



PREOPERATIVE FASTING AND BLOOD SUGAR HIGHLIGHTS EMERGENCY COMPLICATIONS IN GENERAL ANESTHESIA PATIENTS

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ABSTRACT

Fasting that is too long will affect the patient's condition, one of which is the patient's blood sugar levels. In this case, it is necessary to control the start time of fasting with the time of the operation that the patient will undergo. The purpose of the study was to determine Preoperative Fasting and Blood Sugar Highlighting Emergency Complications in General Anesthesia Patients at Dr. Reksodiwiryo Class III Hospital in Padang. A correlational analytical observational study was conducted using a cross-sectional approach. This observational analytical correlational study was conducted with a cross-sectional approach. The number of samples was 34 people, the sampling technique used consecutive sampling. This research instrument used an observation sheet and a blood sugar level monitoring tool (Glucometer) With the respondent criteria determined according to the inclusion and exclusion criteria. The test results showed that there was a relationship between the length of fasting and blood sugar levels highlighting emergencies in preoperative general anesthesia patients at Dr. Reksodiwiryo Class III Hospital in Padang with a p value = 0.005. It can be concluded that the duration of preoperative fasting can affect blood sugar levels in general anesthesia patients which causes patients to become hypoglycemic or hyperglycemic which triggers various emergency complications that can worsen the patient's clinical condition when undergoing general anesthesia.

Keywords: blood sugar levels; fasting duration; general anesthesia

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INTRODUCTION

Surgical or operation actions in hospital services are very important medical actions. In perioperative actions, one of the preparations is to fast. Fasting preparation in surgery aims to empty the stomach or colon, the purpose of emptying the stomach greatly affects the results of anesthesia. (Rüggeberg et al., 2024). Menurut WHO (2020) The number of patients undergoing surgery has increased significantly every year, it was recorded that in 2020 there were 234 million patients undergoing surgery in hospitals worldwide. Based on data Kemenkes RI, (2022) Operation or surgical procedures are ranked 11th out of 50 treatments for diseases in Indonesia. Perioperative preparations include anamnesis, ensuring the most suitable anesthesia technique, psychological preparation, physical examination, making a letter of consent for medical procedures, preoperative physical preparation, one of which is preoperative fasting(Gul et al., 2018).

Preoperative fasting in patients who will undergo elective surgery is a must before surgery. This is useful for reducing the volume and acidity of the stomach and reducing the risk of regurgitation or aspiration, better known as Mendelson's syndrome, during anesthesia, especially during induction.Yenni et al., (2024). Longer preoperative fasting can affect the patient's condition before and after surgery (Elfira, 2024) Fasting that is too long can cause patients to experience increased gastric fluid volume, decreased gastric fluid pH, increased risk of aspiration, anxiety, dehydration, decreased insulin levels, increased glucagon, insulin

resistance, increased incidence of postoperative nausea and vomiting, muscle wasting, weakened immune system, postoperative hyperglycemia, and hypoglycemia (Dejen et al., 2024)

Perioperative hypoglycemia and hyperglycemia should be avoided to prevent undesirable events such as surgical complications, surgical delays, surgical cancellations, metabolic decompensation, and prolonged hospital stays. (Hartono et al., 2016). Long-term preoperative fasting makes the patient uncomfortable, the mouth becomes dry and the patient feels thirsty. The purpose of fasting before surgery is to prevent aspiration, anesthetized patients are not only asleep, when given sedation, the patient's digestive tract will also relax. If the patient's stomach still contains food, this food can go up the throat which will cause aspiration where food enters the respiratory tract which will cause respiratory problems. Irwadi, yenni elfira, (2023) To prevent pulmonary aspiration of gastric contents, this is the reason in many surgical practices to fast the patient from solid food and fluids for a specified period of time. (Blaise Pascal et al., 2023). Menurut Hajian et al., (2020) Prolonged preoperative fasting is associated with decreased blood pressure and therefore, should be avoided to prevent hypovolemia and hypotension during anesthesia.

Study (Garima Sharma, et al., 2018) about the relationship between fasting duration and preoperative and pre-induction blood sugar levels in patients undergoing elective surgery at Dr. Hasan Sadikin Hospital, Bandung, stated that fasting before surgery is a must before administering anesthesia, which aims to reduce stomach volume, stomach acid, and reduce the risk of pulmonary aspiration. Of the 371 patients, 8 people (2.2%) experienced hypoglycemia with random blood sugar levels ≤ 70 mg/dL. The results of this study stated that there was no relationship between fasting duration and blood sugar levels before induction. Another study conducted by (Assen et al., 2021), obtained preoperative blood glucose levels with a normal category of 15 people (57.7%) and preoperative blood glucose with a hypoglycemic category of 11 people (42.3%). Meanwhile, the results of another study involving 50 pediatric patients showed that there was 1 patient who had a blood sugar level of less than 50 mg/dL (Smith et al., 2011). Based on research (Gökc,et al., 2021) There were 2 out of 203 patients experiencing hypoglycemia with fasting duration of 17.8 and 19.4 hours. Intraoperative hyperglycemia is associated with several postoperative complications such as myocardial infarction, stroke, postoperative infection, and impaired wound healing. (Robinson et al., 2021) Conditions of hypoglycemia and hyperglycemia can cause disturbances in the recovery of consciousness after anesthesia. (Fekede et al., 2022).

METHOD

This study is an observational analytical correlational study using a cross-sectional approach, which was conducted in June 2024 in the operating room at Dr. Reksodiwiryo Padang Class III Hospital. A total of 34 people. The population taken were patients with the inclusion criteria for the research subjects being adult patients who would undergo surgery with general anesthesia. The research sample was taken using a purposive sampling technique. The research instrument used an observation sheet. Data analysis used the Spearman Rank correlation test. The collected data were subjected to univariate analysis, the results of which were frequency distributive with measurements of the patient's fasting duration and blood sugar levels only once at the same time.

RESULT

Table 1.
Frequency Distribution of Respondents Based on Preoperative Fasting Blood Sugar Levels (n=34)

Preoperative Fasting Blood Sugar Levels	f	%
Low	5	14.7
Normal	27	79.4
Tall	2	5.9

Table 1. The number of respondents in this study was 34 people, indicating that a small portion (14.7%) of respondents had low fasting blood sugar levels, a small portion (5.9%) had high fasting blood sugar levels and more than half (79.4%) of respondents were in the normal category at the TK. III Dr. Reksodiwiryo Padang Hospital.

Table 2.
Distribution of blood sugar levels based on the duration of preoperative fasting (n=34)

Lama Puasa (Jam)	Kadar Gula Darah								p value
	Low		Normal		Tall		Total		
	f	%	f	%	f	%	f	%	
6 - 8	0	0.0	18	94.7	1	5.3	19	100	0.005
8 – 10	0	0.0	9	90.0	1	10.0	10	100	
10 – 12	3	100	0	0.0	0	0.0	3	100	
12 - 14	2	100	0	0.0	0	0.0	2	100	

Based on table 2, data shows that low blood sugar levels are more often found in patients with fasting durations of 10-12 hours and 12-14 hours, each of which is 100%. Normal blood sugar levels are most often found in patients with fasting durations of 6-8 hours, which is 95.7%. High blood sugar levels are most often found in patients with fasting durations of 8-10 hours, which is 10.0%. The results of statistical tests using the Spearman Rank correlation test obtained a p value = 0.005 ($p < 0.05$), which means that there is a relationship between fasting duration and blood sugar levels in preoperative general anesthesia patients at the Dr. Reksodiwiryo Padang Class III Hospital.

DISCUSSION

According to (Gupta et al., 2022) Fasting blood sugar is a blood glucose level examination performed on patients who fast for 2 hours before performing a blood sugar level examination. Patients fast before taking the test to avoid an increase in blood sugar through food that affects the test results. This glucose level can indicate the overall state of glucose balance or glucose homeostasis. and routine measurements should be performed on fasting glucose samples. Normal fasting glucose levels are between 70-110 mg/dl (Jarvis et al., 2023). It is seen in the study that most preoperative patients have fasting blood sugar levels in the normal category. This can be seen from the results of measuring the patient's fasting blood sugar levels of 70-110mg/dl. Normal blood sugar levels in patients can be influenced by several factors, as conveyed by Jarvis et al., (2023) that factors that affect fasting blood sugar levels include gender, age, history of DM and diet. Another factor that causes many normal blood sugar levels in patients is because the study used exclusion criteria for patients with DM, pancreatitis, liver cirrhosis and heart disease so that it was ensured that the condition of the patients who were the research samples were with normal blood sugar levels.

However, the research results found that there were patients who experienced low blood sugar levels, namely 14.7%. This can be influenced by the length of fasting in patients, where quite a lot of patients were found with a fasting period of > 8 hours so that it can affect to the level sugar fasting blood of patients. It was also found in the study that there were patients who had high fasting blood sugar levels. This can be caused by stress factors experienced by patients before undergoing surgery, which causes an increase in blood sugar levels. According to the study Frykholm et al., (2024) that the increase in blood sugar levels that occurred in 15 patients (34.9%), this was due to a stress response. The stress response that occurs triggers the secretion of the hormone cortisol from the adrenal cortex and is the most dominant hormone that can cause an increase in blood sugar levels. The overall effect of cortisol is to increase blood glucose concentration by sacrificing protein and fat stores. According to the literature, the increase in blood sugar levels is mainly caused by the secretion of the hormone cortisol which is secreted rapidly.

The presence of stressors in the form of anesthesia and surgical incisions can cause wounds and tissue damage, causing the activation of the sympathetic nervous system. Activation of the sympathetic nervous system will stimulate the adrenal medulla to release the hormone epinephrine. Epinephrine works together with cortisol to increase blood sugar levels by activating the glycogenolysis pathway Hajian et al., (2020). Based on this, according to the researcher's conclusion of this study, it was found that most patients had normal fasting blood sugar levels. However, there are still patients who have low blood sugar levels. This can be influenced by the length of the patient's fast, which is > 8 hours. It was also found that there were patients with high fasting blood sugar levels. This can be caused by stress factors experienced by the patient so that there is a risk of increasing the patient's blood sugar levels. In this case, the role of the anesthesiologist is needed in checking the patient's fasting blood sugar levels to prevent hypoglycemia and hyperglycemia in patients who will be at risk of surgery that will be undergone by the patient. Table 2. Fasting before surgery is very important to avoid complications during surgery and during anesthesia, this avoids emergencies. If the patient does not fast, this can cause the patient to vomit and the vomit can enter the lungs when under the influence of (Pradeep A Dongare et al., 2019). Preoperative fasting is important to be carried out in accordance with pre-anesthetic fasting guidelines to avoid disturbances in blood sugar levels which can cause surgical complications after surgery due to excessive fasting duration (Pang et al., 2024)

Hyperglycemia during preoperative fasting is caused by the effects of stress and increased glucocorticoid secretion. The incidence of hypoglycemia in geriatric patients who fast for 8–14 hours is 17.6–32.4%; Hypoglycemia is one of the feared consequences in patients who fast for too long Sreedharan et al., (2023). Hypoglycemia is rare during fasting. This is due to blood sugar regulation. Fasting blood sugar ranges from 80–90 mg/dL in patients who fast in the morning, it can increase to 120–140 mg/dL after eating and return to normal after 2 hours. This regulation is regulated by several hormones, including insulin, glucagon, adrenal, cortisol, and growth hormone (Sermkasemsin et al., 2022). The hormones insulin and glucagon function as a control system to maintain normal blood sugar concentrations. When blood sugar levels increase, insulin is secreted and causes blood sugar levels to approach normal. Conversely, decreased blood sugar levels cause glucagon secretion Pang et al., (2024). Glucagon functions to increase blood sugar to normal levels. When severe hypoglycemia occurs, low blood sugar levels also have a direct impact on the hypothalamus so that the hypothalamus will stimulate the sympathetic nervous system which causes the adrenal glands to secrete epinephrine and will release glucose from the liver (Sermkasemsin et al., 2022)

In longer periods of starvation up to several days, the hormones cortisol and growth hormone will also be secreted. These two hormones are useful for reducing the use of glucose by body cells and converting the use of fat cells as an energy source Fawcett & Thomas, (2019) stated that giving drinks two hours before surgery is a safe and beneficial action. Gastric fluid emptying follows an exponential curve and non-caloric drinks will be quickly emptied from the stomach within 10 minutes, while non-fat caloric drinks are emptied in about 90 minutes. Patients who are given carbohydrate-rich drinks before surgery are less hungry and thirsty before and after surgery compared to patients who are not given drinks. This can increase postoperative patient satisfaction which is feared to occur in patients who fast for too long. In a study conducted on non-diabetic patients, it turned out that hypoglycemia rarely occurs. This is due to blood sugar regulation. Fasting blood sugar ranges from 80-90 mg/dL in patients who fast in the morning can increase to 120-140 mg/dL after eating and return to normal after 2 hours. This regulation is regulated by several hormones, including insulin, glucagon, adrenal, cortisol, and growth hormone. The liver functions as a buffer system in regulating blood glucose. When blood sugar levels increase, the rate of insulin secretion also increases, about two-thirds of the blood sugar absorbed from the intestine is directly stored in the liver in the form of glycogen (Tang et al., 2024). When blood sugar levels and insulin secretion decrease, the liver releases glucose back into the blood. Insulin and glucagon function as a control system to maintain normal blood sugar concentrations. When blood sugar levels increase, insulin is secreted and causes blood sugar levels to approach normal. Conversely, decreased blood sugar levels cause glucagon secretion. Glucagon functions to increase blood sugar to normal levels. When severe hypoglycemia occurs, low blood sugar levels also have a direct impact on the hypothalamus so that the hypothalamus will stimulate the sympathetic nervous system which causes the adrenal glands to secrete epinephrine and will release glucose from the liver (Mori et al., 2015)

CONCLUSION

Based on the results of research conducted at the Dr. Reksodiwiryo Padang Class III Hospital, it is known that most preoperative patients fasted for 6-8 hours before surgery. In addition, 27 people (79.4%) patients showed fasting blood sugar levels that were still in the normal category. A relationship was found between the length of fasting time and blood sugar levels, which indicates that fasting that is too long has the potential to significantly lower blood sugar levels. This can pose a risk of emergency, especially in patients who are susceptible to hypoglycemia before general anesthesia. Preoperative hypoglycemia can cause metabolic disorders, decreased consciousness, and even more serious complications during anesthesia and surgery. Therefore, proper preoperative fasting time management is very important to prevent emergency conditions that can endanger patient safety.

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