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# The relationship between dietary compliance and blood sugar levels in diabetes mellitus patient's

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**ABSTRACT**
People with diabetes who follow a nutritious eating pattern often struggle to adhere to the prescribed diet therapy for lowering blood sugar levels. Adherence to a diverse menu of foods has an effective impact on blood sugar control. This study aims to investigate the relationship between adherence to dietary patterns and blood sugar levels. The research involves participants with diabetes, both those undergoing treatment and those not yet treated. The method utilizes statistical analysis, specifically the Chi-Square Test, with a population of 309 patients and 175 respondents. The results indicate that 121 respondents (69.1%) fall into the compliant category, while 54 respondents (30.9%) do not comply. The research conclusion reveals a p-value of <0.000, indicating that dietary adherence significantly influences blood sugar control.

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## INTRODUCTION

Diabetes mellitus is a disease marked by elevated levels of glucose in the blood and disturbances in the processing of carbohydrates, fats, and proteins it's associated with a relative deficiency in insulin secretion (Rahmasari & Wahyuni, 2019). Diabetes Mellitus is divided into two distinct types, where Type 1 diabetes mellitus is caused by an autoimmune process in which the body's immune system attacks the pancreatic beta cells responsible for producing insulin (International Diabetes Federation, 2021).

The level of diabetes patients has been increasing over the years. The Basic Health Research in Indonesia in 2018 found that 10.9% of individuals aged 15 and above had diabetes. According to (International Diabetes Federation, 2021) The statement indicates that the prevalence of diabetes mellitus worldwide is 10.5% (536 million people). Indonesia itself is one of the Southeast Asian countries and ranks 5th in the world for the highest number of diabetes mellitus patients, with a total of 19.5 million people. Based on this, it is evident that there is an increasing number of diabetes mellitus patients. In Indonesia, the main

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factor causing an increase in blood sugar levels and thus diabetes mellitus is the consumption of high-carbohydrate nutrition, types of sugar (glucose, fructose, sucrose, and lactose), and an unhealthy lifestyle (Renaldi et al., 2022). In addition, genetic influence, age, insulin hormones, stress, and the level of physical activity also have an impact (Riyanti & Sutantri, 2022).

The increase in diabetes mellitus patients can lead to an additional economic burden, especially in developing countries (Suwannaphant et al., 2017). High healthcare costs and the rising disease burden have a significantly negative impact on national economic growth and health (Shen et al., 2021). The role of the family in following up on dietary therapy is crucial because diet is a long-term therapy (Hestina, 2017). Although diabetes is not a contagious disease, further intervention is needed to address this issue.

The Indonesian Society of Endocrinology (Perkumpulan Endokrinologi Indonesia - PERKENI) states that the treatment of diabetes mellitus is based on four main pillars: medical nutrition, education, physical activity, and pharmacologic intervention. The management of medical dietary therapy for diabetes mellitus involves the implementation of dietary habits within the limits according to the individual's body needs, with the aim of lowering the blood sugar levels of diabetes mellitus patients (Susanti & Nobel Bistara, 2018). The importance of regulating eating habits and physical activity has a significant impact on maintaining blood sugar levels (Astutisari et al., 2022). This certainly requires a high level of knowledge and discipline in managing the diet, with the hope of maintaining normal blood sugar levels (Limanan & Ciptono, 2023). A part from that, the importance of health knowledge can enhance understanding, prevention efforts, and a positive attitude towards diabetes mellitus (Rosyid et al., 2019).

The researcher commenced data collection by engaging in pertinent activities, such as participating in elderly integrated health posts (posyandu) and interacting with patients who visit public health services (puskesmas). The respondents were selected based on specific inclusion and exclusion criteria, with inclusion being limited to patients with diabetes mellitus who were present during the research. The total population for this study was 309 participants, with 175 individuals responding to the questionnaire. The researcher administered a questionnaire comprising 18 items, encompassing both favourable and unfavourable questions.

This study addresses the pressing issue of managing the schedule of medical dietary therapy for individuals with diabetes mellitus, as many of them fail to adhere to the prescribed schedule, type, and quantity of nutrients they consume on a daily basis (Malini et al., 2022). With this research, the author intends to highlight the importance of discipline in carrying out medical nutrition therapy to lower blood sugar levels and to provide an insight to the readers about the importance of adhering to medical nutrition therapy. The level of adherence to the diet for individuals with Diabetes Mellitus reflects a changes in behavior from negative to positive, involving the regulation of eating patterns, and lifestyle adjustments with the goal of maintaining health. In this case, it is evident that the level of adherence to the Diabetes Mellitus diet at 89.7% indicates non-compliance, which is caused by uncontrolled calorie consumption at 100%, not following meal schedules at 100%, and

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non-compliance in choosing types of food at 65.5% (Ramadhina et al., 2022). Considering the information provided, the researcher is keen on carrying out a study entitled "Diet and Diabetes: Studying the Relationship Between Dietary Compliance and Blood Sugar Levels in Diabetes Mellitus Patients." This research is expected to contribute to the development of more effective interventions in managing diabetes mellitus and to enhance the understanding of the readers about the importance of the role of diet in controlling blood sugar levels in diabetes mellitus patients.

## METHODS

This research employs a quantitative design with a cross-sectional method. Respondents, selected through purposive sampling, consist of 175 individuals diagnosed with diabetes mellitus. They must be proficient in both Indonesian and Javanese, willing to participate, and have no age restrictions. The sample size is determined using the Slovin formula based on a population of 309, including 63 males and 112 females.

Adherence to the diet is measured using an 18-question questionnaire regarding the quantity, type, and schedule of meals for individuals with diabetes. A Likert scale is utilized, where a score of ≥47 is considered compliant. The questionnaire, obtained from http://scholar.unand.ac.id/68282/, demonstrates validity and reliability with an Alphacronbach value >0.60. Sample collection occurs after obtaining ethical clearance from the Surakarta Health Office (No. 1.861/X/HREC/2023) and Pajang Community Health Center. The researcher distributes the questionnaire with verbal instructions over a limited and phased period of 4 weeks. Data collection involves providing guidance to respondents for identity filling. Questions are read aloud if respondents face difficulties, and they independently choose answers. After completing data collection, the researcher compiles and processes the data for analysis, involving non-parametric Chi-Square statistical testing (α 5%). The test results show a significance level of sig < 0.05.

## RESULTS AND DISCUSSION

Based on the research result conducted on 175 respondents with agreed and accordance with criteria set for the study, the following are the characteristics of the respondents in this study:

**Tabel 1.** Respondent Characteristic

| Variable | Frequency | Percentage (%) |
|---|---|---|
| Respondent's age | | |
| Early Adulthood | 3 | 1,7 |
| Late Adulthood | 31 | 17,7 |
| Early Elderly | 84 | 48 |
| Late Elderly | 45 | 25,7 |
| Manula | 12 | 6,9 |
| Gender | | |
| Man | 63 | 36 |

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| Variable | Frequency | Percentage (%) |
|---|---|---|
| Women | 112 | 64 |
| Level of Education | | |
| SD | 31 | 17,7 |
| SMP | 4 | 2,3 |
| SMA | 78 | 44,6 |
| D3 | 22 | 12,6 |
| S1 | 40 | 22,9 |
| Job Status | | |
| PNS | 47 | 26,9 |
| Buruh | 29 | 16,6 |
| Wiraswasta | 30 | 17,1 |
| Petani | 27 | 15,4 |
| IRT | 42 | 24 |
| Blood Glucose Level Status | | |
| Normal | 56 | 32 |
| High | 119 | 68 |

Based on table 1 respondent characteristic, in the age category of respondent's majority belonged to the early elderly group (46-55 years), total 84 people, with a percentage of 48%. In contrast, the fewest respondents were in the early adulthood category (26-35 years) which only consisted of 3 people, with a percentage of 1.7%. In this study, the majority of respondents were women, reaching a total of 112 respondents. Meanwhile, the highest level of education achieved was high school, followed by 78 respondents or around 44.6%. In terms of work, the majority of respondents work as civil servants, with 47 respondents or around 26.9%. When looking at the status of the latest blood sugar results, around 68% of respondents had high blood sugar levels, reaching 119 respondents.

**Tabel 2.** Respondent Compliance Category

| Variable | Frequency | Percentage (%) |
|---|---|---|
| Compliance | 121 | 69,1 |
| Non-compliance | 54 | 30,9 |
| Total | 175 | 100 |

Based on the data table respondent compliance category, the conclusion compliance rate with the diet for Diabetes Mellitus patients, related to the blood glucose level status in the Pajang Community Health Center, Surakarta, reached 69.1% or involved 121 respondents.

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**Tabel 3.** The Relationship Between Compliance and Blood Sugar Status

| | | Blood Glucose Status | | Total |
|---|---|---|---|---|
| | | Normal | High | |
| Compliance category | Non-compliance | 0 | 54 | 54 |
| | Compliance | 56 | 65 | 121 |
| Total | | 56 | 119 | 175 |

According to the data in Table 3, it can be inferred that within the non-compliant group of respondents, there were no individuals with normal blood sugar status, whereas there were 54 respondents with high blood sugar status. On the other hand, in the compliant category, there were 56 individuals with normal GDS status and 65 individuals with high GDS status. Through the Chi-square correlation test, a p-value of .000 was found. Because this p-value is less than 0.05, it can be concluded that there is a significant relationship between the level of compliance with the diet for Diabetes Mellitus patients and the blood glucose status. This study is in line with research conducted by (Purwaningtyas & ., 2020) About the compliance level of diabetes mellitus patients in controlling blood sugar levels in the Kembiritan Community Health Center area, it is stated that the high level of compliance (86.4%) among DM patients in the Kambiritan Community Health Center area is caused by extrinsic and intrinsic factors. Additionally, there are also research studies conducted by (Siwi et al., 2022) The compliance rate for the use of oral antidiabetic medication among diabetes mellitus (DM) patients at Rampal relief Hospital in Malang shows that 53.33% have moderate compliance and 35.67% have high compliance.

In the study (Setyaningrum & Nissa, 2021) entitled "Nutritional Counseling for Local Food Consumption for DM Patients in Dilem Village, Kepanjen, Malang," it is stated that the recommended local foods for diabetes mellitus patients consist of rice, eggs, tempeh, green beans, vegetables, papaya, mackerel, and potatoes. This corresponds with the research findings from interviews with some participants who also follow the consumption of local foods. Conversely, foods that are advised to be avoided include various types of sugar (granulated, rock, Javanese), honey, dodol, cake, sweet jerky, jam, sweetened condensed milk, syrup, biscuits, sweet shredded meat, and sweet soy sauce.

(Khasanah et al., 2021) stated that 60.8% of the respondents indicated that following a proper meal schedule significantly aids in managing blood sugar levels. This study demonstrates that the degree of adherence to dietary therapy for diabetes mellitus has an impact on blood sugar regulation. Furthermore, Mei Fitria's research suggests that elevated fasting blood sugar levels are not solely determined by adherence to a regular schedule; they are influenced by a variety of factors. These factors include age, irregular insulin usage, consumption of high-glucose foods, high levels of stress, and insufficient physical activity, all of which can affect the body's ability to regulate blood sugar levels.

Based on these findings, it can be inferred that a substantial proportion of DM patients are aware of the importance of maintaining a diet aimed at stabilizing blood sugar levels. However, they may find it difficult to adhere to dietary therapy for various reasons.

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## CONCLUSION

The data suggests a strong correlation with the level of adherence to dietary guidelines for Diabetes Mellitus patients and their blood glucose levels. The Chi-square correlation test yielded a p-value of .000, which is below the significance threshold of 0.05, indicating a significant association between dietary compliance and blood glucose status. This emphasizes the crucial role of adhering to a specific diet in managing blood glucose levels in Diabetes Mellitus patients.

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