whereas the observed values of the pre- and post-operation vomiting scores of each group showed a statistically significant difference between the T1, T2, T3, T5 and T7 scores among the groups ($P < 0.05$).

Conclusion: IV dextrose prior to anaesthesia for laparoscopic cholecystectomies was found to be an effectual and secure method for the prevention of PONV.

Key words: Dextrose, Glucose, Laparoscopic cholecystectomy, Nausea, Vomiting.

INTRODUCTION

Postoperative nausea and vomiting (PONV) is generally reported as complication after procedures done under general anesthesia as high as in about 80% high-risk individuals.[1] Some of the problems associated with PONV are aspiration pneumonia, dehydration, prolonged stay in post-anesthesia care unit (PACU) or hospitalization, wound dehiscence, increased medical costs, water and electrolyte disturbances, and acid –base imbalance.[2, 3]

Many drugs have been prescribed for prophylaxis of PONV like dexamethasone, serotonin 5-HT3 receptor antagonists. Nevertheless, these drugs have there own side effects and increase cost factor also. Studies showed that after usage of serotonin 5-HT3 receptor antagonists adverse effects like arrhythmias, headache or dizziness.[4, 5]

In recent studies, oral glucose has been used to treat symptoms of nausea and vomiting. These studies showed that the preoperative administration of oral glucose solutions decreased the incidence of PONV after thyroidectomy and laparoscopic cholecystectomy.[6, 7] Dabu-Bondoc et al (2013) found reduced incidence of PONV after preoperative dextrose 5% administration, whereas Patel et al (2013) did not found any significant change in PONV incidence.[8, 9]

We carried out this study to evaluate the effect of IV dextrose administration for the prophylaxis of PONV after laparoscopic cholecystectomy.

MATERIAL AND METHODS

This study was designed as a single-centre, double-blind, randomised controlled trial and carried out after obtaining an institutional ethical committee clearance and informed consent from all the subjects. The duration of the study was from January 1st 2015 to December 31st 2019 for a period of 5 years, at Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar, Telangana State, India. Our study

included a total of 100 female patients.

Inclusion Criteria:

1. Patients who were scheduled for elective LC under general anaesthesia
2. Non-smokers;
3. Patients of grade I or II American Society of Anesthesiologists' grade (ASA),
4. Patients aged 18–65 years.

Exclusion Criteria

1. Subjects with history of PONV, diabetes mellitus, severe hypertension
2. Subjects with cardiac or hepatic dysfunction
3. Patients who were pregnant or menstruating;
4. Prolonged duration of procedure for more than 2 hours
5. Subjects who could not use the verbal rating scale (VRS);
6. Patients receiving an antiemetic agent within 24 hours before surgery or cases where complications occurred during the surgery.

The sample was equally and randomly divided in to two groups. Patients' demographic data was recorded. Patients of group A received an infusion of 500 mL lactated Ringer's solution and group B received 5% dextrose in lactated Ringer's solution over a period of 30 minutes, before induction of anaesthesia. All operations were performed using the traditional approach of four skin incisions.

Just prior to the study fluid infusion, blood glucose levels were recorded and also after 30 minutes of start of surgery and immediately after post-anesthesia care unit (PACU) arrival by means of a point-of-care device (Bionime Rightest GM110, England). Nausea and vomiting intensity was recorded by verbal rating scale (VRS) immediately; 30, 60, 90 and 120 minutes after PACU arrival and also at intervals of six, 12 and 24 hours after surgery. Blood glucose level and PONV was recorded for each subject by an anaesthesiology resident who was blinded to the study groups. 4 mg IV ondansetron was given for patients with nausea.

The obtained data was entered on a microsoft excel sheet and analyzed using the Statistical Program for Social Science (SPSS) version 20 (SPSS Inc., Chicago, IL). Numerical data were presented as mean ± S.D. and categorical data as proportions (%).

RESULTS

During the study period, we screened 123 patients for LC surgery. Of these, 13 patients did not meet the inclusion criteria and 10 patients declined to participate in the study. Of the 100 patients, we grouped 50 each in to two groups (Fig 1).

Statistically insignificant difference was observed between the groups regarding demographic and clinical characteristics

Variable	Group A (n=50)	Group A (n=50)	P value
Mean Age in years	42.9±5.7	44.3±5.2	1.091
BMI	26.5±3.9	27.8±3.6	1.300
Mean Surgery Time in minutes	62.8±12.7	64.6±11.6	1.800
Mean Anaesthesia Time in minutes	75±15.8	80±14.3	0.100
PACU Stay > 2 hours n: %	12:24%	4:8%	0.029

Table-1: Demographic profile and clinical features

Variable	Group A (n=50)	Group B (n=50)	P value
Nausea T1 Score	5.21±3.45	1.05±2.06	<0.0001*
Nausea T2 Score	4.42±2.47	0.81±1.86	<0.0001*
Nausea T3 Score	1.38±2.86	0.62±1.62	0.1053
Nausea T4 Score	1.17±2.15	0.69±1.46	0.1946
Nausea T5 Score	1.08±1.97	0.65±1.86	0.2645
Nausea T6 Score	2.54±3.98	1.24±2.04	0.0425*
Nausea T7 Score	1.52±2.76	0.75±1.93	0.1092
Nausea T8 Score	0.24±0.65	0.26±0.59	0.8723

Table-2: Mean (standard deviation) Nausea scores at T1–T8 follow-up times

Variable	Group A (n=50)	Group B (n=50)	P value
Vomiting T1 Score	0.65±0.32	0.21±0.15	<0.0001*
Vomiting T2 Score	0.39±0.15	0.15±0.09	<0.0001*
Vomiting T3 Score	0.04±0.01	0.02±0.01	<0.0001*
Vomiting T4 Score	0.04±0.01	0.04±0.02	1.0000
Vomiting T5 Score	0.02±0.01	0.06±0.04	<0.0001*
Vomiting T6 Score	0.72±0.46	0,53±0.29	0.0152
Vomiting T7 Score	0.46±0,28	0.21±0.15	<0.0001*
Vomiting T8 Score	0.05±0.02	0	-

Table-3: Mean (standard deviation) Vomiting scores at T1–T8 follow-up times

ISSN (Online): 2565-4810; (Print): 2565-4802 | ICV 2019: 98.48 |

Variable	Group A (n=50)	Group B (n=50)	P value
Glucose Level T1	93.67±9.27	97.84±8.93	0.0241*
Glucose Level T2	127.37±10.23	175.69±15.89	<0.0001*
Glucose Level T3	121.32±11.94	148.24±12.69	<0.0001*

Table-4: Mean values of glucose level at T1–T3 follow-up times

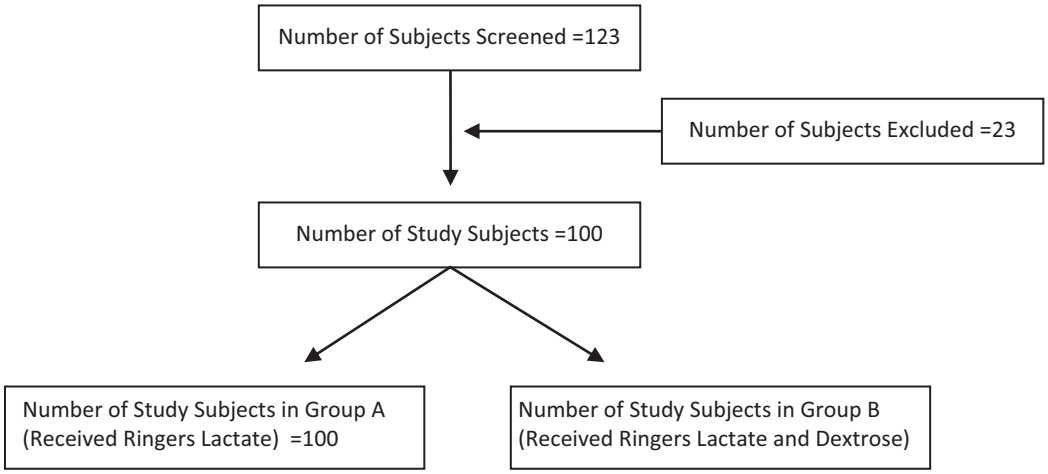
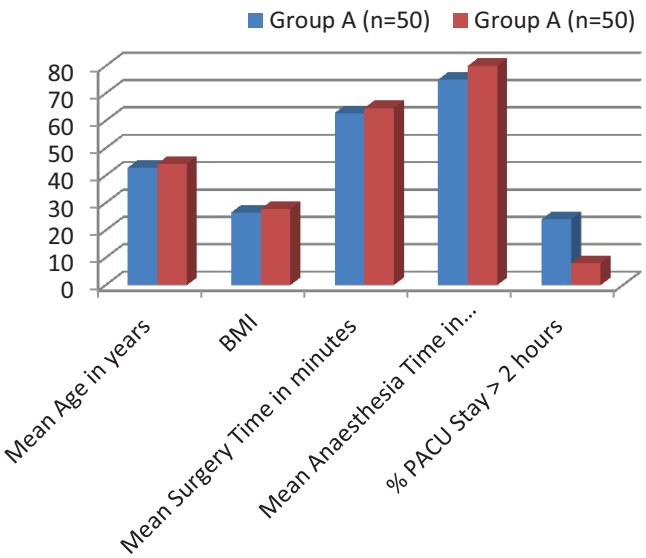
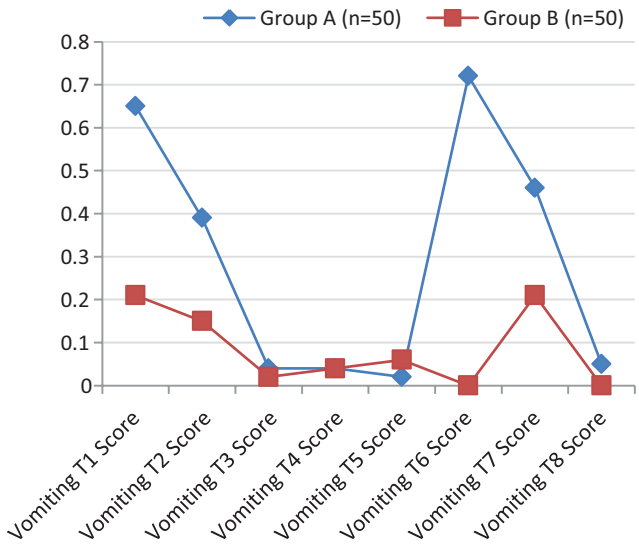


Figure-1: Flow Chart Showing Study Sample



Graph-1: Demographic and clinical characteristics of the study subjects



Graph-2: Mean Nausea scores at T1–T8 follow-up times in both groups

(Table 1 and Graph 1).

The observed values of the pre- and post-operation nausea scores of each group are tabulated (Table 2 and Graph 2). There was a significant difference between the T1 and T2 scores among the groups ($P < 0.05$).

The observed values of the pre- and post-operation vomiting scores of each group are tabulated (Table 3 and Graph 3). We noticed a significant variation between the T1, T2, T3, T5 and T7 scores among the groups ($P < 0.05$).

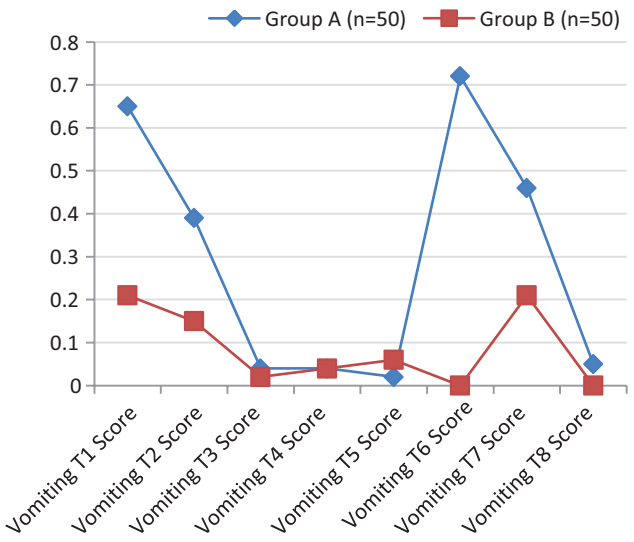
The observed values of the pre- and post-operation vomiting scores of each group are tabulated (Table 4 and Graph 4). There was a significant difference between the groups at T1-T3 levels.

There were no adverse effects in any of the subject.

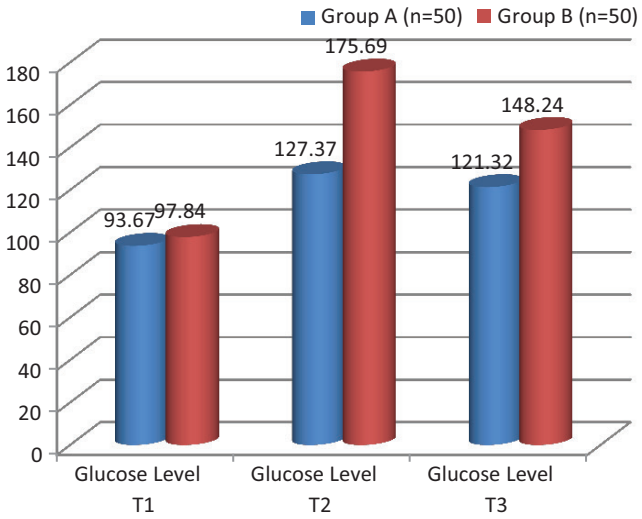
DISCUSSION

Studies showed that oral glucose has widely been used for the treatment of nausea with unknown mechanism. Tissue hypoperfusion may be an important etiological factor for PONV. Gastric mucosal hypoperfusion may occur due to hypovolemia after prolonged fasting. It is supposed that as high osmotic pressure reduces muscle contractions in the gastrointestinal tract. Trendelenburg position (head-down) during gynecologic laparoscopy also intensifies regional hypoperfusion. Intravenous administration of fluid decreases the hypovolemia and hypoperfusion.[8, 10]

There was a significant variation in time/group interaction effect in both groups for PONV score ($P < 0.05$). Our findings are in accordance with Sada et al. and Dabu- Bondoc



Graph-3: Mean Vomiting scores at T1–T8 follow-up times in both groups



Graph-4: Mean (standard deviation) of glucose level at T1–T3 follow-up times in both

et al, who found a positive effect after administration of dextrose-containing IV fluids in PONV incidence, amount of antiemetic usage and the length of PACU stay.[8, 11]

However, Patel et al. and McCaul et al did not notice any such change after dextrose supplementation of IV fluids.[9, 12]

According to few studies reduced PONV after IV dextrose could possibly be related to the reduction of gastric acid secretion due to hyperglycaemia. It has been showed that hyperglycaemia reduces acid secretion as they inhibit vagal cholinergic pathway and also by reducing post-operative insulin resistance that contributes to PONV.[13-16]

The length of stay in PACU was significantly less in dextrose group. We feel that using IV solution dextrose 5% in patients undergoing LC, provides opportunities for considerable cost savings while preserving efficacy.

Limitations of the Study

1. We did not include patients undergoing different surgeries of varying duration.
2. We used only 5% dextrose.
3. Post-operative pain was not evaluated as a risk factor for PONV.

CONCLUSION

IV dextrose prior to anaesthesia for laparoscopic cholecystectomies was found to be an effectual and secure method for the prevention of PONV.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 10-05-2020; **Accepted:** 01-06-2020; **Published online**: 10-09-2020