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# Does Preoperative Intravenous Carbohydrate Improve Post-Operative Well Being in Laparoscopic Surgeries?

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**Abstract:** ***Introduction: All surgical procedures are associated with some amount of stress response by the body. Preoperative oral carbohydrates have been shown to stimulate release of endogenous insulin and reduce insulin resistance. It has been hypothesized that this improvement in perioperative metabolism leads to post-operative wellbeing and better post-operative recovery. The purpose of this study was to determine whether preoperative intravenous carbohydrate loading could improve post-operative wellbeing as compared to overnight fasting in patients undergoing laparoscopic surgeries. Material and Methods: This prospective, interventional, double blinded, randomized controlled trial of a total 100 patients. Patients randomly assigned to intravenous carbohydrate (5% dextrose 500ml) or placebo (500ml NS) half an hour prior to surgery. Post operative nause and vomiting assessed. Results: Comparing the study group and the placebo group, there was no statistical significance in the degree of thirst and hunger in the first 24 hours post operatively as measured by the VAS score(p<0.05), or vomiting. From 6 to 24 hours post following surgery, the incidence of nausea was less in the carbohydrate group and was statistically significant (p=0.01). Conclusion: Preoperative intravenous carbohydrate loading did not improve postoperative wellbeing except for the reduction in postoperative nausea 6-24 hours after surgery.***

**Keywords:** Intravenous Carbohydrates, Laparoscopic, PONV

## 1. Introduction

All surgical procedures are associated with some amount of stress response by the body. This surgical stress is in the form of multiple neuroendocrine and metabolic changes[1]. This stress response has been demonstrated to have negative effects such has immunological impairment and poor wound healing[2].

'Fast Track Surgeries' or 'Enhanced recovery after surgery' are targeted multi-modal interventions which aim to improve surgical outcome and hasten recovery. Preoperative administration of oral carbohydrates two hours before surgery has become one such intervention that is well accepted[3]. Such interventions benefit laparoscopic surgeries as they are commonly done as day care surgeries.

Preoperative oral carbohydrates have been shown to stimulate release of endogenous insulin and reduce insulin resistance[4].It has been hypothesized that this improvement in perioperative metabolism leads to post-operative wellbeing and better post-operative recovery.

While oral preoperative carbohydrate loading has been studied for their various post-operative benefits, few studies have been done to evaluate the post-operative benefits of intravenous carbohydrate loading

The purpose of this study was to determine whether preoperative intravenous carbohydrate loading could improve post-operative wellbeing as compared to overnight fasting in patients undergoing laparoscopic surgeries.

## 2. Materials and Methods

This prospective, interventional, double blinded, randomized controlled trial was conducted in Father Muller's Medical College Hospital, Mangalore, Karnataka, after approval from institutional ethical committee. One hundred patients, aged 18-40, ASA 1 and 2, who were posted for Laparoscopic surgeries during the study period from July2016 to August 2016 were assessed for inclusion. Written informed consent was taken from patients meeting the inclusion criteria. Diabetic patients and patients with previous history of post-operative nausea and vomiting were excluded from the study. Sealed envelope technique was used to randomly assign patients to two groups: Study group or the control group. The study group received 500ml of 5% dextrose solution over 30 minutes, half an hour prior to the surgery, while the control group received 0.9% normal saline over 30 minutes, half an hour prior to surgery.

All patients were kept NPO foratleast 8 hours and premedicated with Tablet Ranitidine 150 mg on the previous day of surgery.

All patients received fentanyl 1mcg/kg before induction and were induced with Propofol 2mg/kg. Succinylcholine 1.5mg/kg was given to assist tracheal intubation.Anaesthesia was maintained with Isoflurane, nitrous and oxygen using controlled positive pressure ventilation. Vecuronium 0.08mg/kg bolus followed by 0.02mg/kg every twenty minutes was used to achieve neuromuscular blockade. Ringer lactate was used as maintenance fluid intraoperatively.

All patients received injection paracetamol 1g intravenously 15 minutes before the end of the surgery. Patients were reversed with Neostigmine 0.5mg/kg and Gylcopyrrolate 0.01mg/kg. No anti emetic was administered to the patient at the end of the surgery.Diclofenac and tramadol was used in the treatment of postoperative pain.

Postoperative wellbeing was assessed using the following criteria: postoperative nausea and vomiting, postoperative thirst and hunger. Data on Postoperative wellbeing was

documented for the first 24 hours post operatively, by a postoperative nurse who was blinded to the study.

Patients were evaluated for postoperative nausea and vomiting in two intervals of 0-6 and 6-24 hours post operatively. Nausea was defined as the subjectively unpleasant sensation associated with awareness of the urge to vomit.Vomiting was defined as the forceful expulsion of gastric contents from the mouth.Allincidences of postoperative nausea and vomiting were treated using Ondansetron 4mg intravenously.

Postoperative thirst and hunger was also evaluated using a visual analog score from 1-10, at 6 and 24 hours post operatively.

## 3. Statistical Analysis

Power analysis from similar studies[5] suggests that a sample size of 50 patients per group is required to get the power of study to 80 %, with 0.05 level of significance. Collected data was analyzed by mean, standard deviation, range and analysis of variance for repeated measures and chi-square test.

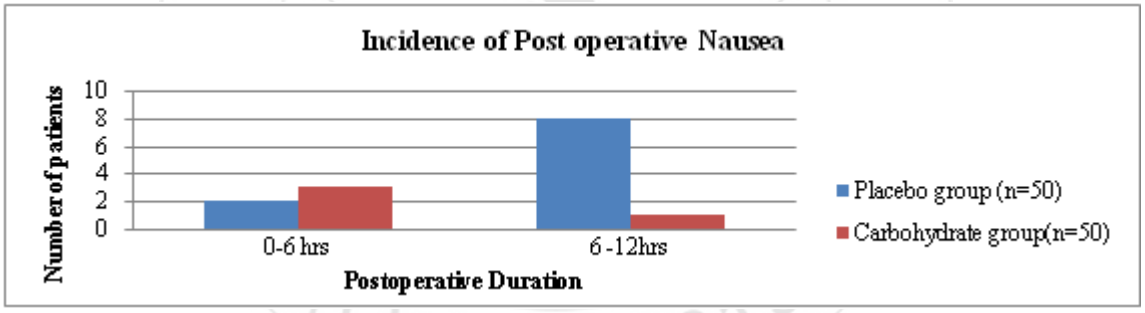
## 4. Results

A total of 50 patients were included in each group. Demographic characteristics and surgical details are presented in table 1. There was no statistical significance found in the mean age and duration of surgery in the study and placebo group.

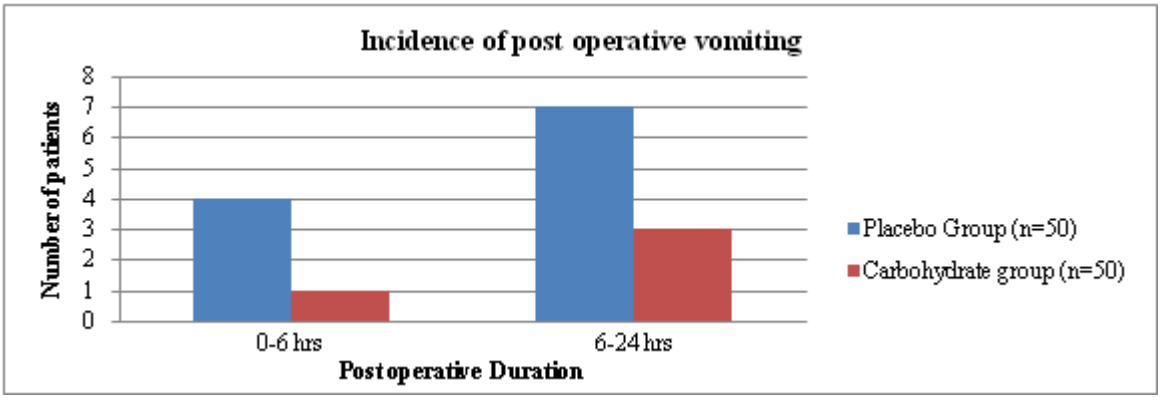
| | Placebo group | Carbohydrate Group | P value |
|---|---|---|---|
| Number of patients | 50 | 50 | - |
| Males | 22 | 22 | - |
| Females | 28 | 28 | |
| Age (mean ± SD) | 37 ± 11.58 | 38 ± 10.9 | 0.65 |
| Weight (mean ±SD) | 63 ± 7.5 | 63 ± 5.3 | 0.85 |
| Duration of surgery in minutes (mean ±SD) | 96 ± 13.6 | 95 ± 17.5 | 0.54 |

The mean age in the placebo group was 37 ± 11.58 years and 38 ± 10.9 years in the study group. The mean duration of surgery was 96 ± 13.6 minutes in the placebo group and 95 ± 17.5 minutes in the study group. There was no statistically difference between the two groups.

The incidence of nausea in the first 6 hours post operatively was 8% in the placebo group and 6% in the study group. This was not statistically significant. From 6 to 24 hours post following surgery, the incidence of nausea in the placebo group was 16% in the placebo group and 2% in the study group. This was statistically significant (p=0.01).




Though the mean incidence of vomiting was higher in the placebo group, this difference was not statistically significant at 0-6 hours (p=0.22) and6-24 hours (p=0.18) post operatively.




Median score for thirst was 3 in the placebo group and study group at 6 hours post operatively. Comparing the study group and the placebo group, there was no statistical significance in the degree of thirst and hunger in the first 24 hours post operatively as measured by the VAS score($p<0.05$).

| | Time | Placebo group (VAS score) | | Carbohydrate group (VAS score) | | P value |
|---|---|---|---|---|---|---|
| | | Median | Range | Median | Range | |
| Thirst | 6hrs | 3 | 1-5 | 3 | 1-5 | <0.05 |
| | 24hrs | 3 | 1-5 | 2 | 1-5 | |
| Hunger | 6hrs | 3 | 1-5 | 2 | 1-5 | <0.05 |
| | 24 hrs | 2 | 1-5 | 2 | 1-5 | |

## 5. Discussion

This study was conducted to assess the effect of preoperative intravenous carbohydrate loading on post-operativewellbeing of patients undergoing laparoscopic surgeries. The major finding in this study was the reduction in incidence of nausea 6-24 hours post operatively. There was no difference in the other wellbeing parameters measured such as thirst and hunger.

Overnight fasting has shown to increase perioperative resistance to insulin[8, 9].This can lead to a post-surgical catabolic state which may be detrimental to the healing process and has shown to independently increase the duration of hospital stay[10].

Studies using preoperative carbohydrate loading have shown various benefits in the post-operative period. Hausel et al[5] showed lower odds of nausea and vomiting 12-24 hours post operatively after elective laparoscopic cholecystectomy in patients who received preoperative oral carbohydrates (n=172). The patients in the carbohydrate group received 800ml of oral carbohydrates the previous night followed by 400ml on the morning of the surgery.

Nygren J et al[11] (1996) in their study compared oral preoperative carbohydrate at a similar dose in 136 patients and found improved post-operative wellbeing with positive effect on thirst, hunger and anxiety compared to a fasting control.

Sada F[13] conducted a randomized, double blind, prospective study comparing carbohydrate-rich liquid drinks with placebo and fasting control in patients undergoing cholecystectomy. They observed improved wellbeing in the patients who were preloaded with oral carbohydrate as compared to the patients who were kept fasting.

Neuroendocrine and inflammation systems are activated in response to surgical stress, which is a protective reaction.Insulin resistance is one of the counter effects of this metabolic change[14, 15]. Longer and more complicated surgeries are associated with more insulin resistance[16]. Intravenous carbohydrate loading could improve post-operative outcome similar to hypothesized benefits of oral carbohydrates, which is by improving the insulin resistance, reducing metabolic stress and nitrogen losses[17].The improvement in incidence of nausea in this study may have been due to this improvement in the overall postoperative metabolic state.

Intravenous dextrose (50g) was given as an intravenous bolus so as to achieve similar rise in blood glucose levels as is seen with oral carbohydrate given 2 hours before surgery.

Contrastingly in their study, Bisgaardet al[6] found no improvement in clinical outcome after preoperative oral carbohydrate. Patients were randomized to two groups. One group received 800 ml of an carbohydraterich beverage the evening before operation (100 g carbohydrate) and another 400 ml (50 g carbohydrate)2 h before initiation of anaesthesia, and the other group received the same volume of a placebo beverage. Both the groups had statistically similar incidence of nausea and vomiting in the 0-6 and 6-24 hour post-operative period.

Mathuret al[12] in their study concluded that CHO drinks were safe for non-diabeticpatients undergoing a variety of major abdominal surgicalprocedures when taken upto 2 hrs before anaesthesia. However, there was no significant beneficial effecton the clinical outcome of these patients.

Helminenet al[7] assessed the effect of preoperative intravenous carbohydrates on preoperative discomfort in patients undergoing elective surgery. They showed that both intravenous and oral carbohydrates increased the insulin levels in the blood, but intravenous carbohydrates failed to decrease the sense of thirst and hunger as compared to oral carbohydrates.

The conflicting findings in this study could be due the absence of a fasting group in our study. Most studies have shown preoperative carbohydrate to be more beneficial than overnight fasting. Studies comparing preoperative carbohydrate with placebo have shown similar improvement in overall postoperative wellbeing.[12, 13]We avoided a fasting group as this was a double-blinded study.

## 6. Conclusion

Preoperative intravenous carbohydrate loading did not improve postoperative wellbeing except for the reduction in postoperative nausea 6-24 hours after surgery.

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