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The effect of sleep hygiene on sleep quality of people with type 2 diabetes mellitus

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ABSTRACT
Patients with Type 2 Diabetes Mellitus (DM) have clinical symptoms such as polydipsia, polyuria, and pain, which also occur at night and can cause sleep disturbances. This sleep disturbance will increase the frequency of awakening, difficulty falling asleep again, and sleep dissatisfaction, which causes the quality of sleep to decrease. Sleep hygiene is a method to improve sleep quality in the form of a list of things that can facilitate and maintain sleep initiation. This study aims to determine the effect of sleep hygiene on the sleep quality of people with type 2 diabetes in the working area of Banjarmasin Indah Public Health Center. This quantitative study has a pre-experimental research design and a one-group pretest-posttest design. The sample in this study amounted to 29 respondents and was selected based on inclusion criteria. The measuring instrument used the Pittsburgh Sleep Quality Index (PSQI) questionnaire to measure sleep quality. In addition, the data was analyzed using the Wilcoxon test. The analysis results showed a significant difference between before and after sleep hygiene intervention (p-value = 0.000), so it can be concluded that sleep hygiene affects the sleep quality of people with Type 2 diabetes. Based on these results, community nurses at Banjarmasin Indah Public Health Center expected to include sleep hygiene in health education given to people with type 2 diabetes and their families.

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INTRODUCTION

Based on data from the International Diabetes Federation (2019), it is estimated that 463 million (9.3%) adults aged 20-79 years are currently living with diabetes. The number is predicted to rise to 578.5 million (10.2%) in 2030 and to 700 million (10.9%) in 2045. The number of deaths due to diabetes and its complications in 2019 is estimated at 4.2 million. This figure is certainly very worrying and shows that diabetes management must be carried out comprehensively.

Diabetes Mellitus (DM) type 2 is the most common diabetes of all types of diabetes (around 90%). Type 2 DM sufferers have classic symptoms such as polyuria, polydipsia, polyphagia, and drastic weight loss without clear causes [1]. These clinical symptoms are not only experienced during the day but at night are also felt by people with type 2 DM; this is what can cause sleep disorders. Sleep disorders are a universal problem that occurs in DM patients, and conversely, DM can also cause sleep disorders due to complaints of

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nocturia and pain [2]. Increased frequency of waking up, difficulty falling back asleep, and sleep dissatisfaction, which causes decreased sleep quality, are the consequences of sleep disorders [3].

The above statement is supported by Wahyuningsih et al. from their research that most Type 2 DM sufferers at the Balowerti Kediri Community Health Center experienced insomnia (82.2%). Likewise, research conducted by Tentero et al. at the Pancaran Kasih General Hospital GMIM Manado found a significant relationship between DM and sleep quality [2,4]. Sleep quality is a condition that can create fitness and freshness when someone wakes up [5]. Poor sleep quality can result in fatigue, irritability, irritability, and clinical depression [6].

One method to improve sleep quality is sleep hygiene [7]. Sleep hygiene is a list of activities that can be carried out to facilitate the onset of sleep and maintain it. The components on the list consist of creating a comfortable environment for sleeping, relaxing, eating healthy food at night, exercising, and setting a bedtime routine. The components in this list cause the natural tendency for sleep to increase and things that disturb sleep to decrease [7]. This research aims to determine the effect of sleep hygiene on the sleep quality of Type 2 DM sufferers.

METHOD

This research is quantitative with a pre-experimental design and a One-group pretest-posttest design. Twenty-nine respondents who were sufferers of Type 2 DM in the work area of the Banjarmasin Indah Public Health Center were selected as samples. The sample was selected using a purposive sampling technique with inclusion criteria. After the respondents were found, the researcher went to the respondents' houses and gave the Pittsburgh Sleep Quality Index (PSQI) questionnaire, which consisted of 9 questions, to the respondents. After that, the researchers carried out an intervention in the form of health education regarding a sleep hygiene list that contained 12 activities that needed to be done to improve sleep quality. Then, for three consecutive days, the researcher, assisted by four research assistants, monitored the respondent shortly before the respondent's sleep schedule at night using telephone and video calls to ensure that the respondent carried out sleep hygiene according to what had been taught. At the end of the intervention, the researcher returned to the respondent's house and gave the PSQI questionnaire again to the respondent.

Bivariate analysis was used to determine differences in sleep quality in Type 2 DM sufferers before and after being given sleep hygiene intervention. Before carrying out the bivariate statistical test, a normality test was carried out using the Shapiro-Wilk test because the number of samples was 29 (≤50). The results of the normality test for sleep quality data before and after the sleep hygiene intervention was given were 0.023 and 0.003 (<0.05), which can be concluded that the data was not normally distributed, so the statistical test used was the Wilcoxon test, and the result was p-value = 0.000.

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RESULTS AND DISCUSSION

Table 1. Demographic data of adolescent students at Banjarmasin Family Education Foundation HighSchool in Banjarmasin City

Category	*Mean*	Minimum	Maximum	SD
Sleep quality before sleep intervention hygiene	9.31	5.00	19.00	3.63
Sleep quality after sleep hygiene intervention	5.93	3.00	13.00	2.33

Table 2. Differences in Sleep Quality Before and After Sleep Hygiene in Type 2 DM Sufferers

Sleep quality	n	Mean	SD	p-value
Pretest	29	9.31	3.63	0,000
Posttest	29	5.93	2.33	

Discussion

Table 1 shows that the average sleep quality of respondents before the sleep hygiene intervention was 9.31; after being given the intervention, the average sleep quality of respondents increased to 5.93, although both values were still in the poor category (>5).

Several physical factors can affect the quality of sleep in DM sufferers, namely frequent urination at night (nocturia), frequent feelings of thirst and hunger, skin itching, tingling, cramps, and pain in the extremities, especially in the legs [3]. After someone wakes up several times to urinate, it becomes difficult to go back to sleep. If the blood sugar content is above 160-180 mg/dl, glucose will enter the urine. The kidneys will excrete additional water to dilute the large amount of glucose lost if the blood glucose content is even higher, resulting in excessive urine so that the sufferer often urinates in large amounts. An increase in the number and frequency of urination causes sufferers to drink a lot because they experience excessive thirst. In this kind of situation, sufferers often wake up to drink [22]. Sufferers also experience weight loss due to the loss of large amounts of calories in the urine. To compensate for this, sufferers often feel hungry and eat a lot, especially at night. Itching of the skin and pain in the extremities are other clinical symptoms of DM. This makes it uncomfortable for sufferers to sleep and can cause them to wake up from sleep [3].

From Table 2, it is known that the results of the Wilcoxon test for the quality of sleep of Type 2 DM sufferers before and after the sleep hygiene intervention show a p-value of 0.000 (<0.05), meaning that there is a significant difference between before and after the sleep hygiene intervention, so it can be concluded that there is an influence sleep hygiene has a significant impact on the sleep quality of Type 2 DM sufferers.

As explained in the previous discussion, physical factors are the main cause of sleep disorders in type 2 DM sufferers [18]. However, apart from physical factors, two other factors cause sleep disorders, namely psychological and environmental factors. A study by Bukit in the Internal Medicine Inpatient Room at Ulin General Hospital showed that of the 22 respondents who were anxious, 91% of them experienced poor sleep quality [21]. Of

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the 37 respondents who were depressed, 86% of them experienced poor sleep quality. Anxiety and depression can be caused by feelings of anxiety due to illness, medical costs, and medical procedures [8]. According to Miller (1995) and Fordham (1991), anxiety and depression can make patients wake up from sleep, have difficulty falling back asleep, and wake up early [8].

Environmental aspects are also causes of sleep disorders, namely poor ventilation, sound/noise, very bright lights/lights, uncomfortable rooms and beds, uncomfortable smells, and temperatures that are too hot/cold. This is in line with research obtained by Bukit that shows that loud noises, hot room temperatures, and very bright lights are common causes of sleep disorders.

Good ventilation is an essential aspect for a restful sleep. So that the lungs do not dry out, the humidity in the room must be considered because if the humidity in the room is not regulated, a person will not be able to sleep, and even if they can sleep, they will wake up with a dry throat. The level of sound that can wake a person from sleep depends on the sleep phase. Low sounds more often wake people from sleep phase 1, while loud sounds wake people in sleep phases 3 and 4. The sound level needed for someone to sleep peacefully is below 40 dB. Increased sound intensity can also cause a person to wake up from sleep [3].

Another thing that can also affect the ability to sleep is light. A normal light level is that the light during the day is brighter than at night. If the lights are too bright in the bedroom, someone used to sleep in darkness will have difficulty sleeping. A bedroom is a place to free up tired thoughts after a day of activities. If the bedroom is dirty or smelly, it can be said that this is the cause of difficulty sleeping. A very hot/very cold room also often makes a person anxious. This condition will disturb a person's sleep. The Rapid Eye Movement (REM) sleep phase decreases if the temperature is very hot/very cold [3].

Sleep hygiene is a term used to describe good sleep habits by reducing the factors that cause sleep disorders. Many studies have developed guidelines designed to improve sleep quality, and much evidence suggests that these strategies can provide long-term solutions to sleep disorders. In this study, researchers created media as a leaflet about a sleep hygiene list, which contains 12 strategies that need to be carried out to improve sleep quality. This list was then given to respondents while teaching them in detail about sleep hygiene strategies and ensuring that respondents could carry them out [15].

The strategy is to have a regular schedule for waking up and sleeping daily. Note down the client's sleep agenda, and try to get the client to start sleeping at that time. Then, they get into the habit of being in bed only when they are asleep and sleepy. Avoid doing activities other than sleeping in bed, such as watching or playing on a cell phone. Apart from that, make the mind and body calm and relaxed. Clients can use the deep breathing relaxation method: Inhale slowly through breathing while feeling the flow of air through the nose, then when they feel the person has inhaled enough air, hold for a moment, then exhale slowly through their mouth. This technique can be done five times. Research conducted by Cahyaningsih proves that deep breathing relaxation therapy influences the sleep quality of the elderly [9].

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The next strategy is that clients are advised not to take naps for more than 30 minutes to increase sleep quality at night. When clients are sleepy during the day, they should do activities to ward off drowsiness, such as exercising or walking. The next strategy is that the client is advised not to sleep with bright light because it can keep the client's mind awake. If the client is not used to dark conditions, then set the light to dim. The next strategy is to set a comfortable bedroom temperature. Clients can wear thick blankets when the weather is cold or wear thin clothes when the weather is hot [20].

The next strategy is to stay away from loud noises. Before going to bed, the client must turn off the television. If he cannot sleep in silence, the client can listen to soft music at a low volume to relax the client. Then, taking an afternoon shower with warm water is another strategy to improve sleep quality. Taking a warm shower 1-2 hours before bed is very beneficial because it can increase body temperature and make the client sleepy. Next, ensure the client's room is clean and remove items scattered around the client's bed. It would be better for the client with a sleeping struggle to install an air freshener to relax the body [17].

Next is to encourage clients to consume healthy and balanced foods regularly. Choose foods that contain lots of fiber in fruits and vegetables, and limit fat consumption. Clients should also sleep and eat enough because if they are too full, the body will need around 2-3 hours to fall asleep comfortably. Clients are advised not to drink coffee or tea because it can cause the body and brain to remain awake, inhibiting drowsiness and making sleeping more difficult. On the other hand, several foods, such as milk and honey, are recommended for better sleep. Milk contains tryptophan, an amino acid useful for increasing serotonin in the brain, making them sleep more soundly [10].

Clients are also advised to stop smoking because not smoking can help improve the performance of the heart and lungs. This is proven by research conducted by Supit et al. (2018) that there is a relationship between smoking and poor sleep quality. The final strategy is to make an exercise schedule, such as walking for 20-30 minutes every morning. A study on the Psychology Today website in 2013 proved that regular exercise can improve sleep quality. However, researchers say this influence will only be felt significantly over a long period, namely after several weeks or months [11].

In this study, sleep hygiene strategies were taught and then carried out on each respondent. This study's results align with research conducted by Duman and Taşhan, who found that progressive muscle relaxation training and sleep hygiene can reduce insomnia symptoms in postmenopausal women [12].

Sleep quality is related to the glucose content in the blood; as is known, in Type 2 DM sufferers, there is an increase in blood glucose levels or hyperglycemia, so Type 2 DM sufferers need to maintain blood glucose levels within normal limits. To control blood sugar levels in Type 2 DM sufferers, apart from the four pillars of DM management (education, diet, physical activity, and pharmacology), improving sleep quality is also an important thing for Type 2 DM sufferers to do [23]. This follows research conducted by Kalsum; there was a significant relationship between sleep quality and blood glucose content in Type 2 DM patients at the Cempaka Putih Islamic Hospital, Jakarta. The function of the endocrine

system will be disturbed, especially related to glucose tolerance, insulin resistance, and reduced insulin response if there is a lack of sleep [13,19].

Likewise, research conducted by Kurnia et al. in 2017 found a relationship between sleep quality and fasting blood glucose content in Type 2 DM patients at Pancaran Kasih GMIM Hospital, Manado. Lack of sleep can affect hormones that regulate appetite. If there is a lack of sleep, leptin levels, which make a person feel full, decrease, and ghrelin levels, which stimulate appetite, increase. Insufficient sleep time also causes a person's opportunity to eat, so losing sleep will increase appetite and food intake, which can cause weight gain and increased blood glucose levels [14,16].

CONCLUSION

Sleep hygiene influences the sleep quality of Type 2 DM sufferers in the Banjarmasin Indah Public Health Center working area (p-value = 0.000). Suggestions to community nurses at the Banjarmasin Indah Public Health Center are expected to include sleep hygiene in the health education that must be given to type 2 DM sufferers and their families so that the quality of the sufferer's sleep can improve.

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