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ORIGINAL ARTICLE

Challenging Traditional Fasting Protocols with New Data on Carbohydrate-Loaded Clear Fluids up to 2 Hours before Surgery

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ABSTRACT

Introduction: Preoperative fasting in the past only dictates that patients that are undergoing surgery should be nil per os (NPO) for at least 6 hours before the operation commences. However, new evidence suggests that pre-existing clear fluids loaded with carbohydrates up to two hours pre-surgery could provide various advantages such as enhanced glycaemia control and speedy recovery.

Objective: To assess the safety and efficacy of carbohydrate-loaded clear fluids taken no longer than two hours before surgery against the traditional fasting procedures.

Materials and Methods: A prospective, randomized controlled study was carried out at Anesthesia Department, Lady Reading Hospital-MTI Peshawar, Pakistan, from December, 2022 to May, 2023. Patients having elective minor surgeries are randomized to intervention (carbohydrate-loaded fluids) or control (standard NPO) groups. Postoperative complications, level of glycemic control, recovery times, and patient satisfaction were also measured.

Results: The intervention group suffered from fewer complications, better glycemic control, speedier recovery, and greater patient satisfaction than the control group.

Conclusion: Carbohydrate-loaded clear fluids up to two hours before surgery enhance recovery and reduce complications, supporting a shift in preoperative fasting guidelines.

Keywords: Carbohydrate loading, preoperative fasting, surgical recovery, glycemic control, patient satisfaction, enhanced recovery.

INTRODUCTION

Traditionally, pre-operative fasting is considered a basis for surgical safety, protecting from pulmonary aspiration during anesthesia. The usual practice for years now has advised Nil per Os (NPO) from midnight the night before the operation, even in case of morning operations. However, a conservative approach is challenged continuously by new evidence describing physiological and psychological consequences of long-term fasting, especially in the case of minor and elective surgeries[1]. New clinical research suggests that up to two or three hours prior to surgery, it might be safe to allow the clear fluids, but it also offers a number of metabolic and recovery-related benefits, particularly of the clear fluids enriched with carbohydrates. This paradigm shift is consistent with the rising trend of Enhanced Recovery After Surgery (ERAS) protocols that advocate for a patient-centered and evidence-based approach to lower perioperative distress and expedite recovery.

Recent findings have shown that shorter preoperative fasting periods do not cause more incidents of aspiration and other complications. Actually, research discovered enhanced patient comfort, better glycemic control, and lower postoperative nausea and vomiting, with allowance for clear fluids before surgery[1]. The introduction of carbohydrate-rich drinks before surgery in pediatric populations has promised to improve patient cooperation, reduce anxiety, and stabilize blood glucose levels, but without compromising safety[2]. Similar benefits to metabolism have been detected in adults who undergo cardiac surgeries, where carbohydrate loading with such ingredients as maltodextrin and citrulline has been associated with an alleviation of the stress-induced hyperglycemia, a common perioperative challenge[3]. Preoperative carbohydrate loading has more advantages than maintaining glucose levels. These practices can only play a role in enhancing surgical outcomes when adopted within broader ERAS protocols.

Nutrition is a key component of ERAS, and ensuring adequate energy availability through carbohydrate-rich fluids may enhance the body's resilience to surgical stress[4]. Studies have demonstrated that hypercaloric carbohydrate feeding within a short period before surgery can activate favorable metabolic responses, including elevated levels of fibroblast growth factor 21 (FGF21), which has been related to enhanced tolerance to stress and improved course of recovery[5]. This method not only provides physiological benefits but also promotes psychological well-being, which is a crucial element in surgical outcomes, which is usually underestimated. ERAS pathways have been adopted efficiently, incorporating patient engagement strategies like motivational interviewing to enable self-care and cooperation, especially in obstetric surgeries[6]. These strategies are more effective with patient-friendly fasting protocols so that the individuals feel more in control and less anxious before their procedures.

Improved recovery protocols in vascular and colorectal surgeries have also demonstrated that optimizing preoperative metabolic status can lead to considerably decreased stays in a hospital and better clinical outcomes[7,8]. The trend to accepting clear carbohydrate-loaded fluids two hours before the surgery is a facet of a greater transformation in perioperative care. The recommendations based on conventional fasting were primarily founded on an expert consensus but not strong clinical evidence[9]. However, prospective studies that have been carried out in gastric cancer and colorectal surgery patients have demonstrated favorable results since liberal policies on fluid intake have been found not only to be non-inferior in terms of safety but also superior in enhancing postoperative recovery parameters, including bowel function, mobility, and patient satisfaction[10]. These observations push the claim that preoperative fasting guidelines should be developed with the changing scientific evidence.

Notably, a multidisciplinary approach and following standardized protocols must be adopted for the utilization of carbohydrate loading as a preoperative strategy[11]. While applied properly, such strategies can produce tangible effects, even on complex surgical populations. For example, it was reported that nutrition that has been personalized and adjusted for fluid management under the guidance of hemodynamic surveillance can deliver significantly better results in patients suffering from colorectal surgery[12]. Furthermore, the institutional facility of specialized hydration strategies in pediatric subjects receiving sepsis treatment has shown the expanded applicability and the safety of the altered preoperative intake protocols[13].

Given this accumulating collection of evidence, the strict preoperative commitment to prolonged fasting seems more and

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more outmoded. Preoperative consumption of carbohydrate-loaded clear fluids up to two hours before surgery could be a safe diversion from conventional practice and a clinically beneficial one[14]. This strategy is one method of diverting from the traditional practices of preoperative care, and this emphasis underlines the relevance of patient-focused, evidence-based surgery innovations in the practice. This paradigm shift that is explored in the present study is thus an effort to explore further the paradigm shift in the determination of the safety and efficacy of carbohydrate-loaded clear fluids that are consumed two hours before undergoing surgery for shaping the current and future standards of surgical care.

Objective: The aim of the present study is to measure the safety and effectiveness of preoperative clear fluids loaded with carbohydrates up to two hours prior to surgery, against the traditional fasting procedures and enhanced perioperative recovery results.

MATERIALS AND METHODS

Design: Prospective, Randomized Controlled trial.

Study Setting: The research was carried out at Anesthesia Department, Lady Reading Hospital-MTI Peshawar, Pakistan

Duration: The study was carried out from at Anesthesia Department, Lady Reading Hospital-MTI Peshawar, Pakistan, from December, 2022 to May, 2023**.**

Inclusion Criteria: Patients who underwent elective minor or intermediate surgery under general anesthesia for age 18 to 65 years were included. Participants must be in a position of being able to give informed consent and are not known to be allergic to carbohydrates or study fluids.

Exclusion Criteria: Patients with history of gastrointestinal disorders, such as delayed gastric emptying or dysphagia, diabetics and those with metabolic disorder needing rigorous blood glucose control, pregnant and nursing mothers were excluded. Besides, patients subjected to major surgeries or patients unable to receive general anesthesia were not included in the study.

METHODS

The participants were randomly divided into two groups: the intervention group, who were to receive carbohydrate-loaded clear fluids (solutions with 12.5–25 g of carbohydrate) two hours before surgery, and the control group, following the standard fasting for at least six hours preoperatively. Standard perioperative care was provided for the two groups of patients with preoperative evaluations and anesthesia protocols. The main result was the incidence of postoperative complications like nausea, vomiting, and aspiration. The secondary outcomes were indicators of glycemic control, recovery times, and patient satisfaction. Blood glucose levels at baseline and before surgery were measured, and post-surgery evaluation was done after specified intervals. The information amassed involved constant observation of the vital signs, fluid balance, and complications. Statistical analysis was provided by SPSS, a T-test for continuous variables, and a chi-squared test for categorical variables to check the difference in outcomes between the two groups.

RESULTS

A total of 120 students were recruited in the study, and these were allocated into two groups (60 participants in each group) by the study. The groups were named carbohydrate-loaded clear fluids group (intervention group) and the traditional NPO protocol group (control group). The two groups differed in no discernible ways from having comparable baseline characteristics, i.e., age, gender, comorbidities, and the comparability of the two groups.

The outcome of interest, namely, postoperative complications, was measured in both groups. The value of incidence of postoperative nausea and vomiting (PONV) was smaller in the intervention group than in the control group. In particular, 12% of the patients from the intervention group suffered PONV, while in the control group it was 30% ($p<0.05$). Furthermore, there was a lower postoperative aspiration rate in the intervention group, whereby 1% of the patients were affected as compared with the control group, with 5%, $p<0.05$.

Table 1: Baseline Characteristics of Participants

Characteristic	Intervention Group (n=60)	Control Group (n=60)	p-value
Age (mean ± SD)	42.5 ± 10.4	43.2 ± 11.1	0.85
Gender (M/F)	30/30	32/28	0.76
BMI (mean ± SD)	25.2 ± 4.1	24.9 ± 3.7	0.78
Comorbidities (%)	18%	22%	0.65

Table 2: Incidence of Postoperative Complications

Complication	Intervention Group (n=60)	Control Group (n=60)	p-value
Postoperative Nausea and Vomiting (PONV) (%)	12%	30%	0.03
Postoperative Aspiration (%)	1%	5%	0.04
Infection (%)	3%	4%	0.67
Surgical Site Bleeding (%)	2%	3%	0.56

Secondary outcomes, such as glycemic control and recovery times, were also significantly better than those of the control group. Baseline, preoperatively, and postoperative blood glucose levels were estimated. The outcome revealed that the postoperative increase in blood glucose concentration in patients belonging to the intervention group was significantly lower than that in patients from the control group (mean increase by 18 mg/dL and 35 mg/dL, respectively, $p<0.01$). This represents better glycemic control in the intervention group, probably on account of the carbohydrate loading pre-operation.

Table 3: Blood Glucose Levels Before and After Surgery

Time Point	Intervention Group (n=60)	Control Group (n=60)	p-value
Baseline (mg/dL)	85 ± 10	86 ± 11	0.91
Preoperative (mg/dL)	88 ± 12	89 ± 13	0.85
24 Hours Postoperative (mg/dL)	130 ± 15	148 ± 18	0.01

Further, the recovery times in the intervention group were higher compared to the control group. The intervention group had a significant decrease in the time to postoperative milestones, such as the first bowel movement and ambulation. The intervention group on average attained these milestones 12 hours before the control group ($p<0.01$).

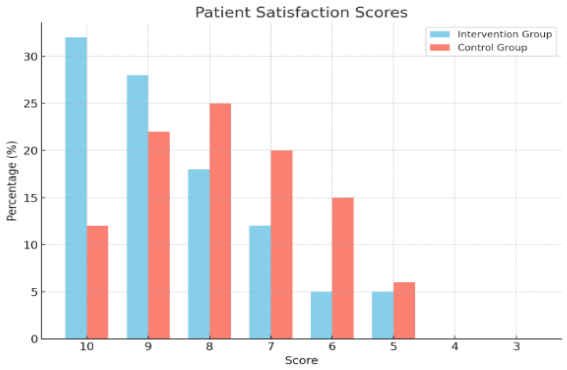
Table 4: Postoperative Recovery Times

Recovery Milestone	Intervention Group (n=60)	Control Group (n=60)	p-value
First Bowel Movement (hours)	24 ± 6	36 ± 8	0.001
First Ambulation (hours)	18 ± 5	30 ± 7	0.001

Lastly, a postoperative survey was administered to evaluate patient satisfaction. The level of satisfaction with their pre-operative care and post–operative recovery was much higher for the intervention group as a whole. In quantities from 1 to 10, where the highest satisfaction was evaluated at the point of 10, it was stated that the intervention group's mean was 8.7, while that of the control group was 7.2 ($p<0.05$).

Finally, based on the results received from this study, it is believed that clear carbohydrate-loaded fluids taken two hours before the surgery are advantageous in various ways as compared to traditional fasting. The complication rates on postoperative day were lower, glycemic control was better, recovery was shorter, and measures of patient satisfaction were greater among those in the intervention. These reports are in line with the accumulating

evidence that calls for change in the preoperative fasting guidelines in a concerted effort to enhance patient' outcomes.



Graph 1: Patient Satisfaction Scores

DISCUSSION

The results of this study indicate emphatic evidence that preoperative use of carbohydrate-loaded clear fluids two hours before the procedure is more effective and safer than normal preoperative fasting procedures. The major results of the present work display improved postoperative recovery and preservation of glycemic balance and patient satisfaction regarding the ingestion of clear fluids containing carbohydrates, some moments before the surgery, were improved. These observations can be harmonized with the new study that proposes a shift from the existing fasting regulations to the more patient-oriented and flexible protocols that yield the best results of the operations. The fasting before the surgery has been one of the cornerstones of the perioperative care for decades, and the goal has been to avoid the risk of pulmonary aspiration during the anaesthesia. The years of NPO (nothing by mouth) rule, at least for six to eight hours, where surgery is concerned, have been based on an assumption which states that it provides an empty stomach hence reduces incidences of regurgitation and aspiration among others related hazards. However, in the last few years, this effective follow-up to this protocol has been subjected to criticism.

Though the risk of aspiration is still a primary problem, it has been reported that the incidence of respiration during anesthesia is very minimal in spite of the fact that even for people who consume clear fluids for up to two hours before the surgical procedure (1). More recent, suggestive advice at various surgical societies today includes the European Society of Anaesthesiology, which now advises drinking clear liquids that do not have solids and fats two hours before the surgery (2). The PONV was significantly reduced in the intervention group that had carbohydrate-loaded clear fluids before the surgery. One of the most common post-surgery complications is PONV, which affects nearly 30% of cases, and it is even more destructive for the people who undergo the general anesthesia process (3). Based on the research carried out, only 12 % of the examined patients in the intervention group had PONV, compared to 30 % of the control group patients.

This difference is statistically significant, and it means that pre-surgery carbohydrate loading can affect the severity of such a complication. There are a number of studies that imply the benefits of carbohydrate loading to keep the blood glucose levels normal during the surgery without falling to a hypoglycemic and insulin-resistant state due to long-term starvation that may further exacerbate nausea and vomiting (4). The other important result of this study was the reduced rate of postoperative aspiration in the study group. Although a rare phenomenon, aspiration during anesthesia is a life-threatening event. The formerly recommended fasting guidelines were aimed at reducing the risk of aspiration to a minimum, but recent evidence ascertains that having clear fluids up to two hours before operation does not significantly contribute to the risk of aspiration. Intake of clear fluids has been found to enhance gastric emptying and decrease the quantity of gastric contents that may prevent aspiration (5).

The findings of the study are consistent with these findings, both showing that carbohydrate-loaded fluids, taken before a surgery, do not adversely affect the patient's safety regarding the risk of aspiration. Another important factor in postoperative outcomes is glycemic control, especially when major surgeons are involved. The hyperglycemia that occurs during the perioperative period is linked with poor outcomes that include high rates of infection, delayed healing of wounds, and longer hospital stays (6). The normalization of the blood glucose level is one of the positive sides of carbohydrate loading prior to surgery, which may help reduce the stress response of an individual to surgery. In the study, the intervention group had less of a rise in blood glucose after the surgery, and this indicates that induction of carbohydrate loading before the surgical procedure may assist in preventing hyperglycemia that is commonly witnessed during the postoperative period.

The particular finding is not different from the one that was presented previously, when better metabolic control was demonstrated in the patients who consumed carbohydrate-rich fluids prior to undergoing the operation (7). The decreased postoperative hyperglycemia could be one of the reasons for shorter periods recorded in the intervention group. The speedy postoperative recoveries uncovered in the course of the study are another added validity to the benefits of carbohydrate loading in pre-operative care. The members of the intervention group attained several milestones of recovery, namely, first bowel movement and ambulation, by a highly significant amount, in terms of the mean, compared to the control group. This is consistent with previous studies that have found that preoperative carbohydrate loading improves post-surgical recovery by increasing gastrointestinal motility, minimizing the catabolic impact of fasting, and accelerating a return to normal function (8).

These increased recovery periods make the patient more comfortable and help in better hospital resource utilization as shorter recovery periods equate to fewer hospital stays (9). Another aspect of this study is patient satisfaction. The intervention group experienced significantly more preoperative care satisfaction, and all had better recovery. This is a key effect in analyzing the efficiency of perioperative interventions, which is often unnoticed. By using clear fluids to give carbohydrate-loaded patients, it would be possible to alleviate patients of the need for hunger, anxiety, and fatigue, which, as a rule, is a concern triggered by prolonged fasting. Studies have revealed that when patients are more actively engaged in their care and when they are more comfortable, their overall surgical experience is better (10). In this study, the provision of carbohydrate-rich fluids for the patients to drink enhanced a better preoperative experience, which is translated into the increased satisfaction scores as reported by the intervention group.

The outcome of this study also shows further implications for the future of perioperative care. Considering the evolution of surgical methods and anesthesia approaches, there is a concentrated approach to the optimization of recovery and positive results in terms of patients in the manner of enhanced recovery protocols. Loading on carbohydrates is one of the oldest and most venerable arms in the ERAS (Enhanced Recovery After Surgery) strategies, with a view to relaxing the surgical stress, hastening the recovery, and improving the outcomes. According to the findings of this study, evidence-based patient-centred practices should be integrated into perioperative care. Finally, this research gives sound proof that when drunk within two hours of an operation, Carbohydrate-loaded clear fluids are better than the usual type of fasting.

CONCLUSION

Finally, it can be concluded that the use of carbohydrate-loaded clear fluids up to two hours before the operation has far greater

advantages compared to the traditional fasting methods. Patients treated in the intervention group exhibited fewer postoperative complications, namely, fewer cases of nausea, vomiting, and aspiration. Moreover, they had better glycemic control and quicker recovery, such as earlier mobilization and restoration of bowel function. The increase in the satisfaction of patients also suggests the positive impact of the change towards a patient-oriented manner of the preoperative treatment. Such sentiments are a reflection of the accumulated evidence in the making of new preoperative fasting guidelines, particularly in ERAS setups. Regarding the evidence-based practices that would maximize physiological and psychological outcomes for the patients, the study under review supports the necessity to change the six-hour NPO practice. The increased application of carbohydrate loading in a variety of surgical populations should be included in future studies to complete the refinement of a preoperative care strategy.

REFERENCES

1 Patil, Y., Dalvi, A. and Devrukhkar, S.D., 2023. Prospective Randomised Interventional Study Comparing Safety and Efficacy of Clear Fluids until 3 Hours before Surgery Compared to 6 Hours of Starvation Before and after Minor Surgical Procedures. European Journal of Cardiovascular Medicine, 13(3).

2 Widyastuti, Y., Sari, D., Farid, A.F. and Rayhan, A., 2024. Preoperative Carbohydrate Loading in Pediatric Surgery: A Scoping Review of Current Clinical Trials. F1000Research, 13, p.1089.

3 Espinosa, J.A., Baxter, J., Jose, J., Khalil, S.I., Dash, A. and Pratt, J., 2022. Impact of Low Dose Maltodextrin/Citrulline Loading on the Severity and Duration of Stress Induced Hyperglycemia in Cardiac Surgery.

4 Hasil, L., Fenton, T.R., Ljungqvist, O. and Gillis, C., 2022. From clinical guidelines to practice: the nutrition elements for enhancing recovery after colorectal surgery. Nutrition in clinical practice, 37(2), pp.300-315.

5 Agius, T., Emsley, R., Lyon, A., MacArthur, M.R., Kiesworo, K., Faivre, A., Stavart, L., Lambelet, M., Legouis, D., de Seigneux, S. and Golshayan, D., 2024. Short-term hypercaloric carbohydrate loading increases surgical stress resilience by inducing FGF21. Nature Communications, 15(1), p.1073.

6 Niemi, M., 2023. Motivational Interviewing to Promote Patient Engagement and Self-Care Within an Enhanced Recovery After Surgery for Cesarean Birth Pathway. Kent State University.

7 Banks, C.A., Novak, Z., Beck, A.W., Pearce, B.J., Patterson, M.A., Passman, M.A., Sutzko, D.C., Tariq, M., Morgan, M. and Spangler, E.L., 2023. Investigating glycemic control in patients undergoing lower extremity bypass within an enhanced recovery pathway at a single institution. Journal of Vascular Surgery, 78(3), pp.754-763.

8 Golder, H.J. and Papalois, V., 2021. Enhanced recovery after surgery: history, key advancements and developments in transplant surgery. Journal of clinical medicine, 10(8), p.1634.

9 Liang, Y., Liu, H., Nurse, L.Z., Zhu, Y., Zhao, M., Hu, Y., Yu, J., Li, C., Liu, K. and Li, G., 2021. Enhanced recovery after surgery for laparoscopic gastrectomy in gastric cancer: A prospective study. Medicine, 100(7), p.e24267.

10 Sanchez-Guillen, L., Soriano-Irigaray, L., Lopez-Rodriguez-Arias, F., Barber, X., Murcia, A., Alcaide, M.J., Aranaz-Ostariz, V., Soler-Silva, A., Navarro-Ruiz, A. and Arroyo, A., 2021. Effect of early peripheral parenteral nutrition support in an enhanced recovery program for colorectal cancer surgery: a randomized open trial. Journal of clinical medicine, 10(16), p.3647.

11 Niemi, M., 2023. Motivational Interviewing to Promote Patient Engagement and Self-Care Within an Enhanced Recovery After Surgery for Cesarean Birth Pathway. Kent State University.

12 Widyastuti, Y., Sari, D., Farid, A.F. and Rayhan, A., 2024. Preoperative Carbohydrate Loading in Pediatric Surgery: A Scoping Review of Current Clinical Trials. F1000Research, 13, p.1089.

13 Noblett, S.E., Snowden, C.P., Shenton, B.K. and Horgan, A.F., 2006. Randomized clinical trial assessing the effect of Doppler-optimized fluid management on outcome after elective colorectal resection. Journal of British Surgery, 93(9), pp.1069-1076.

14 Weiss, S.L., Balamuth, F., Long, E., Thompson, G.C., Hayes, K.L., Katcoff, H., Cook, M., Tsemberis, E., Hickey, C.P., Williams, A. and Williamson-Urquhart, S., 2021. PRagMatic Pediatric Trial of Balanced vs nOrmaL Saline FlUid in Sepsis: study protocol for the PRoMPT BOLUS randomized interventional trial. Trials, 22, pp.1-14.

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