THE RELATIONSHIP BETWEEN DIETARY ADHERENCE AND RANDOM BLOOD GLUCOSE LEVELS IN TYPE 2 DIABETES MELLITUS PATIENTS AT THE ANGGREK ELDERLY POSYANDU UNDER THE WORKING AREA OF BULULAWANG HEALTH CENTER

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ABSTRACT
Background: Elevated blood glucose levels are indicative of type 2 diabetes mellitus, a metabolic disease. Glycemic stability is largely determined by dietary compliance, a crucial non-pharmacological treatment.
Purpose: To determine how elderly clients with type 2 diabetes mellitus at the Anggrek Wellbeing Center in the Bululawang Community Health Center service area relate to random blood sugar levels and adherence to diet.
Methods: A descriptive correlational quantitative technique and a cross-sectional strategy were used in this study. 54 elderly people with type 2 diabetes from the Anggrek Old Health Center comprised the study sample. This was obtained by use of the entire sampling approach. Diet compliance was measured using the PDAQ questionnaire, while blood sugar levels were measured using a glucometer. The relationship between the two variabels was analyzed using Pearson's test.
Results: Most participants had moderate to good dietary adherence (38.9% each), while 22.2% exhibited poor adherence. More than half of participants (57.4%) had normal RBG levels, while 42.6% had high levels. Dietary adherence and RBG showed a high and significant negative connection ($r = –0.907$, $p = 0.000$), suggesting that lower blood glucose levels were linked to improved adherence.
Conclusion: Dietary adherence is essential for individuals with Type 2 diabetes in order to control their blood sugar levels at random. Strengthening dietary education and continuous monitoring is essential
Keywords: Diabetes Mellitus Type 2, Dietary Compliance, Elderly, Random Blood Glucose

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BACKGROUND

Type 2 diabetes mellitus (T2DM) is a chronic non-communicable metabolic disease characterized by elevated blood glucose levels due to impaired insulin secretion, insulin resistance, or a combination of both. According to the International Diabetes Federation (IDF, 2025), this disease develops progressively and often remains asymptomatic in its early stages. As a result, many new cases are diagnosed only after serious complications have occurred, such as cardiovascular disease, nephropathy, neuropathy, retinopathy, and diabetic ulcers. (PERKENI, 2021) states that delayed diagnosis and suboptimal management contribute to an increased risk of complications and reduced quality of life among patients. Therefore, type 2 diabetes mellitus is recognized as a "silent killer" and poses a significant challenge in healthcare services.

The prevalence of type 2 diabetes mellitus has increased significantly worldwide. The (IDF, 2025) reported that the number of people with diabetes reached 589 million in 2024 and is projected to rise to 853 million by 2050. The World Health Organization (WHO, 2022) explains that most cases are closely associated with lifestyle changes, particularly diets high in sugar and fat combined with low physical activity. In line with this, (Assyakurrohim et al., 2022) noted that the transition to modern lifestyles is a major factor contributing to the increasing incidence of T2DM. These findings indicate that diabetes management remains a serious public health problem.In Indonesia, type 2 diabetes mellitus has also shown a meaningful increase and is one of the leading causes of morbidity. According to the (IDF, 2025), Indonesia ranks among the ten countries with the highest number of diabetes cases worldwide, with over 19 million individuals affected. (PERKENI, 2021) emphasizes that T2DM significantly contributes to the rising incidence of cardiovascular disease, kidney failure, and other chronic complications. The high burden of this disease highlights the need for more focused management efforts, particularly through lifestyle modification and dietary control. Such approaches are especially crucial for vulnerable populations, such as the elderly.

Elderly individuals are at high risk of developing type 2 diabetes due to physiological changes associated with aging. The (WHO, 2022) notes that decreased insulin sensitivity and altered body composition in older adults affect glucose metabolism. Additionally, (PERKENI, 2021) mentions that the elderly often experience physical limitations and cognitive decline, which can affect their ability to manage chronic diseases. (Ding et al., 2024) further add that these conditions increase the risk of blood glucose instability in older adults. Therefore, diabetes management in this population requires special attention.

Random blood glucose (RBG) is one of the indicators commonly used to assess glycemic control in patients with type 2 diabetes, particularly at primary healthcare and community levels. (Luscombe-Marsh et al., 2023) state that RBG testing is practical and easy to perform in routine monitoring. (PERKENI, 2021) explains that elevated RBG levels reflect suboptimal glycemic control and are associated with an increased risk of complications. Moreover, (Arisandi et al., 2020) found that fluctuations in RBG among older adults are often influenced by dietary patterns and adherence to prescribed diets, highlighting the importance of dietary management in controlling blood glucose levels.

Dietary adherence is a fundamental pillar in managing type 2 diabetes mellitus, alongside pharmacological therapy and physical activity. (PERKENI, 2021) emphasizes that dietary management should follow the "3J" principle: type, amount, and timing of food intake. (Aisyah, 2022) states that non-adherence to dietary recommendations can lead to increased blood glucose levels and accelerate complications. Conversely, (Kuwanti et al., 2023) reported that good dietary adherence helps stabilize blood glucose and improves quality of life in diabetic patients. Therefore, dietary adherence plays a critical role in T2DM management.

Previous studies have demonstrated the relationship between dietary adherence and blood glucose levels in patients with type 2 diabetes. (Rahmatiah et al., 2022) and (Khasanah et al., 2021) found that poor dietary adherence is significantly associated with elevated blood glucose levels. However, most of these studies were conducted among working-age populations and in formal healthcare settings. (Arisandi et al., 2020) highlighted that studies focusing on older adults at the community level are still limited. Additionally, the use of random blood glucose as an indicator of glycemic control in older adults has not been widely explored, indicating a research gap.

Preliminary studies at the Anggrek Elderly Posyandu under the Bululawang Health Center revealed that some elderly individuals with type 2 diabetes mellitus do not adhere to dietary recommendations. This condition is accompanied by considerable fluctuations in random blood glucose levels among some respondents. (PERKENI, 2021) notes that dietary non-adherence at the community level is often influenced by long-standing eating habits. Furthermore, (IDF, 2025) emphasizes the importance of local data as a basis for planning interventions. Therefore, this study was conducted to analyze the relationship between dietary adherence and random blood glucose levels in elderly individuals with type 2 diabetes mellitus at the Anggrek Elderly Posyandu under the Bululawang Health Center.

OBJECTIVE

To determine how elderly clients with type 2 diabetes mellitus at the Anggrek Wellbeing Center in the Bululawang Community Health Center service area relate to random blood sugar levels and adherence to diet.

METHODS

Study Design

The present study employed a cross-sectional methodology and was quantitative in nature with a correlational descriptive design.

Setting

This study was conducted at the Anggrek Elderly Health Center in East Java, which is part of the operational area of the Buluawang Community Health Center.

Research Subject

The study was conducted on November 13-15, 2025. Data collection was conducted door-to-door with all respondents. The total number of respondents was 54, all of whom were elderly people diagnosed as having type 2 diabetes mellitus who were registered and actively participating in activities at the Anggrek Elderly Health Center. Total sampling, which included

all population members who satisfied the requirements, was the sampling strategy used in this investigation.

Instruments

Tools to test blood sugar levels and tools to evaluate diet compliance were the two kinds of instruments employed in this investigation. The Perceived Diet Adherence Questionnaire (PDAQ), which was taken from (Abidin's, 2018) research (Asaad et al., 2015), was the tool utilized to measure diet compliance levels. Meanwhile, blood sugar levels were measured using a Yuwell glucometer, with the results recorded in mg/dL. This tool is utilized to acquire objective data regarding the glucose levels of participants during data collection.

Data Analysis

The degree and direction of the relationship between RBG levels and dietary compliance were analyzed using Pearson's relationship analysis. A statistically sigmportant p-value is less than 0.05. SPSS was used for the statistical analysis, which made it possible to calculate correlations and descriptive statistics accurately. Mean, standard deviation, and frequency distribution were used in descriptive analyses for RBG levels, dietary adherence scores, and demographic traits. Since both variables are continuous and normally displayed, they meet the requirements for parametric correlation analysis, and Pearson's correlation is selected.

Ethical Consideration

The ethics agreement obtained from ITSK Dr. Soepraoen Malang Hospital, which is licensed to issue ethical review latters, ensures that all procedures comply with ethical standards in research involving human participants. The local posyandu authority provided comprehensive written approval in order to adhere to public health management rules. The participants were reminded of confidentiality, that participation was completely optional, and that they might withdraw at any time without fear of consequences. Participants' privacy and ethical compliance were maintained throughout the research by not disclosing any information that may be used to identify them.

RESULTS

Table 1. Distribution Based on Respondent Age

Age	Frequency	Percentage (%)
60	4	7.4
61	5	9.3
62	6	11.1
63	1	1.9
64	2	3.7
65	4	7.4
66	1	1.9
67	5	9.3
68	3	5.6
69	4	7.4
70	6	11.1
71	2	3.7
72	2	3.7

73	4	7.4
74	3	5.6
75	2	3.7
Total	**54**	**100.0**

The 54 responders' ages varied from 60 to 75 years, which is within the older adult (≥60 years) group according to the World Health Organization (WHO, 2022). The most dominant age groups were 62 and 70 years (11.1% each), followed by 61 and 67 years (9.3%). Ages 63 and 66 had the smallest representation with only one respondent each (1.9%). Overall, the age distribution indicates that the majority of respondents fell within the early to middle range of older adulthood. This may influence their physical condition, perception of illness, and experience

Table 2. Frequency Distribution of Characteristics Respondents (n=54)

Gender	Frequency	Percentage (%)
Male	28	51.9
Female	26	48.1
Total	**54**	**100.0**

The sample consisted of 28 male participants (51.9%) and 26 female participants (48.1%). This nearly balanced distribution indicates that both genders were proportionally represented, minimizing the possibility of gender bias in the analysis.

Table 3, Distribution of Marital Status

Marital Status	Frequency	Percentage (%)
Married	35	64.8
Divorced	4	7.4
Widow/Widower	15	27.8
Total	**54**	**100.0**

Most respondents were married (64.8%), while 27.8% were widowed or widowers, and 7.4% were divorced. Most elderly patients with Type 2 Diabetes Mellitus have a spouse, according to these studies, who can help them manage their chronic condition emotionally and socially. Conversely, respondents without partners may have different levels of support in adhering to diabetes management.

Table 4. Distribution Based on Religion

Religion	Frequency	Percentage (%)
Islam	51	94.4
Christian	3	5.6
Total	**54**	**100.0**

The majority of respondents were Muslim (94.4%), while the remaining 5.6% were Christian. This distribution reflects the demographic composition of the Bululawang region. Although religion is not directly associated with blood glucose levels, it may influence dietary habits and cultural practices relevant to diabetes management.

Table 5. Characteristics of Respondents Based on Education

Education Level	Frequency	Percentage (%)

Elementary School	33	61.1
Junior High School	10	18.5
Senior High School	7	13.0
No Formal Education	4	7.4
Total	**54**	**100.0**

Most respondents had an elementary school education (61.1%), while 7.4% had no formal education. This distribution indicates that the majority had low educational attainment, which may affect their understanding of health information, including dietary adherence and diabetes management. Lower educational levels are often associated with challenges in health literacy.

Table 6. Characteristics of Respondents Based on Occupation

Occupation	Frequency	Percentage (%)
Private sector employee	1	1.9
Entrepreneur	1	1.9
Farmer	11	20.4
Laborer	10	18.5
Unemployed/Retired	31	57.4
Total	**54**	**100.0**

More than half of the respondents were unemployed or retired (57.4%), consistent with the age group studied. Farmers (20.4%) and laborers (18.5%) comprised a substantial portion of the working respondents. The majority being retired suggests that most respondents no longer engage in routine physical activity associated with employment, which may affect their lifestyle patterns and glycemic control.

Table 7. Distribution Of Dietary Compliance Among Patients with Type 2 Diabetes Mellitus

Dietary Adherence	Frequency	Percentage (%)
Poor	12	22.2
Moderate	21	38.9
Good	21	38.9
Total	**54**	**100.0**

Most respondents demonstrated **moderate (38.9%)** or **good (38.9%)** dietary adherence. However, 22.2% still showed poor adherence. This indicates that although many elderly individuals follow dietary recommendations, a notable proportion still struggles with consistent adherence. Such non-adherence may contribute to poor glycemic control. The findings highlight the ongoing need for targeted nutritional education and regular monitoring to improve dietary compliance among older adults with T2DM.

Table 8. Distribution of Random Blood Sugar in Patients with Type 2 Diabetes Mellitus

RBG Category	Frequency	Percentage (%)
Normal	31	57.4
High	23	42.6
Total	**54**	**100.0**

More than half of the respondents (57.4%) had normal RBG levels, while 42.6% exhibited high levels. This indicates that although many elderly individuals have achieved adequate glycemic control, a substantial percentage still experiences elevated blood glucose. Factors such as dietary adherence, physical activity, medication compliance, and comorbidities may influence these outcomes.

Table 9. Normality Test

Category	Unstandardized Residual
N	54
Asymp. Sig. (2-tailed)	0.200

To determine if the residuals were normal, the Kolmogorov–Smirnov test was used. The residuals were found to be normally distributed, since the resultant Asymp. Sig. value of 0.200 was greater than the significance threshold of $\alpha = 0.05$. This satisfies one of the key assumptions of parametric correlation analysis, ensuring the validity of subsequent statistical testing.

Table 10. Cross tabulation

Dietary Adherence	Normal RBG	High RBG	Total
Poor	0	12	12
Moderate	10	11	21
Good	21	0	21
Total	**31**	**23**	**54**

The crosstabulation results revealed a clear relationship between dietary adherence levels and RBG categories. Respondents with poor dietary adherence were entirely in the high RBG category (100%). Among those with moderate adherence, the distribution was mixed, with 10 having normal RBG and 11 having high RBG. Notably, all respondents with good dietary adherence had normal RBG levels (100%). These findings indicate that higher dietary adherence is strongly associated with better glycemic control, while poor adherence is linked to elevated RBG levels.

Table 11. Correlation Between Diet Compliance and Random Blood Sugar in Type 2 Diabetes Patients

Variable	GDS	TOTAL
GDS	1	-0.907
Sig. (2-tailed)	—	0.000
N	54	54
TOTAL	-0.907	1
Sig. (2-tailed)	0.000	—
N	54	54

RBG levels (GDS) and the TOTAL variable showed a very high and statistically significant negative association ($r = -0.907$, $p = 0.000$) according to the Pearson correlation test. Higher RBG levels are closely linked to worse dietary adherence ratings, according to this negative connection. In contrast, blood glucose levels that are lower and more steady are associated with greater dietary adherence ratings. The strength of this correlation highlights the

importance of dietary compliance in managing blood sugar levels in older adults affected by Type 2 Diabetes Mellitus.

DISCUSSION

Dietary Adherence among Elderly Patients with Type 2 Diabetes Mellitus.

This study found that most elderly participants exhibited moderate to good dietary adherence, with 21 respondents (38.9%) categorized as having good adherence and 12 respondents (22.2%) classified as having poor adherence. Variations in adherence levels are related to cognitive decline often experienced by the elderly, such as memory impairment and difficulty understanding and remembering dietary instructions for patients with type 2 diabetes mellitus. These conditions make it challenging for older adults to maintain consistent eating patterns in accordance with diabetes dietary recommendations.

Biological factors also play a role in influencing dietary adherence and glycemic control. (Shang et al., 2024) explained that increased visceral fat is associated with insulin resistance and a decreased ability of the body to regulate blood glucose levels. This finding aligns with the current study, which shows that visceral obesity can worsen glycemic control in patients with type 2 diabetes mellitus. Moreover, the use of the PDAQ instrument in this study proved useful in systematically assessing dietary adherence among elderly individuals with type 2 diabetes mellitus.

The clinical implication of these findings highlights that dietary adherence among the elderly requires special attention through continuous education and monitoring. Therefore, healthcare professionals, particularly community nurses, should actively provide dietary education tailored to the cognitive abilities of the elderly to help maintain long-term adherence.

Random Blood Glucose Level in Type 2 Diabetes Mellitus Patients.

The results of this study showed that 23 respondents (42.6%) had elevated random blood glucose (RBG) levels, while the majority, 31 respondents (57.4%), had RBG levels within the normal range. This condition may be influenced by metabolic changes commonly occurring in older adults, such as decreased insulin sensitivity and impaired glucose regulation. (Ding et al., 2024) explained that the aging process reduces the body's ability to maintain glucose homeostasis, making the elderly more susceptible to fluctuations in blood glucose levels.

In addition to biological factors, RBG control is also influenced by dietary patterns and adherence to diabetes diets. (Arisandi et al., 2020) reported that elderly individuals with good dietary adherence are more likely to achieve normal RBG levels. (Shang et al., 2024) also emphasized that blood glucose instability in older adults is often affected by visceral fat accumulation, which disrupts insulin sensitivity and glycemic control.

The clinical implication of these findings suggests that RBG testing can serve as a simple and practical indicator for monitoring glycemic control in elderly patients with type 2 diabetes mellitus. Routine RBG assessments at elderly posyandu can assist healthcare

professionals in the early detection of blood glucose instability and in evaluating the effectiveness of dietary management.

The Relationship Between Diet Compliance and Random Blood Sugar in Patients with Type 2 Diabetes Mellitus.

The analysis revealed a highly significant relationship between dietary adherence and random blood glucose levels ($r = -0.907$; $p = 0.000$). This extremely high correlation should be interpreted critically, as it may be influenced by the relatively homogeneous characteristics of the sample, where all respondents were elderly patients with type 2 diabetes from a single healthcare service area with similar disease management patterns. All respondents with good dietary adherence had RBG levels within the normal range, while all respondents with poor adherence fell into the high RBG category. The clear separation of categories between dietary adherence and RBG may contribute to the magnitude of the correlation coefficient obtained. These findings support previous research by (Arisandi et al., 2020), which indicated that adherence to dietary patterns significantly affects blood glucose control in patients with type 2 diabetes. (Rahmatiah et al., 2022) also reported that dietary non-adherence is a major contributor to elevated random blood glucose levels in patients.

Furthermore, (Khasanah et al., 2021) emphasized that glucose stability can be achieved through proper control of the quantity, type, and timing of meals. In elderly patients with type 2 diabetes mellitus, the relationship between dietary adherence and RBG levels is clearly evident due to physiological and metabolic changes associated with aging. In addition, the high correlation value may also be influenced by uncontrolled confounding variables, such as adherence to pharmacological therapy, physical activity levels, and duration of diabetes, reflecting real-world conditions in community healthcare settings.

The clinical implication of these findings underscores the importance of routine monitoring of dietary adherence in elderly patients with type 2 diabetes mellitus, as it has been shown to be strongly associated with RBG control. Based on these results, healthcare professionals, particularly nurses at elderly posyandu and primary healthcare services, are encouraged to actively monitor diet, provide ongoing dietary education, and involve family members in supporting dietary adherence to prevent diabetes-related complications.

CONCLUSION

Because cognitive function, glucose metabolism and insulin sensitivity all decline in old age, seniors who do not follow a diet tend to consume foods high in sugar and simple carbohydrates, which immediately raise blood glucoses levels while the body's ability to control sugar has already declined. As a result, dietary compliance affects blood sugar levels in older adults. Resesrch findings clearly demonstrate this: all older adults with good dietary compliance have normal random blood sugar, while those with poor dietary compliance have elevated blood sugar levels.

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REFERENCES

Aisyah, N. (2022). The effect of dietary adherence on glycemic control in type 2 diabetes mellitus patients. *Journal of Nutrition and Health*, 10(2), 123–130. https://doi.org/xxxx

Arisandi, W., Djamaluddin, A., & Permatasari, A. (n.d.). *Hubungan Perilaku Diet Dengan Kadar Gula Darah Pada Lansia Penderita Diabetes Melitus Tipe 2 Di Wilayah Kerja Puskesmas Rawat Inap Sukoharjo Kabupaten Pringsewu Tahun 2020* (Vol. 1). Abikusno.

Asaad, G., Sadegian, M., Lau, R., Xu, Y., Soria-Contreras, D. C., Bell, R. C., & Chan, C. B. (2015). The reliability and validity of the perceived dietary adherence questionnaire for people with type 2 diabetes. *Nutrients*, *7*(7), 5484–5496. https://doi.org/10.3390/nu7075231

Ding, G., Lu, M., & Li, J. (2024). BMI, weight change, appetite reduction and cognitive impairment of elderly patients with diabetes. *Scientific Reports*, *14*(1). https://doi.org/10.1038/s41598-024-65005-4

International Diabetes Federation. (2025). IDF Diabetes Atlas (11th ed.). Brussels, Belgium: International Diabetes Federation.

Khasanah, J. F., Ridlo, M., & Putri, G. K. (2021). Gambaran Pola Diet Jumlah, Jadwal, dan Jenis (3J) pada Pasien dengan Diabetes Melitus Tipe 2. *Indonesian Journal of Nursing Scientific*, *1*(1), 18–27.

Kuwanti, E., Budiharto, I., & Fradianto, I. (2023). Hubungan Pola Makan dengan Kadar Gula Darah Penderita Diabetes Melitus Tipe 2 : Literature Review. *MAHESA : Malahayati Health Student Journal*, *3*(6), 1736–1750. https://doi.org/10.33024/mahesa.v3i6.10495

Rahmatiah, S., Muh.Basri, Baharuddin.K, Khaerunnisa, Syahar, Yakub, & Yakub, A. S. (2022). Hubungan Kepatuhan Diet Dengan Kadar Gula Darah Pada Pasien Diabetes Melitus Literature Review : The Relationship Between Dietary Compliance And Blood Sugar Levels In People With Diabetes Mellitus. *Jurnal Ilmiah Kesehatan Diagnosis*, *17*(2), 40–45.

Rosyida, R. W., Kadek, N., Purnamayanti, D., Kristi, M., & Rining, L. (2019). *Machine Translated by Google Kebiasaan Makan Penderita Diabetes Melitus Tipe 2 di Pelayanan Kesehatan Primer Tengah Machine Translated by Google*. *3*, 85–88.

Shang, C., Yuan, M., Wang, Y., Wang, Y., Bao, W., Zeng, S., Zhang, D., Liu, P., & Sun, L. (2024). Association Between Visceral Obesity and Glycemic Control in Patients with Type Diabetes Mellitus: A Retrospective Study. *Diabetes, Metabolic Syndrome and Obesity*, *17*, 2869–2880. https://doi.org/10.2147/DMSO.S470836

World Health Organization. (2022). *Global report on diabetes*. World Health Organization. https://www.who.int/publications/i/item/9789241565257