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# Stress Management And Blood Glucose Control Among Patients With Type 2 Diabetes Mellitus: Implications For Nursing Management

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**Abstract**

**Research background:** Diabetes Mellitus is a chronic metabolic disease characterized by hyperglycemia due to impaired insulin function. Stress is one of the psychological factors that can increase blood glucose levels through hormonal mechanisms, especially through increased cortisol and catecholamines. Stress management is an important part of the non-pharmacological treatment of Diabetes Mellitus patients.
**Purpose and scope of the paper:** This study aims to analyze the relationship between stress management and blood glucose levels in patients with type 2 Diabetes Mellitus at Pringsewu Hospital.
**Methods:** This study used an analytical quantitative design with a cross-sectional approach. The sample amounted to 70 respondents who were selected using the purposive sampling technique. Stress management data was collected using a Likert scale questionnaire, while blood glucose levels were checked using a glucometer. Bivariate analysis uses a Gamma correlation test.
**Results:** Results showed that 40% of respondents had poor stress management and 60% had uncontrolled blood glucose levels. The gamma test showed a significant association between stress management and blood glucose levels (p value = 0.000), suggesting that the better the stress management skills, the more controlled the patient's blood glucose levels.
**Conclusion:** Stress management abilities have been shown to have a significant influence on glycemic control in patients with type 2 Diabetes Mellitus. Therefore, the application of stress management interventions needs to be integrated into conducting holistic care in healthcare facilities to support improving patients' quality of life.

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## INTRODUCTION

Diabetes Disorder is a disorder of the metabolism caused by insufficient insulin action, consisting of both insulin resistance and insulin shortage which results in increased blood sugar levels (WHO, 2024). The existence of uncontrolled elevation of blood sugar levels for a prolonged period can result in the development of complications in diabetes mellitus patients, both microvascular and macrovascular complications, which eventually raise the mortality of diabetes mellitus patients (Reynolds et al., 2023). People with diabetes often experience stress Due to changes in habits or very diverse demands, including dietary adjustments, regulation of physical activity and adherence to treatment regimens, there are concerns about possible complications in the future (Guo et al., 2023). Stress is one of the factors that cause fluctuations in blood glucose levels through the hormonal mechanisms of cortisol and catecholamines (Cao et al., 2025). Stress-induced hyperglycemia has been recognized as one of the causes of death and cardiovascular events in the case of chronic kidney disease and diabetic nephropathy patients (Cao et al., 2025). This situation stems from the HPA Axis's activation that is responsible for the increased cortisol and

catecholamines' output that, furthermore, activates the insulin resistance and raises the insulin demand (Sharma et al., 2022). Under the condition of variable or long-standing stress, metabolic regulation becomes unbalanced and chronic allostatic load occurs (Zu et al., 2024). Chronic stress not only triggers hormonal responses, but also has endocrine, metabolic, and immunological implications that can contribute to the development and complications of type 2 diabetes (Lisco et al., 2024). Therefore, there is a need for stress management in the control of diabetes mellitus to keep blood glucose levels controlled by suppressing activation *HPA Axis,* Lowers the secretion of cortisol and catecholamines, and restores insulin sensitivity so that blood glucose levels are stable (Lihua et al., 2023). The literature shows that stress management interventions are very beneficial for patients with metabolic syndromes who also experience psychological symptoms, which directly supports the importance of stress management in glucose stabilization (Lihua et al., 2023).

There are quite a number of studies that have already demonstrated an important role of stress in elevating blood glucose levels (Yusuf, 2020). Hamdiana et al. (2025) through their research of the 60 diabetic patients, Mellitus also found that 65% of respondents experienced severe stress and showed uncontrolled glucose levels. Research Lihua dkk. (2023) found that Stress Management lowers blood glucose levels in patients with diabetes Mellitus, by suppressing the hormonal response caused by Stress, which in turn decreases production *Brief Isolation* and *Catecholamine*, and increase sensitivity. Research Putra Ritonga & Ningsih (2021) It also found something similar where stress management interventions can lower the blood glucose levels of patients with diabetes mellitus.

Although there have been several previous studies that have addressed stress, stress management and blood glucose levels, but there are still limitations to previous studies where previous studies addressed the relationship between stress and blood glucose levels and the effects of a single stress management intervention on blood glucose levels. Meanwhile, studies assessing how well stress management is done and its relationship with blood glucose levels have never been done.

Inefficient and improper handling of stress can result in a constant state of stress, which in turn causes blood glucose levels to rise and the risk of complications to be higher (Papachristoforou et al., 2020). Given the challenges faced by people with diabetes, holistic interventions including psychological aspects are needed. The objective of this research is to bridge the present gaps as well as to give a more profound understanding of the connection between the stress control methods and blood glucose levels of the diabetic mellitus patients at Pringsewu Hospital.

The aim of this research is to investigate the connection between stress management and blood glucose levels of type 2 diabetes mellitus patients at Pringsewu Hospital. The provided hypothesis states that there is a connection between stress management and blood glucose levels in type 2 diabetes mellitus patients at Pringsewu Hospital.

## METHODS

The research applied quantitative methods, cross-sectional approaches, and descriptive analytical design to examine the connection between stress management and blood glucose levels in type 2 diabetes mellitus patients. The study sample comprised all patients with type 2 diabetes mellitus who visited the hospital outpatient unit in Pringsewu, totaling 192 individuals. The chosen sampling method was purposive sampling, where 70 respondents were selected according to the inclusion criteria. The independent variable for this study was stress management, which was assessed through a stress management questionnaire containing 17 items scored on a Likert scale. The items of the questionnaire have undergone validation and reliability testing in diabetic patients and were found to be acceptable for application, with the 17-item results having an r-count value of greater than 0.3 thereby complying with the (Sugiyono, 2023) When the questionnaire item has a r-count value of more than 0.3, the questionnaire is declared valid. While the Cronbach alpha reliability value is 0.930, according to (Sugiyono, 2023) This value is more than 0.600 so it can be declared very reliable to use. The total score is categorized into three levels, namely good, adequate and poor stress management, according to the instrument assessment guidelines. The dependent variable is blood glucose levels, which are measured using a glucometer with the standard procedure of random blood glucose testing (RBG). The results of the examination are then categorized into controlled and uncontrolled based on applicable clinical standards. Data collection was carried out through filling

out questionnaires and blood glucose checks. Data processing goes through several stages of editing, coding, assessment, and tabulation before being statistically analyzed. The data analysis was made of univariate analysis, which used to provide a description of the frequency of each variable distribution and bivariate analysis, which was used to examine the connection between stress management and blood glucose levels. The statistical test used is the Gamma correlation test, because the two variables are ordinal. The relationship is stated to be significant if $p < 0.05$. The interpretation of the coefficient value is carried out based on the strength of the relationship according to the Gamma correlation guidelines. This research was carried out at Pringsewu Hospital in the period from October 6 to October 21, 2025 and the entire research process has received approval from related parties in accordance with the applicable research ethics procedures. This research has received ethical approval with NO: 647/UAP. OT/KEP/EC/2025.

## RESULTS AND DISCUSSION

**Results:**

1. Frequency Distribution of Respondent Characteristics

**Table 1 Distribution of Characteristics of Diabetes Mellitus Respondents**

| Respondent Characteristics | f | % |
|---|---|---|
| **Age** | | |
| Late Adult | 8 | 11,4% |
| Early Elderly | 25 | 35,7% |
| Elderly Late | 35 | 50% |
| Elderly | 2 | 2,9% |
| **Quantity** | 70 | 100% |
| **Gender** | | |
| Male | 40 | 57% |
| Female | 30 | 43% |
| **Quantity** | 70 | 100% |
| **Work** | | |
| Self-employed | 39 | 56% |
| Housewives | 25 | 36% |
| Merchant | 3 | 4% |
| Teacher | 3 | 4% |
| **Quantity** | 70 | 100% |

Based on the table above, most of the respondents are dominated by the elderly at the end of 50%, mostly men 57%, and working as self-employed 56%.

2. Stress Management Frequency Distribution

**Table 2 Frequency Distribution of Stress Management in Patients with Diabetes Mellitus**

| Stress Management | f | % |
|---|---|---|
| Good | 19 | 27% |
| Enough | 23 | 33% |
| Bad | 28 | 40% |
| **Quantity** | 70 | 100% |

Based on the table above, for stress management, most respondents tend to be poor by 40%.

3. Frequency Distribution of Blood Glucose Levels

**Table 3 Frequency Distribution of Blood Glucose Levels in Patients with Diabetes Mellitus**

| Blood Glucose Levels | f | % |
|---|---|---|
| Controlled | 28 | 40% |
| Out of control | 42 | 60% |
| Quantity | 70 | 100% |

Based on table 3, the glucose levels of most respondents were uncontrolled at 60%.

4. The Relationship between Stress Management and Blood Glucose Levels in Patients with Diabetes Mellitus at Pringsewu Hospital

**Table 4 Distribution of Respondent Frequency Based on the Relationship of Stress Management with Blood Glucose Levels of Patients with Diabetes Mellitus**

| Stress Management | Blood Glucose Levels | | | | | | P-Value | r |
|---|---|---|---|---|---|---|---|---|
| | Controlled | | Out of control | | Quantity | | | |
| | f | % | f | % | f | % | | |
| **Good** | 15 | 78,9 | 4 | 21,1 | 19 | 100 | | |
| **Enough** | 11 | 47,8 | 12 | 52,2 | 23 | 100 | **0,000** | **0,837** |
| **Bad** | 2 | 7,1 | 26 | 92,9 | 28 | 100 | | |
| **Quantity** | 28 | 40 | 42 | 60 | 70 | 100 | | |

Based on the table above, most of the respondents 40% had poor stress management and 60% of the respondents had uncontrolled glucose levels, this shows a relationship between the two variables

This result is evidenced by the results of the analysis of the relationship The relationship between stress management and blood glucose levels of type 2 diabetes mellitus patients at Pringsewu Hospital was verified using a gamma correlation statistical test between stress management and blood glucose levels of patients with diabetes mellitus at Pringsewu Hospital, showing that the result of the value of p = 0.000 < 0.05, then Ho is rejected and Ha is accepted, meaning that there is a relationship between stress management and blood glucose levels of type 2 diabetes mellitus patients at Pringsewu Hospital. Meanwhile, the correlation level is 0.837 which means it has a very strong relationship level.

**Discussion:**

The results showed that the better the stress management, the more likely the patient is to have controlled blood glucose levels. The results obtained are consistent with the physiological theory according to which stress causes the activation of the HPA axis and thus the release of cortisol and catecholamines which further activate gluconeogenesis and decrease insulin sensitivity (Cao et al., 2025). Chronic stress is associated with poorer glycemic control in individuals who do not have effective coping strategies. Some studies have also shown that stress in diabetics is associated with greater diabetic distress, lower diabetic empowerment, greater insulin use, and poorer glycemic control (Zu et al., 2024). Moreover, the latest research reveals that the daily life stress even at the lowest level can lead to a direct increase in blood glucose levels among the people with insulin resistance (Schrems et al., 2025). Type 2 diabetes patients also show a more pronounced cortisol response to acute psychosocial stress, with or without complications (Buckert et al., 2022).

Good stress management in this study includes positive thinking skills, relaxation, adjusting tasks/allocations, using activities as a stress channel, and spiritual support. These behaviors have been shown to lower psychological tension and improve adherence to medications, diet, and physical

activity factors that are crucial in glycemic regulation. Interventions that work through the mind-body connection or are based on the body like mindfulness, have proved to be very effective in improving glycemic control significantly in type 2 diabetes mellitus patients (Sanogo et al., 2023). The use of techniques that involve both the mind and the body has a strong correlation with glycemic control improvement in patients suffering from type 2 diabetes mellitus, moreover, stress-relieving practices such as deep breathing and five-finger hypnosis have proven effective in reducing blood sugar levels in this group of patients (Bin et al., 2025).

In contrast, respondents with poor stress management tend to use maladaptive coping such as problem avoidance, withdrawal, or negative emotional responses. This form of coping increases psychological distress thereby interfering with glucose regulation (Sayadi et al., 2022). Less effective coping strategies such as emotional avoidance or withdrawal, can exacerbate stress and interfere with diabetic self-management, ultimately affecting glycemic control (Hapunda, 2022).

Interestingly, the study also found some respondents with poor stress management but blood glucose levels remained under control. This condition is influenced by other factors such as adherence to medication, diet, physical activity, family support, or differences in biological responses to stress between individuals. (Kibret et al., 2022) confirms that glycemic control is multifactorial and not solely determined by stress. Apart from stress, numerous other factors including demographic, socioeconomic, and psychological ones like income level, educational background, mental health condition, and living condition, play a crucial role in the self-management and the glycemic outcomes of adults with type 2 diabetes mellitus (Akhter et al., 2024). The factors determining the glycemic control in individuals with type 2 diabetes mellitus are very intricate and contain personal, clinical, treatment-related, and behavioral aspects (Alduwayhis et al., 2022).

Overall, these findings reinforce the literature that states that stress management is an important factor in the non-pharmacological treatment of patients with type 2 Diabetes Mellitus.

**Implications:**

This study shows that stress management needs to be a regular part of holistic care practice in patients with type 2 diabetes mellitus. Education on adaptive coping strategies, breathing exercises, relaxation, mindfulness, and spiritual support in line with the guidelines (Ministry of Health, 2022), can improve quality of life and help maintain long-term glycemic control. The implementations of psychotherapeutic methods designed specifically for diabetes type 2 patients have been demonstrated to be effective in cutting down the levels of diabetic distress right after the intervention (Zu et al., 2024). This indicates that stress management programs can be an important component of holistic treatment.

**Research contributions:**

This research adds a significant contribution to the nursing literature, especially involving the treatment of type 2 Diabetes Mellitus. In contrast to most previous studies that focused more on stress levels, this study highlights stress management as a skill that can be trained and improved, rather than just a passive psychological state. The study also reinforces the theoretical foundation of Lazarus & Folkman (1984) in the context of DM treatment, as well as adds to the literature on the role of adaptive coping in the glycemic management of type 2 DM patients.

**Limitations:**

This research has several limitations that need to be considered. First, stress management measurements are carried out using self-report instruments, which are susceptible to perceptual bias or the desire to provide expected social answers. This approach can affect the accuracy of stress management ability assessments. This study uses a cross-sectional design so that it cannot determine the relationship Cause and effect between stress management and blood glucose levels. Other variables such as dietary adherence, disease duration, physical activity, and social support were not directly measured, as factors that contributed to influencing glycemic control (Kibret et al., 2022). Blood glucose levels were solely assessed through Random blood glucose (RBG), while HbA1c, which

is a reliable indicator for the long term, was not applied and hence not assessed. RBG selection may limit the ability of studies to describe overall glycemic status. Recent research suggests that measuring physiological biomakers of stress such as cortisol levels in hair may provide more objective identifiers of chronic stress and have a correlation with metabolic outcomes in type 2 diabetes mellitus (Buckert et al., 2024), (Noushad et al., 2021).

**Suggestions:**

Conversely, several suggestions or explanations can be suggested. At the health care level, primary care facilities and hospitals need to develop integrated stress management programs in DM nursing care, such as relaxation training, brief counseling, or patient support groups. The program has been shown to be effective in improving adaptive coping and impacting blood glucose stability (Putra Ritonga & Ningsih, 2021), (Lihua et al., 2023). Recent systematic studies and meta-analyses suggest that psychological interventions, such as cognitive behavioral therapy, can significantly reduce diabetic distress, although the effects on HbA1c may not always be significant in the short term (Zu et al., 2024). It emphasizes the importance of addressing psychological aspects in addition to physiological.

For subsequent researchers, it is recommended to use longitudinal or experimental designs to evaluate the impact of stress management more accurately over time. The use of HbA1c testing, cortisol measurements, or behavioral variables such as diet and physical activity can provide a more comprehensive picture.

Studies over time have revealed a connection between stress and HbA1c, thus encouraging the conducting of future research to clarify the long-term influence of stress on the control of glucose levels in the blood (Horner et al., 2023).

For patients, encouragement is needed to regularly implement adaptive coping strategies, follow stress management education, and improve discipline in DM management, including physical activity and medication adherence.

## CONCLUSION

This study aimed to explore the connection between stress management and blood glucose levels in type 2 Diabetes Mellitus patients, as stated in the Introduction section. The study results indicate that stress management possesses a very strong and significant relationship with blood glucose levels. Consequently, the initial research objectives set forth at the beginning of the study have been successfully accomplished and validated through the output of supportive statistical analysis. These findings confirm that the patient's ability to manage stress is an important factor that affects glycemic stability. Adaptive coping strategies, relaxation practices, positive thinking, social support, and spiritual approaches have been shown to correlate with more controlled blood glucose. In contrast, maladaptive coping has the potential to worsen the stress response and increase the risk of uncontrolled glycemic disorders. Future research development prospects include longitudinal evaluations to assess the effectiveness of long-term stress management interventions, measurements of stress biomarkers such as cortisol, as well as incorporating additional variables such as diet, physical activity, and medication adherence. Experimental research or nursing-based intervention programs could also potentially be applied to test the effectiveness of stress management techniques directly.

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## AUTHOR CONTRIBUTION STATEMENT

1) (EE) compile research designs, develop instruments, collect data, and conduct statistical analysis.

2) (H) provide methodological briefings, review of research design, and supervision of data analysis and interpretation.
3) (GS), (HU) contributes to the review of academic substance, scientific correction, and refinement of the final manuscript.
   All authors contribute substantially to the process of drafting, reviewing, and approving the manuscript
4) (CP) contributes to the review of academic substance, scientific correction, and refinement of the final manuscript.

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