
Literature Review: The Relationship Between Dietary Patterns, Physical Activity, And Medication Compliance With The Increase In Blood Sugar Levels In Diabetes Mellitus Patients

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Abstract

Diabetes mellitus is a chronic metabolic disorder characterized by hyperglycemia due to impaired insulin secretion or action. Blood glucose control in patients with type 2 diabetes mellitus is influenced by various factors, including dietary patterns, physical activity, medication adherence, as well as psychosocial factors such as stress and family support. This study used a literature review method by searching scientific articles through Google Scholar, PubMed, and ScienceDirect within the publication period of 2022–2026. Selected articles focused on the relationship between diet, physical activity, and medication adherence with blood glucose levels in patients with type 2 diabetes mellitus. The review findings indicate that most studies show a significant relationship between dietary patterns, physical activity, and medication adherence with blood glucose levels. Physical activity and dietary adherence contribute to better glycemic control, while medication adherence shows inconsistent results. Other factors such as family support, stress levels, and smoking habits also influence blood glucose stability. Blood glucose control in diabetes mellitus is multifactorial. Proper diet and regular physical activity improve insulin sensitivity and glucose metabolism. Medication adherence is important, but not always directly associated with glycemic control due to the influence of individual and lifestyle factors. Dietary patterns, physical activity, and medication adherence play important roles in controlling blood glucose levels in patients with type 2 diabetes mellitus, although results are not always consistent. Diabetes management requires a comprehensive approach including lifestyle modification and psychosocial support.

Keywords: *Diabetes Mellitus, Diet, Physical Activity, Medication Adherence, Blood Glucose.*

INTRODUCTION

Diabetes Mellitus (DM) is a disease with a very serious health threat around the world. According to data from International Diabetes Federation (IDF), the number of people with diabetes globally continues to experience a significant surge that will continue to grow every year (Nascimento et al. 2025). This disease occurs not only in developed countries, but also in developing countries. Diabetes mellitus itself is a chronic metabolic disorder characterized by high blood sugar levels (hyperglycemia). This condition occurs because the body is unable to produce enough insulin or cannot use insulin effectively (Bulu et al., 2019).

According to the report Indonesian Health Survey (SKI) and Riskesdas, the prevalence of diabetes showed a sharp increase, placing Indonesia as one of the countries with a large number of DM sufferers in the Southeast Asian region (Gunarti Yahya, 2022) For example, at Siti Aisyah Hospital in Lubuklinggau City, type 2 DM is included in the top three most diseases, recorded that the number of patients continues to increase from 130 people to 150 people and jumps in 2024 to 210 people (O'Neill, 2026).

Although the problem of diabetes mellitus cannot be completely cured, the sufferer can still live a productive life but with well-controlled blood sugar levels through self-management behaviors or self-care management. If blood sugar is left high continuously, patients will be very susceptible to serious complications such as heart disease, stroke, kidney failure, and blindness (Shukla et al. 2025). This complication problem not only drastically lowers the patient's quality of life, but also adds a huge economic burden to the family for long-term care costs (Bar et al. 2025).

To keep blood sugar stable, patients must carry out several treatments in a disciplined manner, such as scheduled drug use, dietary adjustments, physical activity, and self-management education

(Husna et al. 2022), but what happened shows that the level of patient compliance is still very low, many patients feel bored to take medication every day so they often forget or stop taking their medication because they feel that it has improved. This non-compliance is the main factor causing blood sugar levels to remain high even though patients have been regularly treated (Regina Marintan Sinaga, 2025).

In addition to medication issues, adherence to dietary and exercise routines is also often an issue that is often overlooked. Although physical activity is also important to help in burning sugar into energy and physical factors, psychological conditions such as stress are also very influential when patients feel stressed the body will release hormones that actually trigger a rise in blood sugar, therefore the management of emotions and thoughts is an important part of diabetes therapy (Astam Nihullohti, 2023).

The role of the family is the main one, family support both in the form of emotional motivation and direct assistance such as preparing diet foods and reminding the schedule of medications that must be taken to determine the success of the patient in managing blood sugar levels so that they remain under control (Khulwatunnisa, 2025).

Based on the results of the data obtained from the increase in cases and the many factors that greatly affect blood sugar stability, the study is interested in further researching the relationship between diet (diet), physical activity, medication adherence, stress levels, and family support for blood sugar levels in patients with type 2 diabetes mellitus.

RESEARCH METHODS

The design of this study uses literature reviews taken from literature searches through Google Scholar, Pubmed and ScienceDirect with a publication time range of 2022 to 2026, using the keywords "diet", "physical activity", "medication adherence", "blood glucose levels", and "diabetes mellitus". The literature review method is a series of activities related to the method of collecting library data, reading and recording and processing writing materials (Nursalam, 2016).

From the initial search results, 100 articles were obtained, which after deduction was made on duplicate articles, 85 articles were obtained. In the screening process, articles were selected according to the background and writing abstracts, 50 articles were eliminated, leaving around 35 articles. The next stage is the assessment of the feasibility of the article as a whole, the assessment is carried out based on the inclusion and exclusion criteria that have been set, such as the suitability of variables, the publication year 2022 to 2026 with the research subject age >45 years. In this stage, there are 25 articles that have been eliminated and 10 articles are left suitable. These articles are then used in the preparation of the results of literature review research.

RESULTS AND DISCUSSION

Table 1. Analysis of 10 scientific articles

Number	1	2	3	4	5	6	7	8	9	10
Researcher	Agusto Pereira Guteres, Dewi Laelatul Badriah, Dwi Nastiti Iswarawanti, Esty Febriani	Made Sri Rahayuningsih, Ni Komang Wiardani	Tania Nascimento, amanda Andrade, Ezequiel Pinto, Catarina Cabrita, Sandra Pais, Rocio de la Puerta	Lorita Doru, Rosita, Yulta Sometime s, Hayati Kalla	Medhat A Khalil, Ayman M Elbadawy , Rasha O Abdelmoniem, Mohammed S Saleh, Fawzia F Asfour, Walaa M Ibrahim	Made Rismawati, Ni Made Tisna Handayani, I G.A. Rai Rahayun i	Vinita Shukla, Baisakhi Maji, Ankita Mishra, Sarmistha Chakraborty	Hamdray ani, Fadli Syamsudin, Pipin Yunus	Shela Permata Sari, Mokhtar Jamil, Dian Pitaloka, Priasmoro	Andrik Hermanto, Masroni, Dedek Nabila Syakif

Year of Publication	2026	2023	2025	2023	2024	2023	2025	2022	2023	2025
Research Title	Analysis of Factors Related to Blood Sugar Levels in Patients with Diabetes Mellitus of Productive Age at the Comoro Health Center, Dili Regency, Timor Leste 2025	The Relationship between Physical Activity and Dietary Adherence to Blood Glucose Levels in Type 2 DM Patients	Medication Adherence and Glycemic Control in Older Adults with Type 2 Diabetes: A Cross-Sectional Study in a Community Setting	The Relationship of Diet and Physical Activity with Incidence of Diabetes Mellitus in the UPTD Working Area Birobuli Health Center in Palu City	Adherence of Diabetic Patients to Healthy Lifestyle and Medication and Its Impact on Glycemic Control, Complications of Diabetes and Quality of Life: A Hospital Based Cross-Section Study in Benha City, Egypt	The Relationship of Medication Adherence to Blood Sugar Levels During In Patients with Type II Diabetes Mellitus	Medication adherence, physical activity, and dietary habits among patients attending a diabetes clinic of a Government Hospital in Kolkata, West Bengal, India	The Relationship between Medication Adherence, Diet and Exercise and Blood Glucose Levels of Diabetes Mellitus Patients at the Gorontalo Police Clinic	The Relationship of Physical Activity and Blood Sugar Levels in Type II Diabetes Mellitus Patients	Treatment Adherence And Its Impact On Glycemic Control In Patients With Diabetes Mellitus Type 2 In Working Area Of Klatak Health Center São Paulo 2024
Research Design	Case studies with Descriptive Analytics with Cross-Sectional Design	Case study with Observational approach with cross sectional design	Case study with a cross-sectional Descriptive approach	Case study with Quantitative approach with descriptive design correlation, cross sectional approach	Case study with a Cross-Sectional study approach	Case studies with a descriptive approach , correlation with a Cross-Sectional approach	Case study with descriptive observational approach with Cross-Sectional design	Analytical survey with a cross-sectional approach Systematic Literature Review	Quantitative Descriptive with Cross-Sectional Design	Cross-Sectional
Analysis	Spearman Rank Correlation Test	Uji Chi Square (Chi Square Contingency Coefficient)	Uji Kruskal-Wallis, Chi-Square, Mann-Whitney U, Spearman correlation, Wilcoxon signed-rank test, Fisher Exact Test	Univariate and bivariate analysis with Chi Square test	Chi-Square(x^2) test and Fisher Exact test, analysis using SPSS	Uji Spearman Rho	Chi-Square (Pearson) test, multivariable logistic regression , analysis using SPSS	Uji Fisher Exact	Uji Spearman Rank	Uji Spearman Rank
Number of Samples	119 respondents	45 respondents	133 respond	47 respond	4590 respondents of diabetes mellitus patients	57 respond	304 respond	30 respond	80 Respond	35 respond
Instruments	Closed questionnaire and primary and secondary data	GPAQ (physical activity), 2x24-hour recall (dietary adherence) , glucometer	Questionnaire (TAM), Mini Nutritional Assessment, WOMAC	Questionnaire	Questionnaire (EQ-5D-5L), MMAS-8 (Morisky Medication Adherence Scale),	MMAS-8 questionnaire and blood sugar level check during	Questionnaire (MARS), International Physical Activity Questionnaire	Questionnaire	IPAQ (International Physical Activity Questionnaire) questionnaire and	MTAQDM (Modified Treatment Adherence Questionnaire) questionnaire, observation

		r (blood glucose level)	Index, laboratory tests (blood glucose and HbA1c), blood pressure measurement		GPAQ, laboratory examination (HbA1c lipid profile, kidney function), patient interview		(IPAQ), anthropometric measurements, laboratory examination (fasting blood sugar, postprandial, HbA1c), interview		glucometer for checking blood sugar levels	sheet, HbA1c laboratory examination
Results	There was a significant association between diet (p=0.000 ; r=0.780), physical activity (p=0.000 ; r=0.745), medication adherence (p=0.002 ; r=0.695), family support (p=0.003 ; r=0.649), smoking habits (p=0.010 ; r=0.587), and stress level (p=0.000 ; r=0.729) and blood sugar levels	There was a significant relationship between physical activity and blood glucose levels (p=0.01; c=0.358) and dietary adherence to blood glucose levels (p=0.001; c=0.606). The higher the physical activity and the more adherent the diet, the more controlled blood glucose levels are.	The results showed that after adherence to medication was high (97.7%), but glycemic control was low. There was no significant association between medication adherence and glycemic control (p>0.05). Involuntary non-compliance behaviors such as forgetting to take medication are a frequent factor	There was a relationship between the incidence of diabetes mellitus (p=0.005, 0.05) and there was a relationship between physical activity and the incidence of diabetes mellitus (p=0.002, 0.05)	The results showed that there was a significant association between dietary adherence, physical activity, and medication with glycemic control, diabetes complications, and quality of life, high adherence was associated with lower HbA1c and fewer complications while low adherence was associated with increased complications, high lipid profile, and high HbA1c	The results showed that there was a significant relationship between medication adherence to blood sugar levels when (p=0.000 ; r=0.492). Most of the adherence was in the high category (47.4%) and blood sugar levels were mostly normal (63.2%)	The results showed that as many as 69.7% of respondents had high compliance and 30.3% had low compliance. There was a significant relationship between adherence to age, gender, education, occupation, and length of diabetes. Logistic regression shows that low education and certain socioeconomic status increase the risk of low compliance	The results showed that there was a relationship between adherence to taking medication, diet, and exercise with blood glucose levels (p value 0.000.0.05), most respondents adhered to taking medication (73.3%), good diet (70%), regular exercise (70%), and had normal blood glucose levels (73.3%)	There was a significant relationship between physical activity and blood sugar levels (p=0.0013 <0.05). Most respondents had moderate physical activity (67.5%) and high blood sugar levels (70%)	The results showed that there was no relationship between medication adherence and glycemic control (p=0.628>0.05; r=0.085). All respondents were compliant (100%), but most had poor glycemic control (97% of the diabetes category)

Discussion

The results of the study from 10 journal articles show that blood glucose levels in people with diabetes mellitus are influenced by several factors, including diet, physical activity, adherence to taking medications, and psychosocial factors such as family support and sterling levels. Most studies use cross sectional designs, as in studies (Doru et al., 2023), (Andrik Hermanto & Masroni, 2025), (Khalil et al. 2024) and research that aims to determine the relationship between variables in one measurement time. In addition, there is also research with a systematic literature review design such as in (Guterres et al. 2026) and (Mujisari et.,al 2021), which comprehensively examines the results of previous research.

In terms of research results, most studies show a relationship between behavioral variables and blood glucose levels. Research (Doru et al., 2023) It shows that there is a significant relationship

between diet and physical activity with the incidence of diabetes mellitus, with p values of 0.005 and 0.002, respectively. This is in line with research (Made Sri Rahayuningsih & I Wayan Juniarsana, 2023) which states that physical activity and dietary adherence are related to blood glucose levels ($p=0.01$ and $p=0.001$). In addition, adherence to taking medication has also been shown to have a relationship with blood glucose levels. Research (Made Rismawan, by Made Tisna Handayani, 2023) showed a significant relationship between medication adherence to medication and blood sugar levels at the time ($p=0.000$; $r=0.492$). Similar results were also found in the study (Hamdrayani & Syamsuddin, 2022) which showed that adherence to medication, diet, and exercise together was associated with blood glucose levels ($p=0.000$).

These results are reinforced by other studies (Sari et al., 2025) which shows a significant relationship between physical activity and blood sugar levels ($p=0.0013$). More comprehensive research by (Guterres et al. 2026) It showed that diet ($p=0.000$; $r=0.780$) and physical activity ($p=0.000$; $r=0.745$) had a strong relationship with blood sugar levels. This confirms that the two factors are not only related, but also have a high strength of relationship to glycemic control. However, different results were found in the study (Mujisari et al., 2021), which suggests that only physical activity is associated with blood sugar levels ($p=0.000$), while dietary regulation shows no significant association ($p=0.155$). This shows that there are variations in research results that can be influenced by other factors.

Medication adherence is one of the important factors in controlling blood glucose levels. Research (Made Rismawan, by Made Tisna Handayani, 2023) showed a significant relationship between medication adherence to blood sugar levels ($p=0.000$; $r=0.492$). These results are supported by research (Hamdrayani & Syamsuddin, 2022) which suggests that medication adherence along with diet and exercise is significantly related to blood glucose levels ($p=0.000$). Research also showed that medication adherence had a significant relationship with blood sugar levels ($p=0.002$; $r=0.695$), suggesting that the higher adherence, the better glycemic control.

In a broader context, self-care management is an important factor in controlling blood glucose levels. Research (Ayunda & Wayunah, 2023) stated that there is a relationship between self care management and blood glucose levels ($p<0.05$). However, different results were found in the study (Sari et al., 2025) which showed that there was no association between medication adherence to blood sugar levels ($p=1,000$). This is in line with research (Nascimento et al., 2025) which showed that there was no significant relationship between medication adherence to glycemic control ($p>0.05$), although adherence levels were relatively high. Similar results were also found in the study (Andrik Hermanto, Masroni, 2025) which showed that there was no association between medication adherence and glycemic control ($p=0.628$; $r=0.085$), even though all respondents adhered to treatment.

Similar things were also found in the study (Sari et al., 2025) where some variables such as knowledge, dietary regulation, and medication adherence are not related to blood sugar levels. These differences in results show that blood glucose level control is multifactorial, influenced by various factors that interact with each other, so it cannot be explained by just one variable, such as other factors, namely diet, physical activity, stress level, length of illness, and individual physiological factors also play a role in determining glycemic control.

In addition, some studies have also shown that despite high levels of compliance, blood glucose levels remain uncontrolled. This indicates that compliance alone is not enough without being balanced with comprehensive lifestyle management. Research (Shukla et., al 2025) also shows that sociodemographic factors such as age, education, and occupation can affect patient compliance levels.

Overall, the results of the study showed that: Diet and physical activity were significantly related, medication adherence was related, but not always consistent, psychosocial factors played an important role, blood glucose control was complex and multifactorial. Thus, the management of diabetes mellitus requires a comprehensive approach that includes lifestyle management, medication adherence, and psychosocial support.

CONCLUSIONS

Based on several articles, it can be concluded that diet and physical activity have a significant relationship with blood sugar levels in people with type 2 diabetes mellitus. Adherence to medication also affects blood sugar levels, but the results show that it is not always consistent or the same. In addition, psychosocial factors such as family support and stress levels also affect the stability of blood glucose levels.

Overall, the control of blood sugar levels in people with diabetes mellitus is multifactorial and is influenced by the interaction of various factors, both in terms of lifestyle, medication adherence, and psychosocial conditions. Therefore, a comprehensive approach in the management of diabetes mellitus is needed to achieve optimal glycemic control.

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