Indonesian Journal of Global Health Research
Volume 8 Number 2, April 2026
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

THE IMPACT OF VARIATIONS IN FASTING DURATION ON HEMODYNAMIC STATUS AND BLOOD SUGAR LEVELS IN ELECTIONAL SURGERY PATIENTS

Irwadi*, Fatimah, Yenni Elfira
Vocational Faculty, Universitas Baiturrahmah, Jl. Raya By Pass KM 15 Aie Pacah, Padang, Sumatera Barat, 25158, Indonesia
*irwadi@staff.unbrah.ac.id

ABSTRACT
Preoperative fasting is a standard applied in surgical services to prevent aspiration, but in hospital practice, fasting often occurs that exceeds the recommendations of the American Society of Anesthesiologists (ASA) which recommends a minimum fast of 6-8 hours, the negative impact of extended fasting will affect the hemodynamic and metabolic status of patients. This study aims to analyze the impact of variations in fasting duration with hemodynamic status and blood sugar levels in patients. This study used a quantitative design with a cross-sectional approach with a sample of 252 elective surgical patients collected by purposive sampling. Data collected included demographic characteristics, ASA physical status I-II, fasting duration, and preoperative clinical parameters. with inclusion criteria: respondents aged 18-55 years, ASA physical status I-II, undergoing elective surgery while exclusion criteria were patients with metabolic disorders such as diabetes mellitus or unstable cardiovascular disorders and cytotoxic patients. Data were collected using observation sheets related to demographics, physical status, type of surgery, last meal, and post-operative complaints, as well as a Non-Invasive Blood Pressure Monitor (NIBP) to measure hemodynamics, a pulse oximeter for oxygen saturation, and a glucometer for glucose levels. The results of the one way anova test showed that variations in fasting duration did not affect hemodynamics ($p > 0.05$), but did affect blood sugar levels where the value ($p < 0.05$). It was found that these findings confirm that pre-operative fasting beyond the recommendation can affect the patient's metabolic status, so that fasting duration management according to ASA standards is important to maintain the patient's metabolic and physiological stability.

Keywords: blood sugar levels; elective surgery; fasting variations; hemodynamic status; management; perioperative

How to cite (in APA style)
Irwadi, I., Fatimah, F., & Elfira, Y. (2026). The Impact of Variations in Fasting Duration on Hemodynamic Status and Blood Sugar Levels in Electional Surgery Patients. Indonesian Journal of Global Health Research, 8(2), 41–52. https://doi.org/10.37287/ijghr.v8i2.669.

INTRODUCTION

Preoperative fasting is a recommended and essential part of surgical preparation and has become standard practice for elective surgical patients undergoing hospital surgery. It aims to reduce the risk of pulmonary aspiration during anesthesia (ASA, 2019). Failure to fast can lead to aspiration and serious respiratory distress (Ruggeberg et al. 2024). Proper fasting helps maintain gastric volume and acidity, reducing the risk of aspiration (Elsharkawy et al. 2021). Fasting also helps stabilize metabolic conditions, particularly in controlling blood glucose levels it can help the surgical team more effectively manage the patient's fluid and hemodynamic needs during surgery (NSW, 2023). The American Society of Anesthesiologists (ASA) has published guidelines for preoperative fasting prior to elective procedures. The ASA recommends a 6-hour fasting period for solid foods, a 4 hour fasting period for breast milk and formula, and a 2 hour fasting period for clear liquids (ASA, 2019). Patients' fasting times before surgery in hospitals sometimes vary, with fasting times often exceeding the recommended duration (Daniel, 2022). This raises concerns about the impact on hemodynamic stability, particularly in high-risk patients (Frykholm *et al.* 2022).

The main causes of prolonged fasting include surgical delays, lack of human resources, and underlying patient health conditions. Fasting longer than patients are accustomed to can affect their physiological state during and after surgery, negatively impacting hemodynamic stability and postoperative metabolism, including fluctuations in blood glucose levels (Jeannette, 2019). One common effect is hypovolemia, caused by dehydration and electrolyte loss uet o prolonged fluid deprivation, in addition to changes in blood glucose levels, can affect the patient's intravascular fluid volume and metabolic status (Tsukamoto et al. 2021). Prolonged decreased food intake can lead to hypoglycemia, which can worsen the body's response, this condition can lead to a drop in blood pressure and compromise hemodynamic stability during anesthesia (Daniel, 2022). In line with research by Akbuga & Başer, (2021), long-term fasting before surgery in patients causes depletion of glycogen stores in the liver and muscles, resulting in fluctuations in blood glucose levels. This can trigger hypotension and postoperative complications such as excessive thirst, fatigue, hyperglycemia, or hypoglycemia (Su et al. 2020).

Preventing complications that occur due to patient hemodynamic instability is therefore a concern for staff to prevent complications both pre-anesthetic, intra-operative, and post-operative (Scott et al. 2024). Other impacts of prolonged fasting, besides affecting the patient's hemodynamics, can also affect blood glucose levels, causing hypoglycemia or hyperglycemia, which can increase the risk of perioperative complications and can worsen vital organ function during anesthesia and surgery (Frykholm et al. 2022). According to Lin et al. (2021), showed that prolonged fasting during the perioperative period leads to the development of hyperglycemia due to insulin resistance and systemic skeletal muscle wasting after surgery.Research conducted by Johnston et al. (2019) found that patients who fasted for more than 10 hours had average blood glucose levels below 70 mg/dL, as many as 65% experienced hemodynamic decline after anesthesia. Perioperative hyperglycemia is known to increase the risk of surgical wound infection, prolonged recovery time, and mortality (Rajendra et al. (2020).

This study presents an innovation by conducting a comprehensive analysis of two key physiological parameters, namely blood glucose levels and hemodynamic stability, simultaneously. This approach differs from previous studies, which generally only focus on one parameter. Furthermore, this study highlights the reality of variations in preoperative fasting duration in Indonesian healthcare facilities, where patients often fast beyond the recommended time. This contextual focus makes the study results more relevant and applicable to local clinical practice. Methodologically, this study employed an observational analytical design with a quantitative approach, and collected real-time data before fasting, during induction, and after anesthesia to obtain an actual and accurate picture of patient physiology. This study was conducted with the aim of determining the impact of variations in fasting duration on hemodynamic parameters and blood sugar levels in elective surgery patients.

METHOD

This is an observational, analytical, cross-sectional study conducted in October 2024 at Dr. Reksodiwiryo Regional General Hospital and Siti Rahmah Islamic Hospital, Padang. The study population, 252 elective surgery patients, served as the sample size, determined using the Slovin formula with a purposive sampling technique. The inclusion criteria included patients aged 18–55 years, with ASA physical status I–II, undergoing elective surgery, and willing to provide informed consent. Exclusion criteria included patients with metabolic disorders (diabetes mellitus), cardiovascular instability, non-participation, intraoperative complications requiring additional intervention, or use of D5/D10 fluids. The study instruments included a Non-Invasive Blood Pressure Monitor (NIBP) to measure systolic, diastolic, and mean arterial pressure (MAP), as well as a portable glucometer with Indonesian National Standard (SNI) standards to measure blood glucose levels. Data were collected based on fasting duration (6–8 hours, 8–10 hours, and >10 hours) as well as hemodynamic parameters and blood sugar levels measured before, after, and after surgery. Data analysis was performed using one-way ANOVA after testing for normality and homogeneity, with decisions based on significance (p-value). This study has obtained ethical approval from the Health Research Ethics Committee of Harapan Bangsa University under the registration number B.LPPM-UHB/467/05/2025.

RESULT

Table 1
Frequency of Respondent Characteristics: Age, Gender, Physical Status (ASA), and Type of Surgery in Elective Surgery Patients (n=252)

Variabel	Kategori	f	%
Age	Late Adolescence (17–25 years)	122	44.4
	Early Adulthood (26–35 years	54	21.4
	Late Adulthood (36–45 years)	55	21.8
	Early Elderly (46–55 years)	31	12.3
Gender	Femele	88	34.9
	Male	168	65.1
Physical Status ASA	ASA I	151	59.9
	ASA II	101	40.1
Operation Category	Minor	61	24.2
	Moderate	191	75.8
Type of Surgery	Obstetrics and Gynecology Surgery	41	16.3
	General Surgery	59	23.4
	Digestive Surgery	55	21.8
	Otolaryngologic Surgery	50	19.8
	Orthopedic Surgery	18	7.1
	Urologic Surgery	9	3.6
	Oncology Surgery	20	7.9
Type of Last Meal	Heavy Foods	182	72.2
	Snacks	49	19.4
	Drink Milk/Tea/Water	11	4.4
Post Operative Complaints	Any Complaints	215	85.3
	No Complaints	37	14.7

Results of the analysis Table 1 shows that of the 252 respondents, 122 (44.4%) were in their late teens (17–25 years old). Most of the respondents were male (164) (65.1%). Based on ASA physical status, the majority of respondents were in the ASA I category (151) (59.9%). The most common type of surgery undergone by respondents was moderate surgery (191) (75.8%), while the most common type of surgery was general surgery (59). Based on the type of last meal, the majority of respondents consumed solid food (192) (76.8%). In addition, the majority of respondents experienced post-operative complaints (215) (85.3%).

The results of the analysis based on table 2 show that there are no significant differences in hemodynamic parameters (systolic, diastolic blood pressure, MAP, pulse rate, respiratory rate, and (SpO_2) between patient groups with fasting durations of 6–8 hours, 8–10 hours, and more than 10 hours ($p > 0.05$). All parameters show relatively stable values in each measurement phase, both before fasting, after fasting, and post-operatively. Thus, it can be concluded that the duration of preoperative fasting does not have a significant effect on the hemodynamic stability of elective surgical patients.

Table 2.
Impact of Variations in Fasting Duration on Hemodynamic Stability of Systolic and Diastolic Blood Pressure, Mean Arterial Pressure (MAP), Pulse Rate, and Spo2 in Elective Surgery Patients (n=252)

Variabel Hemodinamik	lama Puasa			p-value
	6–8 hour (Mean ± SD)	8–10 hour (Mean ± SD)	>10 hour (Mean ± SD)	
Systolic Blood Pressure	Before: 117.98 ± 10.67 After: 116.14 ± 10.66 Postop: 118.21 ± 9.60	Before: 116.86 ± 9.98 After: 118.51 ± 10.84 Postop: 119.83 ± 9.96	Before: 119.18 ± 10.18 After: 116.11 ± 9.29 Postop: 118.92 ± 10.63	0.344 0.223 0.580
Diastolic Blood Pressure	Before: 78.06 ± 7.95 After: 76.30 ± 7.67 Postop: 78.25 ± 8.06	Before: 78.45 ± 8.05 After: 77.24 ± 7.51 Postop: 77.49 ± 7.64	Before: 78.55 ± 7.61 After: 77.96 ± 7.16 Postop: 78.25 ± 7.22	0.913 0.349 0.758
MAP	Before: 91.35 ± 5.99 After: 89.63 ± 6.42 Postop: 91.50 ± 6.37	Before: 91.26 ± 5.82 After: 90.94 ± 6.04 Postop: 91.58 ± 6.25	Before: 92.10 ± 6.79 After: 90.73 ± 5.80 Postop: 91.82 ± 6.18	0.633 0.329 0.942
Pulse	Before: 79.85 ± 8.99 After: 79.01 ± 8.58 Postop: 79.43 ± 9.03	Before: 79.48 ± 9.11 After: 79.44 ± 8.39 Postop: 79.77 ± 9.84	Before: 80.80 ± 8.98 After: 79.68 ± 9.38 Postop: 81.11 ± 7.98	0.620 0.883 0.442
Breathing Rate	Before: 21.62 ± 1.68 After: 21.89 ± 1.44 Postop: 21.98 ± 1.51	Before: 21.64 ± 1.69 After: 21.69 ± 1.51 Postop: 21.83 ± 1.85	Before: 21.62 ± 1.65 After: 21.69 ± 1.61 Postop: 21.81 ± 1.63	0.994 0.609 0.783
SPO_2	Before: 97.31 ± 1.64 After: 97.38 ± 1.64 Postop: 97.85 ± 1.65	Before: 97.40 ± 1.63 After: 97.45 ± 1.83 Postop: 97.65 ± 1.78	Before: 97.35 ± 1.65 After: 97.67 ± 1.83 Postop: 97.32 ± 1.57	0.930 0.552 0.122

Table 3
The Impact of Variations in Fasting Duration on Blood Sugar Levels in Elective Surgery Patients (n=252)

Leght of Fasting	Blood Sugar Before Fasting (Mean ± SD)	Blood Sugar After Fasting (Mean ± SD)	Postoperative Blood Sugar (Mean ± SD)
6–8 hour	95.11 ± 8.13	98.99 ± 9.55	100.00 ± 14.31
8–10 hour	94.95 ± 8.31	110.36 ± 9.40	101.50 ± 11.95
>10 hour	94.71 ± 7.63	120.76 ± 10.16	107.54 ± 11.30
p-value	0.950	0.001	0.000

Results of the analysis based on table 3, the mean blood sugar levels in the 6–8 hour fasting group were 95.11 ± 8.13 mg/dL before fasting, 98.99 ± 9.55 mg/dL after fasting, and 100.00 ± 14.31 mg/dL postoperatively. In the 8–10 hour fasting group, the mean values were 94.95 ± 8.31 mg/dL, 110.36 ± 9.40 mg/dL, and 101.50 ± 11.95 mg/dL, respectively. Meanwhile, the group with a fast of more than 10 hours showed higher increases, namely 94.71 ± 7.63 mg/dL, 120.76 ± 10.16 mg/dL, and 107.54 ± 11.30 mg/dL. Statistical test results showed no significant difference before fasting ($p = 0.950$), but significant differences after fasting ($p = 0.001$) and post-surgery ($p = 0.000$) between groups. Therefore, the longer the fasting duration, the higher the blood sugar levels before and after surgery. This suggests that prolonged fasting can trigger increased blood sugar levels due to metabolic stress and the body's physiological response to surgery.

DISCUSSION

The impact of variations in fasting duration on hemodynamics

Based on the results of vital parameter measurements in the three fasting duration groups (6–8 hours, 8–10 hours, and >10 hours), relatively stable values were obtained and did not differ significantly in all measurement phases, both before fasting, after fasting, and post-surgery. Overall, all vital parameters (systolic and diastolic blood pressure, MAP, pulse rate, respiratory rate, and oxygen saturation) had no effect, with the resulting p-value >0.05. This indicates that differences in fasting duration do not significantly affect the hemodynamic stability of patients before, during, and after surgery. Pre-anesthesia fasting shows that fasting for 6–8 hours is a safe time without increasing the risk of hemodynamic complications and also explains the absence of an effect between fasting duration and hemodynamic instability, except in patients with metabolic disorders and poor body condition, such as ASA III and IV patients (Warner et al. 2019). The human body has a homeostasis system that is able to maintain stable blood pressure and heart rate through the regulatory mechanisms of the sympathetic nervous system and the renin angiotensin aldosterone hormone (RAAS) so that in conditions of mild to moderate fasting, blood pressure and pulse remain within normal limits, especially in healthy individuals (John E. Hall, 2020). When the body experiences a fast, the sympathetic nervous system may be slightly activated to help maintain blood flow to vital organs. However, during mild to moderate fasting, especially in healthy individuals, the body is still able to maintain blood pressure and heart rate within normal limits without the need for excessive sympathetic activation (Povoa, 2023).

Research conducted by Anas et al. (2024) found that patients who fasted longer than the guidelines of ≥10 hours did not experience significant changes in MAP, blood pressure, and pulse at the time of pre-induction. This is also supported by the results of research that fasting >8 hours does not cause significant clinical changes in pre-induction MAP in people with optimal physical status (Muller et al. 2020).. The human body has a very sophisticated autoregulatory system to maintain hemodynamic stability, especially in individuals with healthy physical status (ASA classification I–II) (Anas et al. 2024). This autoregulation aims to maintain blood pressure, cardiac output, and vital organ perfusion within the normal range, even when the body faces mild stress conditions such as prolonged pre-operative fasting (Scott et al. 2024).. This mechanism involves a complex interaction between the sympathetic nervous system and the hormonal system, including the renin-angiotensin-aldosterone system (RAAS), vasopressin, and catecholamines (Triebel & Castrop, 2024). This effect increases systemic vascular resistance (SVR) (Wang et al. 2019). Which directly helps maintain mean arterial blood pressure MAP, thus, even though preload volume decreases slightly due to the absence of fluid intake during fasting, cardiac output and blood pressure are maintained through this neural regulation (Delalio et al. 2020). The released renin converts angiotensinogen to angiotensin I, which is then converted to angiotensin II via the enzyme Angiotensin-converting enzyme (ACE) (Demirci et al. 2023). Angiotensin II is a potent vasoconstrictor and also stimulates aldosterone secretion from the adrenal glands, which increases sodium and water reabsorption in the kidneys. This helps increase intravascular volume and maintain (Das, 2019). A study conducted by Komurcu et al. (2024) regarding fasting on hemodynamics concluded that heart rate did not experience a significant increase despite fluid and food restrictions in an average fasting period of >10 hours. Strengthened by the results of the study Anas et al. (2024). which stated that all patients underwent long fasting, with an average liquid fasting time of 10.33 hours (SD = 1.07) and an average solid fasting time of 10.34 hours (SD = 1.11) had a Mean HR at the time of Induction of 106.1133, Mean Intraoperative HR 101.9667 and Mean HR at the time of Extubation 100.9667 and experienced a decrease but was still in the normal category.

Physiologically, the body possesses a fairly effective homeostatic compensatory mechanism for regulating blood pressure and heart rate during fasting (Anas et al. 2024). This mechanism includes activation of the renin-angiotensin-aldosterone system (RAAS), increased release of antidiuretic hormone (ADH), and mild peripheral vasoconstriction, which helps maintain blood pressure and vital organ perfusion (Triebel & Castrop, 2024). Furthermore, fasting duration significantly influences the onset of physiological stress. A fasting duration of 6–12 hours is still considered mild and insufficient to trigger a significant decrease in plasma volume (Bilgili & Umuroglu, 2025). In a study by Gonzalez, (2021), which evaluated the effects of intermittent fasting for >10 hours, no significant differences in hemodynamics were found despite changes in body composition, indicating that the body adapts to fasting without major disruptions to basic cardiovascular functions such as heart rate. From a neurohumoral perspective, heart rate is controlled by a balance of activity between the sympathetic and parasympathetic nervous systems. During short-term fasting, sympathetic activation is not dominant enough to offset parasympathetic tone, allowing the decreased cardiovascular activity, such as heart rate and blood pressure, to remain within normal limits (Demirci et al. 2023). The stability of the heart rate is also supported by several factors proposed by Komurcu et al. (2024) also supports the finding that preoperative fasting of standard duration (6–12 hours) has no significant effect on heart rate in patients with ASA status I and II, especially in young men undergoing elective surgery. And also supported by the study of Coutinho et al. (2024), who emphasized that it is not the length of fasting that affects complications or heart rate variability, but rather gender and ASA classification factors, where ASA I patients show better physiological adaptation and do not experience an increase in heart rate despite fasting for more than 10 hours. This finding is in line with previous research by (Lee et al. 2025) hich also showed that patient oxygen saturation measured in the postoperative recovery room showed no difference in both groups (control, 99.9 ± 0.365% vs. treatment, 99.9 ± 0.548%; P = 0.782).

Fenneni et al. (2019) stated that mild dehydration due to fasting can affect blood pressure, but does not significantly reduce oxygen saturation because the body has an efficient oxygenation compensation system. Theoretically, oxygen saturation (SpO_2) describes the percentage of oxygen bound to hemoglobin in arterial blood, which is primarily influenced by lung function and tissue perfusion (Pinsky et al. 2019). Furthermore, the respiratory and cardiovascular systems have homeostatic mechanisms that work synergistically to maintain a stable oxygen supply, unless there is an underlying pathological disorder (Alexandre, 2024). Preoperative management, such as supplemental oxygen administration, close monitoring of hemodynamic status, and controlled anesthesia, contribute to maintaining patients' SpO_2 levels within the normal range (Tsukamoto et al. 2021). Because this study involved patients in stable condition and with good preoperative monitoring, these variables were relatively controlled, allowing the conclusion that fasting duration is not a primary determinant of oxygenation status (Wang, 2022). Therefore, in clinical practice, the primary focus on oxygenation status should be on respiratory and circulatory aspects, rather than solely on fasting duration (Elsharkawy et al. 2021). Based on the results of the analysis using the one-way anova test, this study showed that variations in the duration of preoperative fasting were not significantly associated with hemodynamic stability in patients. Hemodynamics such as systolic and diastolic blood pressure, MAP, pulse rate, and oxygen saturation (SpO_2) were all in the normal category. These results confirm that preoperative fasting of >8 hours is relatively safe and does not cause hemodynamic disturbances in patients with good physical condition (ASA I–II). This can be explained by the presence of the body's homeostasis system and neurohormonal compensation mechanisms (activation of the sympathetic nervous system and RAAS) which are able to maintain stable blood pressure, heart rate, and oxygenation in mild to moderate fasting conditions.

The Impact of Fasting Variations on Blood Sugar Levels

The results showed that before fasting, blood sugar levels in the three fasting duration groups (6–8 hours, 8–10 hours, and >10 hours) were in almost the same range, with an average of 95.11 mg/dl, 94.95 mg/dl, and 94.71 mg/dl, respectively. The statistical test results ($p = 0.950$) showed no significant differences between the three groups. This indicates that before the fasting period began, all patients had relatively homogeneous blood glucose status, so there were no baseline differences that could affect the measurement results after fasting. However, after the fasting period, there was a marked increase in blood sugar levels in each group. The average blood sugar level increased to 98.99 mg/dl in the 6–8 hour fasting group, 110.36 mg/dl in the 8–10 hour fasting group, and 120.76 mg/dl in the >10 hour fasting group. Statistical test results ($p = 0.001$) indicated a significant difference between the three groups.This increase can be explained by the body's physiological compensatory mechanisms for the metabolic stress caused by prolonged fasting, in which the body releases counterregulatory hormones such as cortisol, epinephrine, and glucagon to maintain blood glucose levels as the primary energy source, especially when liver glycogen reserves begin to decline. After surgery, blood sugar levels again showed significant differences between groups. The average postoperative blood sugar level in the 6–8 hour group was 100.00 mg/dl, in the 8–10 hour group 101.50 mg/dl, and in the >10 hour group 107.54 mg/dl. The statistical test results ($p = 0.000$) showed a significant difference between the three groups. With the highest average blood sugar levels in the group that fasted longer (>10 hours).

In line with the research results of Felicita Felicita Dausawati et al. (2019), fasting for more than 8 hours showed a significant relationship between the duration of pre-anesthetic fasting and induction GDS ($p<0.05$) with an average blood sugar of 111 mg/dL. Several studies have shown that patients who fast for more than 8 hours tend to experience greater fluctuations in blood glucose levels than patients with shorter fasting durations (Togo & Lopes, 2020). A study in elective surgery patients showed that blood glucose levels in patients who fasted for more than 10 hours were significantly lower than those who fasted between 6–8 hours (ASA, 2019). Other studies indicate that fasting for too long causes metabolic stress, which actually triggers reactive hyperglycemia. These results suggest that both too short and too long fasting can affect blood glucose regulation (Jones et al. 2019). Physiologically, these results align with the body's mechanisms during prolonged fasting, the body initially maintains blood glucose levels through glycogenolysis, the breakdown of glycogen stored in the liver into glucose (Mollura et al. 2021). However, once glycogen stores are depleted, the body switches to using fat as an energy source through gluconeogenesis and ketogenesis (Assen et al. 2021). This condition causes a decrease in blood glucose levels, especially if energy intake is not provided for a sufficient period before surgery. Therefore, patients who fast beyond the recommended duration can experience mild to moderate hypoglycemia (Wang & Wu, 2022).Imbalanced blood sugar levels due to variations in fasting duration can negatively impact perioperative outcomes (Li et al. 2019). Hypoglycemia can cause symptoms such as dizziness, weakness, and even decreased consciousness, while hyperglycemia is associated with an increased risk of surgical site infections and impaired healing (Breen, Vishak et al. 2023). Therefore, disproportionate fasting duration can worsen a patient's metabolic condition, especially in individuals with comorbidities such as diabetes mellitus (Elfira et al. 2025). This suggests that the optimal fasting duration should be tailored to the patient's condition to maintain stable blood sugar levels prior to surgery (Hwang et al. 2021).

These findings are supported by previous studies, such as the study by Vishak et al. (2023), which stated that preoperative fasting for more than 8 hours can cause a significant decrease in blood glucose levels in adult patients. Another study by Muller et al. (2019) also showed that fasting beyond the recommended time limit can increase the risk of hypoglycemia and affect the patient's metabolic stability during anesthesia induction. This suggests that excessively long preoperative fasting practices not only provide no additional clinical benefit but can actually compromise the patient's metabolic balance (Anas et al. 2024). The latest 2023 guidelines from the American Society of Anesthesiologists (ASA) recommend that healthy adult patients (ASA I–II) fast from solid foods for 6 hours and clear liquids for up to 2 hours before elective anesthesia (Joshi et al. 2023). Exceeding this duration does not provide a significant benefit to gastric emptying and actually increases the risk of metabolic disorders such as hypoglycemia, dehydration, and electrolyte imbalance (Sreedharan et al. 2023). The implications of these findings also point to the need for better education for healthcare professionals and patients regarding the importance of following proper fasting protocols (Hajian et al. 2020) Patients are often asked to fast from midnight without considering the exact time of surgery, resulting in patients fasting for more than 10 hours. This practice is inconsistent with evidence-based practice and can actually increase the risk of intraoperative metabolic complications (Paluchamy, 2020). Therefore, based on the description and research results above, it can be concluded that variations in fasting duration are significantly associated with blood sugar levels in elective surgery patients. Excessive fasting duration carries the risk of hypoglycemia, while the stress of fasting can also trigger hyperglycemia. Therefore, it is important for healthcare professionals to adjust preoperative fasting times according to the latest clinical guidelines, which generally recommend a 6-hour fast for solid foods and 2 hours for clear liquids. This adjustment will help maintain stable blood sugar levels and minimize the risk of perioperative complications.

CONCLUSION

The results showed that variations in preoperative fasting duration had no relationship to patient hemodynamic stability as measured by systolic blood pressure, diastolic blood pressure, mean arterial pressure (MAP), pulse rate, or oxygen saturation (SpO_2). However, a significant relationship was found between variations in fasting duration and fasting and postoperative blood sugar levels in patients. These findings indicate that although fasting duration does not affect hemodynamic parameters, it can impact patients' blood glucose levels before surgery. This study is expected to help in the development of preoperative fasting protocols that are more suited to patients' physiological needs, thereby minimizing perioperative complications. Future studies are recommended to use a longitudinal design with repeated monitoring of glucose levels and hemodynamic parameters pre, intra, and postoperatively, and to compare different fasting protocols to more clearly see their effects. The sample size and study location also need to be expanded to make the results more representative and to involve various types of surgery and anesthesia to determine the consistency of the findings in a more diverse population.

ACKNOWLEDGEMENTS

The highest gratitude is also expressed to partners of Dr. Reksodiwiryo General Hospital and Siti Rahmah Islamic Hospital Padang who have been willing to help facilitate, support, and provide permission for the smooth running of the research process until the completion of this activity. The author also thanks fellow lecturers who have provided direction, guidance, and motivation during the preparation of this research, as well as valuable input for the perfection of this research. The author also expresses appreciation to the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia through the Directorate General of Higher Education, Research, and Technology (Kemendikbudristek/Diktiristek) for providing policy and funding support through research grant number 016/UM/Kontrak-Unbrah/PL/VI/2025, so that this research can run smoothly and provide real contributions to the development of science and health services. The author also thanks the Higher Education Service Institute (LLDIKTI) Region X for providing facilitation and policy support during the implementation of this research.

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