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RELATIONSHIP BETWEEN STRESS LEVELS AND CHANGES IN RANDOM SUGAR LEVELS IN PATIENTS WITH DIABETES MELLITUS AT MENTIKAN PUBLIC HEALTH CENTER, MOJOKERTO CITY

Lutfi Wahyuni[1], Ilya Krisnana[2], Rizma Dwi Ramadina[3].
[1'3]Universitas Bina Sehat PPNI Mojokerto
[2]Universitas Airlangga Surabaya
Corresponding Email: ltf.hidayat@gmail.com

ABSTRACT

Diabetes mellitus is a metabolic disease characterized by randomly high blood sugar levels. Risk factors that can cause diabetes mellitus include stress, genetic factors, age, and a history of consuming alcohol. The simplest effort to control random blood sugar is by implementing stress management. But in reality, there are still many diabetes mellitus sufferers who cannot manage stress, resulting in random increases in blood sugar levels. This study aims to determine the relationship between stress levels and changes in random blood sugar levels in diabetes mellitus sufferers in the Mentikan Community Health Center, Mojokerto City. This research uses a correlation analytical method with a cross-sectional design. The total sample was 67 respondents taken using the purposive sampling technique. The Spearman Rho test results showed a value of $0.001 < \alpha\ 0.05$, so it can be concluded that there is a relationship between stress levels and random changes in blood sugar levels in diabetes mellitus sufferers. Meanwhile, the correlation coefficient figure shows a value of 0.663, which means the relationship between stress levels and random changes in blood sugar levels is strong. Stress can increase random blood glucose levels because stress stimulates the body to release the hormones cortisol and epinephrine. These two hormones have a strong effect in causing the process of gluconeogenesis, so that it will increase random blood glucose levels by large amounts within a few minutes. It is hoped that good stress management can control sufferers' sugar levels so as to create a better quality of life for Diabetes Millitus sufferers.

Keywords

Diabetes mellitus, Random Blood Sugar, Stress level

INTRODUCTION

Stress is a known contributor to hyperglycemia in those with diabetes mellitus. Cortisol, a hormone that causes increased blood glucose levels, is produced in the bodies of people with diabetes mellitus when they experience stress (Siregar, Simbolon, & Talib, 2020). Patients with diabetes mellitus are very vulnerable to stress. Stress can occur because people with diabetes mellitus have not accepted their condition who are diagnosed with diabetes mellitus. The diabetes mellitus epidemic affects people all over the world. The prevalence of diabetes mellitus is increasing, according to the World Health Organization (WHO), especially in developing countries, reporting that in 2014, 422 million people worldwide had diabetes mellitus, which caused 1.6 million deaths. Forecasts put the figure at 642 million sufferers by 2040. The prevalence of diabetes mellitus in the Indonesian population aged 15 years and older increased over the past five years, from 1.0% in 2013 to 2.0% in 2018, with the highest rate in DKI Jakarta (3.4%) and the lowest in NTT (0.9%), both according to the findings of the Riskesdas study (Ministry of Health of the Republic of Indonesia, 2018). There are currently 10.2 million people with diabetes and 17.9 million people at risk in Indonesia, according to statistics from the Basic Health Research Agency (Indonesian Ministry of Health, 2018). Preliminary studies conducted by researchers at the Mentikan Health Center in Mojokerto City obtained data on the number of DM patients from January to October 2023 as many as 593 DM and Chronic Disease patients. The results of interviews with 7 DM patients found that some patients experienced random increases in blood sugar despite maintaining their diet and daily activities, after being traced some patients said they were tired and stressed about their illness that did not go away and vented about problems in their lives. This shows that stress factors experienced by patients affect the patient's blood sugar levels. Efforts to deal with stress and reduce blood sugar that the Public Health Center has carried out are gymnastics once a week and routine blood sugar checks every month, from that, researchers are interested in examining the problem of stress and random blood sugar changes in diabetes mellitus patients.

METHOD

The research design is correlation analytic with a cross-sectional approach. The independent variable is the level of stress while the dependent variable is the change in random blood sugar levels in patients with Diabetes Mellitus. The population in this study were all patients with diabetes mellitus at the Mentikan Health Center, Mojokerto City. The sample was a portion of DM patients who fit the research criteria as many as 67 respondents. Sampling method with purposive sampling technique and using Spearman Rho statistical test.

RESULTS

Table 1. Characteristics of respondents based on age, gender, level of education, and duration of DM

Characteristics	Frequency (n=67)	Presents
Age		
41 – 45 years	11	16.4
46 – 50 years	32	47.8
51 – 55 years	17	25.4
56 – 60 years	7	10.4
Gender		
Male	26	38.8
Female	41	61.2
Education		
Primary School	23	34.3
Junior High School	15	22.3

Senior High School	21	31.3	
Collage	8	11.9	
Duration of DM			
<5 years	45	67.2	
>5 years	22	32.8	
Total	**67**		**100**

Based on table 1, the age of respondents was mostly 46-50 years old as many as 32 respondents (47.8%). Based on gender, most DM patients are female as many as 41 respondents (61.2%). Based on the level of education, it is more dominated by elementary school education as many as 23 respondents (34.3%). As for the length of time suffering from diabetes, most of them were less than 5 years as many as 45 respondents (67.2%).

Table 2. Cross Tabulation Of The Relationship Between Stress Levels And Changes In Random Blood Sugar Levels In Patients With Diabetes Mellitus

Stress Level	Random Blood Sugar Value							
	Low		Normal		High		Total	
	F	%	F	%	F	%	F	%
Normal	0	0.0	7	10.4	1	1.5	8	11,9
Mild	0	0.0	5	7.4	1	1.5	6	8,9
Moderate	0	0.0	1	1.5	12	17.9	13	19.4
Severe	0	0.0	0	0.0	15	22.3	15	22.3
Very Severe	0	0.0	0	0.0	25	37.3	25	37.3
Total	0	0	13	19.4	54	80.6	67	100
Spearman's rho Sig. (2-tailed) 0,001 *Correlation Coefficient* 0.663								

Based on table 2, data from 8 respondents with normal stress levels, most of the normal blood sugar values were from 7 respondents (10.4%). Of the 6 respondents with mild stress levels, most of the high blood sugar values were 5 respondents (7.4%) and 13 respondents who experienced moderate stress most of the high blood sugar values were 12 respondents (17.9%). 15 respondents (22.3%) who have severe stress levels all have high sugar values. While respondents with very severe stress levels as many as 25 respondents (37.3%) had high blood sugar levels. Based on Spearman's rho test, the p-value is 0.001 < α 0.05 with a Correlation Coefficient value of 0.663, it can be concluded that there is a relationship between stress levels and random blood sugar levels in patients with diabetes mellitus.

DISCUSSION

1. Stress Levels In Patients With Diabetes Mellitus At Mentikan Public Health Center

   Based on Table 1, the stress level of diabetes melitus patients is mostly severe stress as many as 25 respondents or 37.3%. Stress in adults is higher than stress in adolescents. Along with age, humans experience more and more physical, mental, and social limitations. Patients with physical limitations and cognitive impairments experience barriers to social activities with their friends and experience a decrease in the quality of building important relationships, which can increase the stress experienced. This limited condition can be a trigger for stress (Krsinatuti & Latifah, 2021).

   Most respondents aged 46-50 years are included in late adulthood. In late adulthood, certain social needs usually increase, with greater practical support needed to manage the demands of daily

life due to declining physical and cognitive capacity, and greater emotional support needed to cope with grief (Lee et al, 2020). Social frailty is also consistently associated with negative outcomes in late adulthood. This is certainly very likely to cause stress in this age group. With increasing age, individuals will experience many changes both physically, psychologically, and socially. When a stressor is obtained, for example being diagnosed with diabetes mellitus, it can affect the mental status of the respondent. This can have consequences for the survival of respondents both intra-personally and inter-personally. Stress control mechanisms are expected to be implemented immediately before stress increases further. Another factor that affects stress is gender. The results showed that respondents with female gender were far above respondents with male gender, namely 41 respondents (61.2%). Gender plays a role in the occurrence of stress. There are differences in response between men and women when facing conflict. Women's brains have a negative alertness to conflict and stress, in women conflict triggers negative hormones that cause stress, anxiety, and fear. Meanwhile, men generally enjoy conflict and competition, even considering that conflict can provide a positive impetus (Fauzi, 2017). In addition, the level of education also affects a person's stress level. A high level of education tends to cause changes in thinking patterns and outlook on life. A person with a high level of education will experience a change in thinking patterns from traditional to a more advanced direction so that they do not only look at the problem from one side but can be from various points of view (Vierdelina, 2008). Respondents with the highest level of stress were respondents with elementary school education, 23 respondents (34.3%). Someone with a higher level of education is better able to manage problems that occur because they have better information and knowledge. In addition, respondents with higher education levels are also trained when they get problems and are more organized in dealing with problems. Based on the results of the study, it was found that more respondents who experienced stress in the group began to be diagnosed with diabetes mellitus in the period <5 years as many as 45 respondents (67.2%). Research from Harista (2015) found that chronic diseases such as diabetes mellitus greatly affect the incidence of stress. Patients are required to take insulin therapy for a long period of time and change their food intake. This is likely to cause additional stress that affects the emergence of stress. These results mean that the longer a person has diabetes mellitus, the more accustomed the person becomes to the dietary changes, therapeutic interventions, and lifestyle changes that must be implemented. People who have had diabetes mellitus for a long time tend to have mild levels of distress. This is because the person already has a way of coping mechanisms or adapting better to the state of the disease. Old patients are more understanding and experienced with their disease so they will encourage themselves to be better able to anticipate the occurrence of emergencies or something that might happen to the patient someday (Laila, 2017).

2. Random blood sugar levels in Diabetes Mellitus patients at Mentikan Health Center

   Based on the results of the study in table 2, states that respondents with

normal random sugar levels were 13 respondents (19.4%), with and high sugar levels were 54 respondents (80.6%). According to Widiastuti (2020), diabetes mellitus is a condition that is closely related to increased blood glucose levels. The category of metabolic diseases known as diabetes mellitus can be seen from hyperglycemia (randomly high blood sugar levels), the causes of which are insulin secretion abnormalities and insulin dysfunction. One of the factors affecting the increase in random sugar levels is age. According to Sujaya (2009), the increased risk of diabetes along with age, especially at the age of more than 40 years, is due to the aging process that causes the reduced ability of pancreatic β-cells in producing insulin. The results of this study are in accordance with the results of research (Trisnawati et al, 2013) which shows that there is a relationship between age and blood sugar levels where age ≥45 years is the most risk of increasing blood sugar levels. This is based on the fact that age can increase the incidence of diabetes mellitus because aging can reduce insulin sensitivity so that it can affect glucose levels in the blood. Generally, humans experience a physiological decline that drastically decreases rapidly at the age after 40 years, one of which has an impact on the pancreas itself.

Diabetes mellitus patients at the age of >45 years are at risk of blood sugar level instability problems due to the aging process and reduced organ function, so promotive, preventive, curative, and rehabilitative measures are needed during treatment to improve a better quality of life. Furthermore, increased blood sugar levels can be caused by gender factors. Gender is a sex difference acquired at birth that differentiates between males and females. Both men and women are at risk of developing diabetes mellitus. Women have a greater risk of diabetes mellitus than men, because physically women have a greater chance of body mass index. Monthly cycle syndrome (premenstrual syndrome), post-menopause which makes the distribution of body fat easily accumulated due to the hormonal process so that women are at risk of diabetes mellitus (Irawan, 2010). Public knowledge about diabetes mellitus is needed as a foundation for the community in showing diabetes mellitus prevention behavior. Knowledge is also related to the level of education. The higher a person's level of education, of course, the more information they have so that it affects a person's behavior (Notoatmodjo, 2016a).

In addition to the above factors, there is one factor that affects blood sugar values in patients with Diabates Mellitus, namely the length of time suffering from this metabolic disease. The results showed that patients diagnosed with diabetes mellitus> 5 years there were 45 people with criteria 10 people had normal blood sugar levels and 35 people had high blood sugar levels. Duration of diabetes mellitus is related to digital health literacy. This study found that most people with diabetes mellitus in the range of 1-5 years and have a low level of digital health literacy, where digital health literacy is a form of diabetes mellitus self-management. This is in line with research by Musmulyadi et al (2019) which shows that someone who has just suffered from diabetes mellitus has poor health literacy which is related to the knowledge possessed regarding self-management (self-care) (Musmulyadi ea al, 2019).

3. Relationship between Stress Level and Random Blood Sugar Level in Diabetes Mellitus Patients at Mentikan Health Center

Based on table 2, data from 8 respondents with normal stress levels, most of the normal blood sugar values were 7 respondents (10.4%). Of the 6 respondents with mild stress levels most of the high blood sugar values were 5 respondents (7.4%) and 13 respondents who experienced moderate stress most of the high blood sugar values were 12 respondents (17.9%). 15 respondents or (22.3%) who have severe stress levels all have high sugar values. While respondents with very severe stress levels as many as 25 respondents or (37.3%) all had high blood sugar levels. Based on the Spearman's rho test, the p value is 0.001 < α 0.05 with a Correlation Coefficient value of 0.663, it can be concluded that H0 is rejected, which means that there is a relationship between stress levels and random blood sugar levels in patients with diabetes mellitus. The results of the Spearman Rho test state that the value of significance / sig. (2-tailed) of 0.001 < α 0.05, it can be concluded that H0 is rejected, which means that there is a relationship between stress levels and random blood sugar levels of diabetes mellitus patients at Mentikan Health Center with a correlation coefficient value showing a value of 0.663, which means that the relationship between stress levels and random blood sugar levels of diabetes mellitus patients at Mentikan Health Center is strong with the direction of the relationship is positive, which means in the direction of the heavier the stress level, the higher the blood sugar.

The relationship between stress and increased blood sugar levels is that in a state of stress there will be an increase in the stress hormones epinephrine and cortisol. Because these hormones will affect the control and level of blood glucose levels. In addition, if there is a stressful situation, the stress response can be an increase in adrenaline hormone which can eventually convert glycogen reserves in the liver into glucose. Continuously high blood glucose levels can cause complications of diabetes mellitus, while the most dangerous acute complication in patients with diabetes mellitus is hypoglycemia (low blood sugar levels) (Gesang & Abdullah, 2019). The cross tabulation data shows that patients with diabetes mellitus who experience the most stress at a very severe level are 25 respondents (37.3%). The more stressed a person is, the more blood sugar values increase. Stress and sugar levels of patients with diabetes mellitus have a close relationship, especially in industrial and urban areas where this research data was taken. The lifestyle of people in urban areas then affects the lifestyle of the community so that it affects both physical and psychological problems.

CONCLUSIONS

The results of the study showed a relationship between stress levels and random blood sugar levels in patients with diabetes mellitus at Mentikan Health Center with a positive relationship direction and the level of relationship with the strong variable. So it can be concluded that the more stressed the respondent, the higher the risk of an increase in random blood sugar levels in patients with Diabetes Mellitus.

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