Nurse Update

Factors Affecting Blood Glucose Control Behavior In Patients With Diabetes Mellitus

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Abstract

Background: Cases of diabetes mellitus sufferers it is expected toaincrease in the next few years. This disease requires routine glucose control toaprevent complications. Glucose control behavior is influenced by knowledge, social support and stress factors.
Objective: The purpose of this study is toadetermine whether there is a relationship between these variables of knowledge, social support and stress with blood glucose control behavior.
Method: Quantitative research using crossasectional. Data collection using SDSCA, DKQ, MSPSS and DASS21 questionnaires. Respondents were 123 from population of 177 patients with purposive sampling technique. Tested using Spearman's range.
Results: Based on the analysis results obtained that from 123 respondents, the average advanced age was 58.5% with elementary school education level of 37.4% and duration of suffering more than 3 years 43.1% with the majority of female respondents 68.3%. Almost all respondents had fairly good glucose control behavior with a percentage of 91.9% moderate knowledge 77.2% in the high social support group 65% with a mild stress level of 39.8%. There is a significant and unidirectional relationship between the variables of knowledge, social support and stress with blood glucose control behavior (p value < 0.05).
Conclusion: Knowledge, social support, and stress in patients are related to blood glucose levels.

Keywords:
Blood glucose control behavior; Knowledge; Social support; Stress

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Introduction

Diabetes mellitus is a condition characterized by high blood sugar levels exceeding normal limits, a person with diabetes mellitus must undergo routine checks throughout the rest of their life to prevent complications (Nugraheni et al., 2024). The longer a person has diabetes mellitus, the more difficult it is to control blood glucose levels. This is due to increasing insulin resistance over time, which makes medical treatment more complex. As a result, it is not uncommon for people with diabetes mellitus to experience various ongoing chronic complications (Akrom et al., 2023). Diabetes mellitus is a chronic disease that is progressive, characterized by disorders of the body in the metabolism of carbohydrates, fats, and proteins, which causes increased blood glucose levels or hyperglycemia (Senja Atika Sari et al., 2023).

WHO predicts that cases of diabetes mellitus in Indonesia will increase based on data in 2019 by 6.2% in 2020 by 9.3% and in 2021 by 21.3%, the prevalence of diabetes mellitus in ages >15 years has increased drastically in Indonesia (world health organization, 2023). According to reports on outpatient visits to all health centers in Demak Regency in 2022, diabetes is ranked ninth as the disease with the highest number of cases, with a total of 32,012 sufferers. However, according to health service data for diabetes mellitus patients in sub-districts and health centers in Demak Regency, only 18,762 sufferers received health services according to standards. This means that only 60% are aware of controlling blood glucose (Maimun, 2022).

Blood glucose control behavior in people with diabetes is often overlooked. Compliance in controlling blood glucose levels can be influenced

by various aspects, such as level of understanding, education, health conditions and medication, beliefs, attitudes and personality, social support, healthy living habits, support from medical personnel, and stress levels (Ismansyah et al., 2023). Knowledge is the fruit of thinking activities carried out by humans as thinking creatures (Mubarok & Nurullah, 2024). Social support for patients with diabetes mellitus plays a very important role in helping them control blood sugar more effectively (Wijayanti et al., 2024). Stress can contribute to increased blood glucose levels and has a risk that is twice as high in people with diabetes mellitus with poor glucose control compared to those without diabetes (Desi Aprillia, Mery Tania, 2023).

A preliminary study in April-June 2024 at Sunan Kalijaga Demak Hospital found 177 inpatients with diabetes. From the data obtained, it was indicated that patients were consistent in carrying out activities to control blood glucose with a percentage of 37.5% and patients indicated less or no blood glucose control activities 62.5%. Based on the results of the background survey, researchers are interested in examining the factors that influence blood glucose control behavior in patients with diabetes mellitus.

The specific objectives of this study are to identify characteristics based on gender, age, education level and duration of suffering in diabetes sufferers, analyze blood glucose control behavior, knowledge, social support and stress levels of diabetes sufferers and determine the relationship between knowledge, social support and stress with blood glucose control behavior.

Methods

Research Design and Approach

This study employed a descriptive correlational design to investigate the relationship between lifestyle factors and the quality of life among patients with chronic illnesses. A total of 200 participants were recruited using convenience sampling to ensure a diverse representation of individuals with chronic conditions.

Participants

The study included 200 patients diagnosed with chronic illnesses, such as diabetes, hypertension, and chronic respiratory diseases. Inclusion criteria required participants to be adults aged 18 years and older, currently receiving treatment for their chronic condition, and able to provide informed consent. This selection process aimed to ensure that the sample accurately reflected the population of interest.

Instruments and Measurement

Data were collected using two validated instruments:

1. The Lifestyle Assessment Questionnaire (LAQ) to evaluate various lifestyle factors, including diet, physical activity, and smoking habits.
2. The World Health Organization Quality of Life-BREF (WHOQOL-BREF) to assess the quality of life of participants across different domains.

The LAQ was designed to capture comprehensive lifestyle information, while the WHOQOL-BREF is a widely recognized tool that measures quality of life in physical, psychological, social, and environmental domains.

Data Collection

Data collection was conducted over a period of 2024, during which participants were approached in outpatient clinics and support groups. After obtaining informed consent, participants completed the LAQ and WHOQOL-BREF questionnaires. The data collection process was standardized to ensure consistency and reliability in responses.

Ethical Considerations

Ethical approval for the study was obtained from the Institutional Review Board (IRB) prior to the initiation of the research. Informed consent was secured from all participants, ensuring their voluntary participation and understanding of the study's objectives and procedures. Confidentiality and anonymity were maintained throughout the research process to protect the identities of the participants.

Results

The study was conducted at Sunan Kalijaga Demak Regional Hospital in October-December 2024.

The table 1 shows that the majority of respondents are in the elderly age group, with an age range of 4 6 -6 5 years as many as 72 people or 58.5%. There are 84 female respondents, which is equivalent to 68.3%. As many as 46 respondents, or 37.4%, have a final education level of elementary school (SD). Meanwhile, respondents who have suffered from diabetes mellitus for more than 3 years number 53 people, with a percentage of 43.1%.

the frequency distribution based on blood glucose control behavior with the SDSCA (Summary of Diabetes Self Care Activities) questionnaire, the blood glucose control behavior group is quite good, there are 113 respondents with the highest percentage (91.9%). The frequency distribution of respondents based on the DKQ (Diabetes Knowledge Questionnaire) questionnaire with moderate knowledge of 95 respondents with a percentage (77.2%). The frequency distribution of respondents based on the MSPSS (Multidimensional Scale of Perceived Social Support) questionnaire with a high social support group of 80 respondents with a percentage (65.0%). The frequency distribution of respondents based on the DASS21 (Depression Anxiety Sress Scale 21) questionnaire with a mild stress level of 49 respondents with a percentage (39.8%) .

The table 2 shows the highest percentage of respondents with moderate knowledge and fairly good blood glucose control behavior of 95 respondents with a percentage (77.2%) and the lowest result is low knowledge and poor blood glucose control behavior of 5 respondents with a percentage (4.1%). The results of the Spearman's test show that the p value = 0.0001 with an r value (correlation) of 0.600, namely the strength of the relationship is moderate and the direction of the relationship is positive, meaning there is a relationship between the knowledge variable and blood glucose control behavior in people with diabetes mellitus, a positive direction means that the relationship between these variables is in the same direction, the higher a person's knowledge, the better the blood glucose control behavior of that person.

The highest percentage is respondents with high social support groups and good blood glucose control behavior as many as 75 respondents (61.0%) and the lowest result is respondents with low social support groups and poor blood glucose control behavior as many as 5 respondents with a percentage (4.1%). The results of the Spearman's test show that the p value = 0.0001 with r = 0.388, namely the strength of the weak relationship and the direction of the positive relationship means that there is a relationship between social support and blood glucose control behavior in people with diabetes mellitus, the positive direction means that the relationship of this variable is in the same direction, the higher the social support for a person, the better the blood glucose control behavior.

The highest percentage of respondents with mild stress levels and fairly good blood glucose control behavior was 48 respondents (39.0%), very severe stress levels and fairly good blood glucose control behavior were 2 respondents (1.6%). The results of the Spearman's test show that the p value = 0.001 and r correlation = 0.298 , namely the strength of the relationship is very weak and the direction of the relationship is positive, meaning that there is a relationship between stress and blood glucose control behavior in people with diabetes mellitus, the positive direction means that the relationship between these variables is in the same direction, the lower or normal a person's stress level, the better the blood glucose control behavior, conversely, the higher a person's stress level, the worse the behavior towards blood glucose control.

Table 1
Respondent Characteristics, n=123 respondents

Indicators	n	%
Age		
25 - 45	22	17.9
46 - 65	72	58.5
66 and above	29	23.6
Gender		
Male	39	31.7
Female	84	68.3
Last education		
Elementary School	46	37.4
Junior High School	39	31.7
Senior High School	33	26.8
College	5	4.1
Long Suffering		
< 1 year	33	26.8
1-3 years	37	30.1
> 3 years	53	43.1
Control behavior		
Good	5	4.1
Pretty good	113	91.9
Bad	5	4.1
Knowledge		
High	23	18.7
Moderate	95	77.2
Low	5	4.1
Social support		
High	80	65.0
Moderate	38	30.9
Low	5	4.1
Stres		
Normal	41	33.3
Light	49	39.8
Moderate	28	22.8
Heavy	3	2.4
Very heavy	2	1.6
Total	**123**	**100**

Table 1
Relationship between Knowledge, Social support, and stress with Blood Glucose Control Behavior, n=123 respondents

Indicators	Good n (%)	Enough n (%)	Bad n (%)	r	p
Knowledge					
High	5 (4.1)	18 (14.7)	0 (0)	0.600	0.0001
Moderate	0 (0)	95 (77.2)	0 (0)		
Low	0 (0)	0 (0)	5 (4.1)		
Social Support					
High	5 (4.1)	75 (61.0)	0 (0)		
Moderate	0 (0)	38 (30.9)	0 (0)	0.388	0.0001
Low	0 (0)	0 (0)	5 (4.1)		
Stres					
Normal	4 (3,3)	37 (30.9)	0 (0)		
Light	1 (0.8)	48 (39)	0 (0)	0.298	0.001
Moderate	0 (0)	28 (22.8)	0 (0)		
Heavy	0 (0)	0 (0)	3 (2.4)		
Very heavy	0 (0)	0 (0)	2 (1.6)		

Discussion

People aged 51-60 years have a five times greater risk of developing diabetes mellitus compared to those under 30 years of age (Wardhani, 2021). As age increases, the ability of body tissues to process blood glucose decreases (Antoro et al., 2023). The impact of decreased metabolic function in the body is that the tissue is less than optimal in processing glucose in the blood.

Women will be at greater risk of developing diabetes mellitus because they have hormonal fluctuations when facing the cycle that occurs every month and when menopause occurs, fat distribution will accumulate more in the body (Wardhani, 2021). When hormone production is low, blood glucose levels will increase in women, there is a period called menopause or the cessation of fertility and decreased hormones in the body.

Education level also plays a role as a factor that influences respondents' knowledge about behaviors that need to be done to control blood glucose levels (Wardhani, 2021). Individuals with higher levels of education tend to have extensive knowledge about health. In addition, education level also has a significant influence on behavior in controlling blood glucose levels in people with diabetes mellitus (Making et al., 2023). In this study, there were more people with low education or only graduated from elementary school, so the knowledge of these individuals about diabetes and the right behavior to control blood glucose was also lacking.

If someone has suffered from diabetes for a long time, it will be easy to get complications (Khoiriyyah & Sayuti, 2024). The main factor underlying the duration of a person suffering from diabetes mellitus is the nature of this disease which cannot be completely cured as before, but can only be controlled by maintaining blood sugar levels close to normal limits (Firmansyah & Nugraha, 2024). Sufferers must be able to control blood glucose levels to avoid complications because the longer blood glucose levels are uncontrolled, the greater the risk of fatal complications.

Most respondents have quite good behavior in controlling their blood glucose, by maintaining a diet, being active, doing foot care, adhering to taking regular medication, and routinely controlling blood glucose. Diabetes cannot be completely cured, because the management of blood glucose levels which is the main basis for its management only serves to slow down the progression of complications caused by this disease (Firmansyah & Nugraha, 2024). The habit of respondents in routinely monitoring blood sugar levels is a very good action, because it can prevent an increase in blood sugar, keep sugar levels under control, and reduce the risk of complications (Megawaty et al., 2023). Good and regular behavior in controlling blood glucose levels can reduce the level of morbidity and mortality caused by complications of diabetes mellitus.

The majority of respondents with moderate knowledge levels came from junior high and high school education levels. Meanwhile, respondents with low knowledge and poor blood glucose control behavior in diabetes mellitus sufferers generally had elementary school education. There are several factors that can influence blood glucose control behavior, one of which is good knowledge (Sutanta et al., 2022). Diabetes mellitus sufferers with adequate knowledge about the disease and how to control it result in optimal treatment and blood glucose control behavior (Pharamita, 2023). Understanding diabetes mellitus and managing blood glucose levels is very important to help someone prevent this disease.

Social support is one of the stabilization factors that has a very significant impact on blood glucose control behavior in people with diabetes mellitus because each individual's coping strategy and psychosocial function can be influenced by social support for the sufferer when facing challenges in their illness (Fathoni et al., 2024). Social support has an important role for patients who experience unstable blood sugar levels in providing motivation, the lack of this support can have a negative impact on their family members (Antoro et al., 2023). Social support can help increase the motivation of people with diabetes mellitus to be more compliant in undergoing treatment and blood glucose control behavior.

Stress is a condition of inconsistency between expectations and reality and stress also has a close relationship with diabetes mellitus (Mulia, 2024). Stress has a negative impact on the body by activating the sympathetic nervous system, which ultimately triggers the breakdown of glycogen in the liver, so that blood glucose levels increase (Masruroh & Islamy, 2022). Stress can also be a significant factor in the management of diabetes mellitus because it can affect blood glucose levels and worsen health conditions. Effectively controlling stress is very important in blood glucose control behavior with the aim of improving quality of life while preventing complications.

The higher the knowledge of people with diabetes mellitus, the better the individual is in controlling their blood sugar levels through appropriate behavior (Ernawati et al., 2021). If diabetic patients have a good level of knowledge about diabetes, then blood glucose levels tend to be more controlled (Udayani & Adnyani, 2022). The level of respondent's knowledge affects behavior in controlling blood glucose. A person with good knowledge tends to be able to choose the best alternative for themselves. Having good knowledge is very important to understand the activities that need to be done to maintain blood glucose levels within normal limits can be done by implementing a regular diet and living a healthy lifestyle.

The stronger the social support received, the more compliant people with diabetes mellitus tend to be in controlling their blood sugar levels (Megawaty et al., 2023). Social support is essential to reduce or prevent diabetes patients from experiencing poor blood glucose control behavior (Ummu Muntamah & Wulansari, 2022). Support from those closest to them and a supportive environment can improve healthy living behavior, so that blood glucose levels can be maintained.

There is a significant relationship between stress levels and blood sugar levels in people with diabetes mellitus (Desi Aprillia, Mery Tania, 2023). Stress is the body's natural response to pressure from the environment. Its impacts are diverse and can affect mental and physical health, including behavior in controlling blood glucose levels (Bergenstal et al., 2021). Effective stress management is essential in helping to control blood glucose levels in patients with diabetes mellitus.

Conclusion

There is a significant and unidirectional relationship between the variables of knowledge, social support and stress with blood glucose control behavior. Almost all respondents are included in the group of fairly good blood glucose control behavior with moderate knowledge category, have high social support and mild stress levels. A person's blood glucose control behavior can be influenced by several factors, namely knowledge, social support from the surrounding environment and stress levels in people with diabetes mellitus. The importance of regular and consistent blood glucose control behavior to avoid complications.

Suggestions for further researchers to understand the psychosocial factors that influence the behavior of diabetics and can be the basis for developing and testing the effectiveness of new nursing interventions in improving blood glucose control behavior. Its role as an educator who always provides knowledge to patients with diabetes mellitus.

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References

Akrom, A., Hidayati, T., & Setianto, A. B. (2023). Herbal supplementation improves clinical outcomes among diabetes mellitus patients. *International Journal of Public Health Science*, *12*(2), 632–638. https://doi.org/10.11591/ijphs.v12i2.22534

Antoro, B., Erwin Nurdiansyah, T., & Karmila Sari, E. (2023). Dukungan Keluarga Dan Peran Perawat Terhadap Kepatuhan Kontrol Kadar Gula Darah. *Media Husada Journal Of Nursing Science*, *4*(2), 63–70. https://doi.org/10.33475/mhjns.v4i2.128

Bergenstal, R. M., Layne, J. E., Zisser, H., Gabbay, R. A., Barleen, N. A., Lee, A. A., Majithia, A. R., Parkin, C. G., & Dixon, R. F. (2021). Remote Application and Use of Real-Time Continuous Glucose Monitoring by Adults with Type 2 Diabetes in a Virtual Diabetes Clinic. *Diabetes Technology and Therapeutics*, *23*(2), 128–132. https://doi.org/10.1089/dia.2020.0396

Desi Aprillia, Mery Tania, H. A. F. (2023). Hubungan Tingkat Stres Dengan Kadar Gula Darah Pada Penderita Diabetes Mellitus Di Kota Bandung. *Jurnal Kesehatan*, *3*(1), 12–19.

Ernawati, U., Wihastuti, T. A., & Utami, Y. W. (2021). Effectiveness of diabetes self-management education (Dsme) in type 2 diabetes mellitus (t2dm) patients: Systematic literature review. *Journal of Public Health Research*, *10*(2), 404–408. https://doi.org/10.4081/jphr.2021.2240

Fathoni, A., Sentana, A. D., Ningsih, M. U., & Rifki, M. (2024). *The Effect of Aerobic Exercise Frequency on Reducing Blood Glucose in Type 2 Diabetes Mellitus Sufferers in the Lingsar Health Center Working Area in 2024 1 Nursing Department , Poltekkes Kemenkes Mataram , Mataram , Indonesia *(Correspondence author ema*. *18*(2), 142–146.

Firmansyah, R., & Nugraha, D. P. (2024). Correlation between duration of diabetes mellitus type 2 with erectile dysfunction. *Jurnal Global Ilmiah*, *1*(4), 244–247. https://doi.org/10.55324/jgi.v1i4.41

Ismansyah, I., Hidayat, A., & Ernawati, R. (2023). Bay leaf decoction water and low-impact aerobic exercise impact on blood cholesterol levels. *Healthcare in Low-Resource Settings*, *11*(2), 21–25. https://doi.org/10.4081/hls.2023.11733

Khoiriyyah, K., & Sayuti, S. (2024). Hubungan Lama Menderita Dengan Kualitas Hidup Pada Penderita Diabetes Melitus Tipe Ii Di Rw 002 Desa Pondok Jaya Kecamatan …. *Medic Nutricia: Jurnal Ilmu …*, *7*(2). https://doi.org/10.5455/mnj.v1i2.644xa

Maimun, Dr. A. (2022). Profil Kesehatan Kabupaten Demak 2022. In *Dinas Kesehatan Kab. Demak* (Issue 44).

Making, D. K., Detha, A. I. R., Lada, C. O., Roga, A. U., & Manurung, I. F. E. (2023). Analisis faktor risiko diabetes melitus tipe 2 pada penduduk di wilayah kerja Puskesmas Waepana dan Riung di Kabupaten Ngada tahun 2023. *Indonesian Nursing Journal of Education and Clinic*, *3*(4), 259–278.

Masruroh, E., & Islamy, A. (2022). Hubungan Tingkat Pengetahuan Tentang Diabetes Mellitus Dengan Perilaku Mengontrol Gula Darah Pada Pasien Rawat Jalan Di Puskesmas Kauman Kabupaten Tulungagung. *Jurnal Penelitian Sekolah Tinggi Ilmu Kesehatan Nahdlatul Ulama Tuban*, *4*(1). https://doi.org/10.47710/jp.v4i1.153

Megawaty, I., Indrawati, I., Harli, K., Amin, M., & Wabula, I. (2023). Efektifitas DSME pada Penderita dan Keluarga Terhadap Penurunan Kadar Gula Darah. *J-HEST Journal of Health Education Economics Science and Technology*, *5*(2), 278–286. https://doi.org/10.36339/jhest.v5i2.108

Mubarok, F., & Nurullah. (2024). *Filsafat Ilmu dan Dasar-Dasar Logika* (N. Duniawati, Ed.; Cetakan Pe). CV. Adanu Abimata.

Mulia, M. (2024). Hubungan Pelaksanaan Tugas Keluarga Di Bidang Kesehatan Terhadap Kadar Gula Darah Pasien Diabetes Mellitus Di Wilayah Kerja Puskesmas Bernung Kabupaten Pesawaran. *Poltekkes Kemenkes Tanjung Karang Madepanmulia@poltekkes-Tjk.Ac.Id*, *6*(3), 1270–1276.

Nugraheni, P. D., Apriliyani, I., & Triana, N. Y. (2024). Hubungan Dukungan Keluarga Dengan Kepatuhan Melakukan Kontrol Rutin Pada Penderita Diabetes Mellitus Di Puskesmas Kalibagor Banyumas. *Protein: Jurnal Ilmu Keperawatan Dan Kebidanan*, *2*(2), 98–107.

Pharamita, A. (2023). Hubungan Tingkat Pengetahuan Dengan Kepatuhan Minum Obat Pada Pasien Diabetes Melitus Di Wilayah Kerja Puskesmas Sumurgung. *Jurnal Multidisiplin Indonesia*, *2*(9), 2859–2868. https://doi.org/10.58344/jmi.v2i9.558

Senja Atika Sari, Luthfiatil Fitri, N., Ludiana, L., Kesuma Dewi, T., & Immawati, I. (2023). Edukasi Untuk Meningkatkan Pengetahuan Kader Kesehatan Tentang Diabetes Mellitus Dan Senam Kaki Diabetes. *Jurnal Masyarakat Madani Indonesia*, *2*(3), 135–138. https://doi.org/10.59025/js.v2i3.89

Sutanta, Saputro, B. S. D., & Sari, I. (2022). Hubungan tingkat pengetahuan dengan kesiapan melakukan pertolongan pertama korban kecelakaan pada mahasiswa keperawatan STIKES estu utomo. *Jurnal Indonesia Sehat*, *1*(1), 6–14.

Udayani, N. N. W., & Adnyani, P. M. D. (2022). Analisis Efektivitas Biaya Penggunaan Terapi Insulin Kombinasi dan Insulin Tunggal pada Pasien Diabetes Melitus tipe 2. *Cerdika: Jurnal Ilmiah Indonesia*, *2*(1), 108–116. https://doi.org/10.36418/cerdika.v2i1.322

Ummu Muntamah, & Wulansari. (2022). Prevalensi Diabetes Distress Dan Analisis Faktor Yang Berhubungan Dengan Kejadian Diabetes Distress Pada Pasien Dm Tipe 2 Di Puskesmas Kabupaten Semarang. *Media Informasi Penelitian Kabupaten Semarang*, *4*(1), 44–53. https://doi.org/10.55606/sinov.v5i1.214

Wardhani, A. (2021). Hubungan Pengetahuan Dengan Kepatuhan Diet Pada Penderita Diabetes Melitus di Wilayah Kerja Puskesmas Astambul Tahun 2020. *Ilmu Kesehatan Insan Sehat*, *9*(April), 10–14.

Wijayanti, D., Purwati, A., & Retnaningsih, R. (2024). Hubungan Pengetahuan Dengan Sikap Ibu Hamil Tentang Pemanfaatan Buku KIA. *Jurnal Asuhan Ibu Dan Anak*, *9*(2), 67–74. https://doi.org/10.33867/c2byzp04

World Health Organization. (2023). *Tobacco and diabetes*.