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Quality of Sleep and Blood Glucose of Type 2 Diabetes Mellitus

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ABSTRACT

Diabetes Mellitus is a serious problem with a rapidly increasing incidence. Almost all groups of people around the world are attacked by this disease. High blood sugar levels interfere with concentration to sleep well, due to the frequent urge to urinate at night and excessive thirst. The study was to determine the relationship between the quality of sleep and blood glucose levels in patients with type 2 diabetes mellitus. The study was a descriptive correlative with a cross-sectional approach. Seventy-seven respondents were involved in this study and were selected by accidental sampling. Data were collected using The Pittsburgh Sleep Quality Index to determine the quality of sleep and blood glucose levels were measured using Nesco Multicheck. Data were analyzed using chi-square. The results showed that there was a significant relationship between the quality of sleep and blood glucose levels with a p-value of 0.00. It can be concluded that the quality of sleep is related to the patient's blood glucose levels, so it is very important for patients to keep going with good quality of quality.

Keywords: Type 2 diabetes mellitus, Quality of sleep, Blood glucose levels

1. INTRODUCTION

Diabetes mellitus is a group of metabolic disorders characterized by increased blood glucose levels (hyperglycemia) resulting from defects in insulin secretion, insulin performance, or both [1], that require medical treatment and self-management education to prevent long-term acute complications [2]. The most common is type 2 diabetes, usually in adults, which occurs when the body becomes resistant to insulin or does not make enough insulin. In the past 3 decades, the prevalence of type 2 diabetes has risen dramatically in countries of all income levels. For people living with diabetes, access to affordable treatment, including insulin, is critical to their survival. There is a globally agreed target to halt the rise in diabetes and obesity by 2025. Around 422 million people worldwide have diabetes, the majority living in low-and middle-income countries, and 1.5 million deaths are directly attributed to diabetes each year. Both the number of cases and the prevalence of diabetes have been steadily increasing over the past few decades [3].

Indonesia was ranked the seventh highest (after China, India, the USA, Pakistan, Brazil, and Mexico) in terms of the highest number of diabetes patients in the world. There are approximately 10.70 million people >65 years of age. Indonesia was also the fifth-ranked country in the world, in terms of the number of adults (20–79 years) with undiagnosed diabetes [4]. According to the results of the 2018 Riskesdas, it shows that the prevalence of diabetes mellitus in Indonesia based on a doctor's diagnosis at the age of ≥ 15 years is 2%. This figure shows an increase compared to the prevalence of diabetes mellitus in residents ≥15 years in the 2013 Riskesdas results of 1.5%. However, the prevalence of diabetes mellitus according to the results of blood sugar examinations increased from 6.9% in 2013 to 8.5% in 2018. This figure shows that only around 25% of diabetics know that they have diabetes [5].

People with diabetes can be influenced by several factors, namely: physical, psychological, social, and environmental factors. Changes in physical, psychological, social, and environmental aspects can result in reduced sleep time [6]. Sleep disturbance has short- and long-term concerns, as well as increased stress responsivity, reduced life quality, mental health issues, and other non-communicable diseases in healthy

individuals [7], [8]. Additionally, sleep disruption in individuals with type 2 diabetes mellitus results in insulin resistance and chronic hyperglycemia, associated with long-term damage, dysfunction, and failure of different organs [9].

A study also shows the total mortality rate in adults with diabetes mellitus and longer sleep duration is also high [10]. Studies worldwide report poor sleep quality with a wide range of prevalence among individuals with type 2 diabetes mellitus. In the United State, more than half of individuals with diabetes mellitus (55%) were "poor sleepers," according to the Pittsburgh Sleep Quality Index [11]. The prevalence of poor sleep in the Asian continent ranges from 43.9–78.4% [12], [13]. In Africa, poor sleep quality among type 2 diabetes mellitus patients ranges from 50%-97% [14], [15]. In Indonesia, a study conducted by Amelia et al. stated that poor sleep quality among type 2 diabetes patients was 77.7% and 35.7% among relatively healthy individuals [16].

2. METHOD

The study was a descriptive correlative with a cross-sectional approach. Seventy-seven respondents were involved in this study and were selected by accidental sampling. Data were collected using The Pittsburgh Sleep Quality Index (PSQI) to determine the quality of sleep. The PSQI was designed by Buysse et al. [17]. The PSQI is used to measure self-reported sleep quality and sleep disturbances during the preceding month. It is a 19-item test and consists of seven components: (1) subjective sleep quality, (2) sleep latency, (3) sleep duration, (4) sleep efficiency, (5) sleep disturbance, (6) sleeping medication use, and (7) daytime dysfunction. Each component is scored from 0 to 3, and the total score ranges from 0 to 21, with a lower score (<5) indicating favorable sleep quality. The PSQI has adequate internal consistency (Cronbach alpha =0.73) [17]. Blood glucose levels were measured using Nesco Multicheck. Data were analyzed using chi-square

3. RESULTS AND DISCUSSION

Table 1. Respondent Characteristics

Variable	n	%
Age (years)		
45-59	24	31.2
60-69	41	53.2
>70	12	15.6
Gender		
Female	52	67.5
Male	25	32.5
Educational		
Primary school	12	15.6
Junior high school	27	53.1
Senior high school	34	44.2
Collage	4	5.2
Employment		
Farmer	25	32.5
Housewife	18	23.4
Private employee	14	18.2
Self-employed	7	22.1
Civil officer	3	3.9
Long suffer diabetes mellitus (years)		
1-5	14	18.2
6-10	63	81.8
Total	**77**	**100**

Based on table 1, shows that the majority of type 2 diabetes mellitus sufferers aged 60-69 years 41 (53.2%). The majority of respondents were female, 52 (67.5%). The majority of respondents were farmers 25(32.5%). While the majority of respondents with diabetes mellitus for the last 6-10 years are 63 people (81.8%).

Table 2. Quality of Sleep of Type 2 Diabetes Mellitus

Quality of sleep	N	%
Good	22	28.6
Poor	55	71.4
Total	**77**	**100**

Based on table 2, it was found that the quality of sleep in patients with type 2 diabetes mellitus found that the majority of sleep quality was poor 55 (71.4%) and good 22 (28.6%).

Table 3. Blood Glucose Levels of Type 2 Diabetes Mellitus

Blood glucose levels	N	%
Controlled	22	28.6
Uncontrolled	55	71.4
Total	**77**	**100**

Based on table 3, it was found that the blood glucose levels in patients with type 2 diabetes mellitus found that the majority were uncontrolled 55 (71.4%) and controlled 22 (28.6%).

Table 4. The Relationship between Sleep Quality and Blood Glucose Levels in Type 2 Diabetes Mellitus Patients

Quality of sleep	Blood glucose levels				Total		p-value
	Controlled		Uncontrolled				
	n	%	n	%	n	%	
Good	22	28.6	0	0.0	22	28.6	0.001
Poor	0	0.0	55	71.4	55	71.4	
Total	**22**	**28.6**	**55**	**71.4**	**77**	**100**	

Based on table 3, it was found that the sleep quality of type 2 diabetes mellitus sufferers was poor, obtained by 55 respondents (71.4%) with controlled sugar levels, 0 respondents (0.0%) and uncontrolled sugar levels, 55 respondents (71.4%) and the sleep quality of diabetics type 2 mellitus both obtained 22 respondents (28.6%) with controlled sugar levels totaling 22 respondents (28.6%) and uncontrolled sugar levels amounting to 0 respondents (0.0%). Analysis using the Chi-square test obtained a p-value <α (0.001). Based on the results of the analysis using the chi-square test, the significance value of p-value = 0.001 <0.05, which means that Ha accepted, there was a relationship between sleep quality and blood sugar levels in patients with type 2 diabetes mellitus.

The age characteristics of patients with sleep quality are relevant to previous research conducted by Sumah which stated that the age of patients with sleep quality was > 55-80 years as many as 20 people (62.5%) [18]. Other relevant studies also stated that the range age of people with diabetes mellitus with the most sleep quality is 57-62 years old, namely 16 people (39.0%) [19].

Kurnia et al. state that women before menopause have lower cholesterol levels than men of the same age. However, after menopause, Low-density lipoprotein cholesterol levels in women tend to increase [20]. Sumah explained that type 2 diabetes mellitus is more common in women than men. This is supported by gestational diabetes which occurs in pregnant women who previously did not have diabetes. The risk of developing type 2 diabetes is greater than pregnant women who do not have diabetes [18]. In addition, Romadoni and Septiawan explained that women over the age of 40 years are more at risk of suffering from type 2 diabetes mellitus because in women who have experienced menopause, blood sugar levels are more uncontrolled [21].

If someone does not get enough sleep, they will be very susceptible to stress. This condition is associated with an increased risk of diabetes because it makes insulin work, whose levels have been reduced to not be optimal [22]. Lack of sleep causes an increase in the hormone ghrelin, which automatically increases appetite, and reduces leptin levels, the hormone that sends signals of fullness. In conditions where insulin is not working optimally, an increase in appetite certainly also plays a role in increasing the risk of diabetes mellitus [23].

Good quality sleep is needed to help form new body cells, repair damaged body cells, give the body's organs time to rest, and maintain the balance of the body's metabolism and biochemistry [24]. Loss of sleep can affect the involvement of hormones in appetite regulation. After sleep restriction occurs, leptin levels, which are factors that make a person feel full, decrease, and ghrelin levels, which stimulate appetite, increase. A little sleep time also increases a person's opportunity to eat. So the loss of sleep will increase appetite and increase food intake which can lead to obesity and increased blood glucose levels [25].

4. CONCLUSION

There is a relationship between the quality of sleep and blood glucose levels in type 2 diabetes mellitus patients. This research can be used as a benchmark to contribute to reducing poor sleep quality thereby reducing uncontrolled glucose levels.

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