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The effect of ramadan fasting in maintaining blood sugar and cholesterol stability in diabetes mellitus patients 2

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ABSTRACT

Introduction: Fasting is a practice of abstaining from food and drink for 11–18 hours each day over a full month and is known to have benefits in controlling blood glucose and cholesterol levels. Type 2 diabetes mellitus (T2DM) is characterized by hyperglycemia and metabolic disorders that may increase the risk of complications, including those related to hypercholesterolemia. Ramadan fasting has the potential to provide positive effects on metabolic control in patients with T2DM. Objective: This study aimed to determine the effect of Ramadan fasting on random blood glucose (RBG), fasting blood glucose (FBG), and cholesterol levels in patients with T2DM in Jompo Kulon Village. Methods: This study employed a quasi-experimental design with a Pretest–Posttest Control Group. Samples were obtained using a purposive sampling technique and consisted of patients with T2DM in Jompo Kulon Village. Result: The study was conducted during the month of Ramadan in 2025. Data analysis was performed using the Paired T-Test and Mann–Whitney Test. The results showed a decrease in RBG, FBG, and cholesterol levels in the fasting group compared to the control group, with a p-value > 0.001. Conclusion: It can be concluded that Ramadan fasting can reduce RBG, FBG, and cholesterol levels in patients with T2DM compared to those who do not fast.

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INTRODUCTION

Diabetes Mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia resulting from impaired insulin secretion, impaired insulin action, or both, which may lead to various chronic complications affecting the eyes, kidneys, nerves, and blood vessels (PERKENI, 2011). There are two main types of Diabetes Mellitus, namely Type 1 Diabetes Mellitus, also known as insulin-dependent diabetes mellitus, and Type 2 Diabetes Mellitus, also known as non-insulin-dependent diabetes mellitus (Black & Hawks, 2014).

Cholesterol, meanwhile, is an essential lipid component required by the body. However, excessive cholesterol levels may lead to hypercholesterolemia. Hypercholesterolemia is a common

health condition characterized by elevated blood cholesterol levels exceeding 240 mg/dL. Contributing factors include changes in blood vessel walls, dietary patterns, lifestyle factors, and unhealthy habits such as smoking and alcohol consumption. Other contributing factors include overweight or obesity, aging, menopause in women, and the consumption of high-cholesterol foods (Soleha & Maratu, 2012). In patients with diabetes mellitus, hypercholesterolemia may trigger dyslipidemia, characterized by increased levels of triglycerides, total cholesterol, and low-density lipoprotein (LDL), along with decreased levels of high-density lipoprotein (HDL) (Martasari N.J. et al., 2023).

The International Diabetes Federation (IDF) reported in the 10th edition of the Diabetes Atlas (2021) that more than half a billion people worldwide were living with diabetes in 2021, specifically 537 million individuals. This number is projected to increase to 643 million by 2030 and 783 million by 2045, with the majority of cases consisting of Type 2 diabetes (Sanita I.R., 2025).

Indonesia is among the five countries with the highest number of diabetes cases in the world. Based on IDF data, approximately 5.7 million Indonesians were living with diabetes in 2000. This number increased to 7.3 million in 2011 and rose significantly to 20.4 million in 2024 (Herawati, 2025). According to the Banyumas Regency Health Profile (2023), the number of diabetes mellitus cases in Jompo Kulon Village, Sokaraja Subdistrict, was recorded at 20 individuals. These data indicate that diabetes mellitus is one of the health problems within the Jompo Kulon community that requires attention in disease control efforts, including in the context of Ramadan fasting, which is influenced by the social, cultural, and religious conditions of the local community (Banyumas, 2021).

From a community perspective, increasing awareness of the importance of regular health check-ups and healthy lifestyles is essential. Health education should not only be conducted in healthcare facilities but also within community environments, places of worship, and through digital platforms that reach younger generations (Herawati, 2025). Blood glucose levels and cholesterol levels are important indicators in the management of diabetes mellitus. Uncontrolled blood glucose levels may increase the risk of both acute and chronic complications, while high cholesterol levels contribute to cardiovascular diseases, which are among the leading causes of mortality in patients with diabetes mellitus. Therefore, monitoring changes in blood glucose and cholesterol levels during Ramadan fasting is important to be understood (Herawati, 2025).

Several strategies to reduce blood glucose and cholesterol levels include maintaining a healthy diet and lifestyle. Fasting is part of maintaining healthy dietary habits. Literally, fasting means abstaining. Fasting may help neutralize toxins and substances accumulated in the digestive tract, kidneys, and other organs due to preservatives, food coloring agents, artificial sweeteners, and cigarette smoke that accumulate over many years. Fasting is highly recommended for individuals with high cholesterol levels and diabetes (Alfin, 2019).

Based on the above description, research is needed to determine the effect of Ramadan fasting on blood glucose and cholesterol levels among patients with diabetes mellitus in Jompo Kulon Village, Sokaraja Subdistrict, Banyumas Regency. The results of this study are expected to serve as a basis for providing health education and improving diabetes mellitus management during the month of Ramadan.

RESEARCH METHOD

The type of research used is Prospective Longitudinal Experiment research, with a sample respondents and the research population is DM patients in Jompo Kulon Village. Inclusion criteria: Type 2 DM sufferers who have been diagnosed, Muslim and willing to carry out the full month of Ramadan fasting; Type 2 DM patients without complications (controlled), Exclusion criteria: DM patients with complications. Researchers compared the effect of Ramadan fasting on blood sugar and cholesterol levels in the pretest group and the posttest group (fasting and H+7 after fasting). The pretest group is the respondents who received Ramadan fasting treatment and standard care

therapy from the community health center, while the posttest group is the group who after undergoing H+7 fasting and received standard care therapy from the community health center. Other research tools used are stationery, observation sheets and Easy Touch tools.

The research sample was taken using a purposive sampling technique, selecting several informants according to certain criteria. Data collection was conducted on respondents who were willing to sign informed consent. Researchers asked respondents to fast during Ramadan for one full month, accompanied by standard treatment therapies recommended by the community health center. Then, researchers conducted a post-test to check blood sugar levels after the one-month fast and seven days after fasting.

All interventions and measurement results conducted by the researcher using the Easy Touch tool were recorded directly on the observation sheet and implementation sheet. The data obtained were then processed into a data collection matrix previously created by the researcher. The collected data were analyzed in univariate and bivariate forms. The univariate analysis of the research results was presented in the form of a frequency distribution table and a cross-table for bivariate analysis. The statistical test used in this study was a paired t-test or a defendant sample t-test with a p-value <0.05.

RESULTS AND DISCUSSIONS

Characteristics of Type 2 DM Respondents

The study was conducted in Jompo Kulon Village, Sokaraja (around the Yakpermas Banyumas Polytechnic) from February to April 2025. This study aims to see the effect of Ramadan fasting on blood sugar and cholesterol levels in the Type II DM community in the Jompo Kulon Village environment. Based on research conducted before and after Ramadan fasting, there were respondents who had met the inclusion and exclusion criteria and participated until the end. Table 1. discusses the demographic profile of the respondents including age, gender, education and routine medication consumption.

Table 1. Characteristics of type II DM respondents

Characteristics Patients	Control Group (Frequency)	Intervention Group (Frequency)
Age		
45-54	3 (30%)	2 (20%)
55-65	7 (70%)	8 (80%)
66-74	-	-
75-90	-	-
Gender		
Male	2 (20%)	3 (30%)
Female	8 (80%)	7 (70%)
Education		
SD	6 (60%)	5 (50%)
SMP	2 (20%)	3 (30%)
SMA	2 (20%)	2 (20%)
Occupation		
Working	9 (90%)	8 (80%)
Not Working	1 (10%)	2 (20%)
Medication consumption	10 (100%)	10 (100%)
1. OHO medication	0	0
2. Insulin medication	0	0
3. Insulin and OHO medication	0	0

Table 1. shows that respondents with type II diabetes mellitus were predominantly aged 55-65 years, with 7 people (70%) in the control group and 8 people in the intervention group. This

is due to increasing age, which experiences a degenerative process and causes a decline in body function, which impacts endocrine function, particularly the pancreas. This decline in function causes insulin resistance, where cell receptors are less optimal in binding insulin, resulting in insulin accumulation and reduced hormone production. This causes blood glucose levels to rise. In elderly people, there is a physiological decline in organ function, one of which is a decrease in the function of pancreatic beta cells in producing insulin (11). Seen from gender, respondents with type II diabetes mellitus were predominantly female, with 8 people in the control group and 7 people in the intervention group. This is because in menopausal women, the response to insulin decreases due to low estrogen and progesterone hormones. Decreased estrogen levels cause an increase in fat reserves, especially in the abdominal area, thereby increasing the excretion of free fatty acids (Putri, 2024)

The education level of respondents with type 2 diabetes was predominantly elementary school, with two (20%) in each group. Individuals with a higher level of education typically possess a wealth of health knowledge, which fosters awareness of maintaining their health. Individuals with a lower level of education are at risk of paying less attention to lifestyle and dietary habits, as well as to measures to prevent diabetes. This is supported by research by (Nugroho, 2019), which found a significant relationship between education level and the incidence of type 2 diabetes in Indonesia (p-value 0.002). Furthermore, respondents with type 2 diabetes in this study were more likely to be unemployed, with nine (90%) in the control group and eight (80%) in the intervention group. This is a risk factor for diabetes, due to lack of physical activity and obesity, which can lead to reduced energy expenditure.

Table 2. Distribution data of respondents based on blood sugar levels before and after ramadan fasting in the intervention group (n=10)

Variable	N	Mean	SD	Min- Maks	95% CI
Before	10	216.70	29.96	129-371	
After	10	177.00	28.99		

Table 2. shows that the average blood sugar level before Ramadan fasting in the intervention group was 262.60 with a standard deviation of 81.547. The lowest blood sugar level was 128 and the highest was 371. Based on the interval estimation results, it can be concluded that 95% of respondents in the intervention group were confident that their blood sugar levels before Ramadan fasting were between 128 and 371. Meanwhile, the average blood sugar level after Ramadan fasting in the control group was 177.00 with a standard deviation of 28.99. The lowest blood sugar level was 192 and the highest was 428. Based on the interval estimation results, it can be concluded that 95% of respondents in the intervention group were confident that their blood sugar levels after Ramadan fasting were between 192 and 428.

Table 3. Distribution data of respondents based on blood sugar levels before and after ramadan fasting in the control group (n=10)

Variable	N	Mean	SD	Min-Maks	95% CI
Before	10	262.60	81.547	192-428	
After	10	224.20	57.932		

Table 4. Respondent distribution data based on cholesterol levels before and after ramadan fasting in the intervention group (n=10)

Variable	N	Mean	SD	Min-Maks	95% CI
Before	10	229.60	32.411	197-291	
After	10	224.20	29.050		

Table 5. Respondent distribution data based on cholesterol levels before and after ramadan fasting in the control group (n=10)

Variable	N	Mean	SD	Min-Maks	95% CI
Before	10	216.70	29.963	198-300	
After	10	177.00	28.998		

Bivariate Analysis

Gula Darah

Bivariate analysis explains the effect of the independent variable on the dependent variable, namely the effect of Ramadan fasting on reducing blood sugar levels in type II diabetes patients in Jompo Kulon Village. The results of this bivariate analysis will identify the effect of blood glucose levels before and after a full month of Ramadan fasting in type II diabetes patients in the intervention group and the control group (without fasting) using independent T-test.

Table 6. Blood sugar levels before and after fasting during ramadan for 1 month in the intervention group (n = 10)

Variable	N	Mean	SD	Std. error	T	*p-value*
Before	10	216.70	29.96	9.47	3.635	0.003
After	10	177.00	28.99	9.17		

Based on Table 6. shows that the average value of blood glucose levels of respondents (intervention group) before Ramadan fasting was 216.70 mg/dL with a standard deviation of 29.96. While the average value of respondents (control group) after Ramadan fasting was 177.00 mg/dL with a standard deviation of 28.99. The results of the dependent t-statistical test showed that there was a significant effect between blood sugar levels before Ramadan fasting and after Ramadan fasting in the intervention group ($p = 0.003$), ($t = 3.635$), with a value of $\alpha = 0.05$. Then $p < \alpha$ where Ho is rejected, which means that the intervention given in the form of Ramadan fasting affects blood sugar levels. Based on these results, it can be concluded that there is a significant effect between Ramadan fasting and standard DM care therapy on reducing blood sugar levels in type II DM patients in Jompo Kulon Village.

Table 7. Blood sugar levels before and after fasting during ramadan for 1 month in the control group (n = 10)

Variable	N	Mean	SD	Std. error	T	*p-value*
Before	10	262.60	81.547	25.787	2.715	0.012
After	10	224.20	57.932	18.319		

Table 7. shows that the average blood glucose level of respondents (intervention group) before Ramadan fasting was 262.60 mg/dL with a standard deviation of 81.54. Meanwhile, the average value of respondents (control group) after Ramadan fasting was 224.20 mg/dL with a standard deviation of 57.93. The results of the dependent t-statistic test indicate a significant effect between blood sugar levels and the intervention ($p=0.012$) ($t=2.715$), with an α value of 0.05. Therefore, $p<\alpha$, where Ho is rejected, indicates that the intervention, in the form of Ramadan fasting, affects blood sugar levels. Based on these results, it can be concluded that there is a significant effect between Ramadan fasting and standard diabetes care therapy on reducing blood sugar levels in type 2 diabetes patients in Jompo Kulon Village.

Cholesterol

Table 8. Cholesterol levels before and after fasting during ramadan for 1 month in the intervention group (n = 10)

Variable	N	Mean	SD	Std. error	T	*p-value*
Before	10	221.26	23.02	7.28	2.334	0.022

Variable	N	Mean	SD	Std. error	T	*p-value*
After	10	215.50	22.26	7.03		

Table 9. Cholesterol levels before and after fasting during ramadan for 1 month in the control group (n = 10)

Variable	N	Mean	SD	Std. error	T	*p-value*
Before	10	229.60	32.41	10.24	1.927	0.043
After	10	224.20	29.05	9.18		

Tables 8 and 9 show a significant relationship between the intervention group given Ramadan fasting (p=0.022) compared to the control group not given fasting treatment (p=0.043) and total cholesterol levels.

CONCLUSION

Based on the research results, the GDA and GDP levels in the intervention group before and after Ramadan fasting gave significant results compared to the control group, so it can be concluded that Ramadan fasting can have an effect on reducing fasting blood sugar levels and random blood sugar levels in the type 2 diabetes mellitus community.

Practically, the results of this study can serve as a basis for community health workers in developing appropriate health education related to safe fasting practices for patients with Type 2 Diabetes Mellitus. Community nurses and midwives can use the findings as a reference in providing counseling on dietary management, physical activity, therapy adherence, as well as monitoring blood glucose and lipid levels during the month of Ramadan.

In addition, this study contributes to the development of promotive and preventive approaches through the empowerment of patients and families in the self-management of diabetes. With scientific evidence regarding the impact of fasting on metabolic control, health workers can design more effective community monitoring programs to prevent complications resulting from unstable blood glucose and cholesterol levels.

Academically, this study also adds to the scientific references in community nursing and midwifery practice related to the integration of religious aspects into health interventions, thereby enabling health services to become more holistic, contextual, and aligned with community needs.

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