International Journal of Health, Economics, and Social Sciences (IJHESS)
Vol. 8, No. 2, April 2026, pp. 1332~1338
DOI: 10.56338/ijhess.v8i2.10730
Website: https://jurnal.unismuhpalu.ac.id/index.php/IJHESS

The Relationship *of Sleep Hygiene* with Anxiety in Patients with Diabetes Mellitus in the Working Area of the Dungingi Health Center

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Article Info

Article history:

Received 09 Feb, 2026
Revised 27 Mar, 2026
Accepted 14 Apr, 2026

Keywords:

Anxiety;
Diabetes Mellitus;
Sleep Hygiene

ABSTRACT

Sleep hygiene is a habit that supports healthy sleep, such as maintaining a sleep routine and creating a comfortable sleeping environment. *Sleep hygiene* plays a role in sleep quality and psychological conditions, including anxiety, especially in patients with diabetes mellitus (DM). DM patients often experience sleep disorders that can increase anxiety., This study aims to determine the relationship between *sleep hygiene* and anxiety in DM patients at the Dungingi Health Center. *The* study used a quantitative method of cross-sectional design, with a population of 56 and involving 35 patients selected by purposive sampling. *Sleep hygiene* is measured by *the Sleep Hygiene Index (SHI)* and anxiety levels by *the State-Trait Anxiety Inventory (STAI).* The results showed that 57.1% of respondents had *poor sleep hygiene*, and 62.9% were in the category of moderate to high anxiety. There was a significant association between *sleep hygiene* and anxiety (p = 0.000), which suggests that *sleep hygiene* is not good in relation to increased anxiety in DM patients. *and* The conclusion of this study is that there is a significant relationship between *poor sleep hygiene* and increased anxiety levels in patients with diabetes mellitus

INTRODUCTION

Sleep is a fundamental biological process that plays a role in maintaining human physical and mental balance. *Sleep hygiene* is an important factor that affects sleep quality, including regular sleep habits, avoidance of caffeine and alcohol consumption before bed, restriction of the use of electronic devices, as well as the creation of a comfortable sleep environment, which significantly contributes to the quality of sleep and daily functioning of individuals. In individuals with chronic diseases such as diabetes mellitus, sleep disturbances due to nocturia, neuropathic pain, and nighttime blood glucose fluctuations can worsen sleep quality and increase emotional distress, thereby increasing the risk of developing anxiety. (Irish et al., 2021) (Reutrakul & Van Cauter, 2022)

Diabetes mellitus is a chronic metabolic disease with a growing prevalence globally. Data *from the International Diabetes Federation* shows that the number of people with diabetes mellitus is estimated to reach 643 million people by 2030 and increase to 783 million people by 2045. In Indonesia, the prevalence of diabetes mellitus in the adult population reaches 10.6%, which indicates the high burden of disease that must be addressed by the national health system. (International Diabetes Federation, 2021) (Ministry of Health of the Republic of Indonesia, 2023)

In addition to the physical impacts, patients with diabetes mellitus also face significant psychosocial burdens. Long-term management of the disease, fear of complications, as well as the demands of lifestyle changes can trigger the appearance of anxiety and stress, which directly affects the quality of life of diabetic patients. Untreated anxiety has the potential to worsen blood sugar control, decrease adherence to medication, and worsen long-term disease management. (Abualhamael et al., 2024) (Sendekie et al., 2025)

Phenomena at the local level also strengthen the urgency of this research. Data from the Gorontalo Provincial Health Office shows a significant increase in the number of screenings and cases of diabetes mellitus from year to year, including in Gorontalo City. This increase in the number of cases not only reflects the success of early detection, but also indicates an increased risk of psychological problems that accompany the disease.

The results of initial observations at the Dungingi Health Center in March 2025 showed that there were diabetes mellitus patients with irregular sleep patterns accompanied by anxiety symptoms, such as feelings of anxiety and difficulty sleeping. These findings indicate that *poor sleep hygiene* practices can contribute to mental health disorders in patients with diabetes mellitus.

Previous research has shown that poor sleep quality and unhealthy sleep *hygiene are* closely related to the appearance of symptoms of anxiety and fatigue during the day. A study in the college student population found that anxiety levels were negatively correlated with *sleep hygiene* practices and contributed to sleep disorders, which in turn had an effect on overall psychological state. In addition, studies in healthcare workers reveal that poor sleep quality is associated with increased daytime fatigue, which indicates that sleep disorders can clinically worsen an individual's physical and mental condition. These findings are relevant to the concept of (Peng et al., 2025) (Al-Aziz et al., 2024) *sleep hygiene*, as poor sleep habits directly affect the quality of sleep, anxiety, and fatigue that individuals feel in their daily lives.

However, research that specifically examined the relationship between *sleep hygiene* and anxiety in patients with diabetes mellitus, especially at the primary health service level, is still limited. This condition shows that there is a scientific gap that needs to be filled, given the high prevalence of diabetes mellitus and the large risk of accompanying psychological disorders. Therefore, this study is important to obtain empirical evidence regarding the relationship between *sleep hygiene* and anxiety in patients with diabetes mellitus, as well as as the basis for the development of promotive and preventive efforts in improving mental health and quality of life in patients with diabetes mellitus. This study aims to determine the relationship between *sleep hygiene* and anxiety in patients with diabetes mellitus.

RESEARCH METHODS

This study is a quantitative research with a correlational approach using *a cross-sectional* design. The study aimed to analyze the relationship between *sleep hygiene* and anxiety levels in patients with diabetes mellitus, where measurements of both variables were performed at the same time without intervention.

The research was carried out in the working area of the Dungingi Health Center on October 5-12, 2025. The study population is all diabetes mellitus patients registered in March 2025 as many as 56 people. Samples were selected using *purposive sampling techniques* based on inclusion and exclusion criteria, so that 35 respondents were obtained.

The independent variable in this study is *sleep hygiene*, while the dependent variable is anxiety. *Sleep hygiene* was measured using the Sleep Hygiene Index (SHI) developed by Mastin (2006), consisting of 13 items with a 4-point Likert scale. SHI scores were categorized into good (13-25) and bad (26-52) to maintain the stability of statistical analysis.

Anxiety levels were measured using the State-Trait Anxiety Inventory (STAI) adapted by Pratiwi and Ningsih (2022). The instrument consists of 20 items on a 4-point Likert scale, with a total score ranging from 20-80 which is categorized into low, medium, and high anxiety.

Data collection was carried out directly through filling out questionnaires by respondents, and supported by secondary data in the form of medical records of diabetes mellitus patients. The collected data is processed through editing, coding, and tabulation stages before being analyzed.

Data analysis included univariate analysis to describe the distribution of variables and bivariate analysis using the Spearman correlation test with a significance level of 95% (α=0.05) to determine the relationship between *sleep hygiene* and anxiety.

This research has applied the principles of research ethics which include *respect for persons*, *beneficence*, *nonmaleficence*, and *justice*. All respondents participated voluntarily after signing the *informed consent*, without significant physical or psychological risk.

RESULTS AND DISCUSSION

Table 1 Characteristics of respondents

Characteristics	Categories	Frequency (n)	Percentage (%)
Age	20-35 years old	12	34,3
	36-45 years old	11	31,4
	46-50 years old	12	34,3
	Total	**35**	**100**
Gender	Male	13	37,1
	Women	22	62,9
	Total	**35**	**100**
Final Education	Junior High School	10	28,6

Characteristics	Categories	Frequency (n)	Percentage (%)
	High School	17	48,6
	S1	8	22,9
	Total	**35**	**100**

Premiere date 2025

Based on the respondent characteristics table, from 35 respondents, it is known that the age group of 20-35 years and 46-50 years each amounted to 12 people (34.3%), while the age group of 36-45 years was 11 people (31.4%). Based on gender, most of the respondents were women as many as 22 people (62.9%), while men as many as 13 people (37.1%). Meanwhile, based on the latest education, the majority of respondents have high school education as many as 17 people (48.6%), followed by junior high school as many as 10 people (28.6%) and S1 as many as 8 people (22.9%).

Table 2 Sleep Hygiene

Sleep Hygiene	Frequency	Percentage
Good	15	42.9%
Not Good	20	57.1%
Total	35	100%

Premiere date 2025

Based on Table 2, of the 35 respondents, it is known that most respondents have poor sleep hygiene as many as 20 people (57.1%), while respondents with good sleep hygiene are 15 people (42.9%). This shows that the majority of respondents have poor sleep hygiene habits.

Table 3 Anxieties

Anxiety	Frequency	Percentage
Low	13	37.1%
Medium	14	40.0%
Height	8	22.9%
Total	35	100%

Premiere date 2025

Based on Table 3, of the 35 respondents, it is known that most of the respondents experienced moderate anxiety as many as 14 people (40.0%), followed by low anxiety as many as 13 people (37.1%), and high anxiety as many as 8 people (22.9%). This shows that the majority of respondents are in the category of moderate anxiety.

Table 4 Bivariate Analysis

Sleep Hygiene	Anxiety			Total	p-value
	Low n,%	Medium n,%	Height n,%		
Good	12 (80.0%)	3 (20.0%)	0 (0%)	15 (42.9%)	0.000
Not Good	1 (5.0%)	11 (55.0%)	8 (40.0%)	20 (57.1%)	
Total	13 (37.1%)	14 (40.0%)	8 (22.9%)	35 (100%)	

Premiere date 2025

Based on Table 4, the results of bivariate analysis showed that respondents with good sleep hygiene mostly had low levels of anxiety as many as 12 people (80.0%), while respondents with poor sleep hygiene mostly experienced moderate anxiety as many as 11 people (55.0%) and high anxiety as many as 8 people (40.0%). The results of the statistical test showed a p-value = 0.000 ($p < 0.05$), which means that there is a significant relationship between sleep hygiene and the level of anxiety in the respondents.

CONCLUSION

Characteristics of respondents

Based on age characteristics, the respondents in this study were spread relatively evenly in the age group of early adulthood to intermediate adulthood. This condition shows that diabetes mellitus is often experienced at productive age. These findings are in line with research that states that the aging process in adulthood is associated with decreased insulin sensitivity and changes in metabolic function, thereby increasing the risk of developing

diabetes mellitus. In addition, another study reported that patients with diabetes mellitus in the adult and middle adult age groups were more prone to sleep disorders and psychological problems such as anxiety, which can affect (Li et al., 2023) *sleep hygiene practices* as well as overall disease management. Thus, the age distribution of respondents in this study is relevant to the study of the relationship between (Alzahrani et al., 2024) *sleep hygiene* and anxiety in patients with diabetes mellitus.

Based on gender, female respondents dominate than men. These findings are consistent with previous studies that reported that women with diabetes mellitus tend to be more involved in health research and have a higher prevalence of psychological disorders than men. Hormonal factors, physiological changes, and women's social and psychosocial roles are thought to contribute to increased susceptibility to sleep disorders and anxiety. In addition, other studies have shown that women with diabetes mellitus are more likely to experience impaired sleep quality and higher levels of anxiety, which may reinforce the link between poor (Kautzky-Willer et al., 2023) *sleep hygiene* and anxiety. (Tesfahun et al., 2022)

Judging from the level of education, the majority of respondents have secondary education. This condition is in line with research that states that education level plays an important role in improving health literacy, medication adherence, and patients' ability to manage diabetes mellitus independently (Adu et al., 2023) **.** In addition, lower levels of education are also associated with increased psychological problems such as anxiety, which can affect sleep quality and disease management in patients with diabetes mellitus. (Kugbey et al., 2022)

Sleep Hygiene

The results showed that 15 respondents (42.9%) had good *sleep hygiene*, which was characterized by regular sleep patterns, restriction of naps, avoidance of caffeine before bed, and a conducive sleep environment. These habits play an important role in maintaining the stability of circadian rhythms and improving the quality of an individual's sleep. Good (Irish et al., 2021) *sleep hygiene* practices are also known to contribute to more optimal sleep quality in patients with chronic diseases, including diabetes mellitus. (Wang et al., 2023)

Most of the respondents with *good sleep hygiene* were in the age range of 36–50 years, where the pattern of daily activities tended to be more structured. Research shows that individuals in middle adulthood generally have a more stable sleep routine compared to younger ages, thus supporting consistency in bedtime and wake-up time. Additionally, better emotional stability in this age group can help reduce sleep disorders triggered by stress and anxiety. (Díaz-Ramiro et al., 2022) (Al-Sharman et al., 2023)

On the other hand, as many as 20 respondents (57.1%) were included in the category *of poor sleep hygiene*. This group showed irregular sleep habits, caffeine or cigarette consumption before bedtime, as well as the use of electronic devices in bed. Exposure to blue light and stimulants before bed is known to inhibit melatonin production and disrupt circadian rhythms. The habit is also associated with decreased sleep quality and increased insomnia complaints in patients with diabetes mellitus. (Morton et al., 2021) (Reutrakul & Van Cauter, 2022)

In addition to behavioral and environmental factors, *poor sleep hygiene* is also influenced by psychological factors and the condition of diabetes mellitus itself. Research shows that anxiety can inhibit the relaxation process necessary to initiate sleep and maintain good sleep quality. Chronic sleep disorders also contribute to metabolic instability and poor blood glucose control in patients with diabetes mellitus. Therefore, (Zhang et al., 2023) (Knutson et al., 2022) *sleep hygiene education* is an important part of the comprehensive treatment of diabetes mellitus patients.

Anxieties

The results showed that the majority of respondents were in the category of moderate anxiety (40.0%), followed by low anxiety (37.1%) and high anxiety (22.9%). These findings suggest that patients with diabetes mellitus generally experience significant psychological distress in response to chronic disease conditions that require long-term management. Anxiety at moderate levels still allows individuals to function adaptively, although it still has the potential to affect quality of life and disease management. (Chew et al., 2021) (Aljuaid et al., 2023)

Respondents with low anxiety showed good coping skills and emotional stability in dealing with their disease conditions. Research shows that patients with diabetes mellitus with adaptive coping mechanisms and adequate social support tend to have lower levels of anxiety. In addition, confidence in managing the disease and a good understanding of health conditions play an important role in lowering anxiety levels in patients with diabetes mellitus. (Fang et al., 2022) (Gao et al., 2024)

The category of moderate anxiety reflects anxiety that is situational and fluctuating in nature, which is often triggered by concerns about health conditions and the demands of daily life. Previous research has shown that patients with diabetes mellitus often experience moderate anxiety due to uncertainty about complications and lifestyle changes that must be undergone (Bhowmik et al., 2022). Despite this, at moderate levels of anxiety, individuals are generally still able to maintain social functions and daily activities. (Abualhamael et al., 2024)

Meanwhile, respondents with high anxiety showed disturbances in emotional and psychological stability, accompanied by excessive worry and feelings of loss of control. Research shows that high anxiety in patients

with diabetes mellitus is associated with sleep disturbances, low medication adherence, as well as poor glycemic control. This condition can worsen psychological adaptation and increase the risk of complications if not treated adequately. (Sendekie et al., 2025) (Zhang et al., 2023)

Overall, variations in anxiety levels in patients with diabetes mellitus suggest that anxiety is affected by the interaction between chronic disease conditions, individual coping ability, and psychosocial stress. Recent studies confirm that a comprehensive approach to diabetes care needs to include psychological interventions in addition to medical management to improve patient well-being. Therefore, nursing and promotive interventions should be directed at strengthening coping, health education, and emotional support for patients with diabetes mellitus. (Kugbey et al., 2022) (Gonzalez et al., 2021)

Results of Bvariate Analysis

The results of the bivariate analysis showed a meaningful relationship between *sleep hygiene* and anxiety levels in patients with diabetes mellitus in the Dungingi Health Center Working Area. Strong correlation coefficient values suggest that sleep pattern disruption has a significant contribution to increased anxiety in patients with chronic illness. A positive association between poor sleep quality and anxiety has also been widely reported in patients with diabetes mellitus, especially in the context of long-term disease management. (Rezaei et al., 2022) (Alramadan et al., 2023)

In the group of respondents with *good sleep hygiene*, most were in the category of low anxiety. This condition suggests that regular sleep habits and a conducive sleep environment play a role in maintaining emotional balance and lowering stress responses (Palmer & Alfano, 2024). Good sleep quality also supports the regulation of the autonomic nervous system, thus helping individuals manage anxiety more adaptively . However, the fact that respondents were still found to be anxious indicated that other factors such as psychosocial stress and concern about disease complications also affected anxiety levels. (Ben Simon et al., 2023) (Buchanan et al., 2022)

On the other hand, in the group of respondents with *poor sleep hygiene*, the majority experienced moderate to high anxiety. Chronic sleep disorders are known to increase the activation of the hypothalamic–pituitary–adrenal system and increase levels of stress hormones such as cortisol, which play a role in worsening anxiety. In addition, in patients with diabetes mellitus, sleep disorders are often associated with fluctuations in blood glucose and nocturnal physical complaints, which directly increase psychological tension. (Wright et al., 2023) (Khandelwal et al., 2022)

However, variations in anxiety levels were still found in the group with poor *sleep hygiene*, including respondents with low anxiety. This suggests that anxiety is multidimensional and is also influenced by protective factors such as social support, effective coping strategies, and acceptance of health conditions. The stability of daily routines and positive meanings towards illness are also known to reduce the negative impact of sleep disorders on mental health. (Liu et al., 2024) (Park et al., 2023)

Overall, the results of this study confirm that *sleep hygiene* has an important role in influencing anxiety levels in patients with diabetes mellitus, although it is not the only determining factor. These findings support a holistic approach in diabetes care that integrates sleep habit improvement, psychological interventions, and stress management to lower anxiety levels and improve patients' quality of life. The multidimensional approach is considered more effective in dealing with the complexity of physical and psychological problems in patients with diabetes mellitus. (Peng et al., 2025) (Gao et al., 2024)

SUGGESTION

Based on the results of a study on 35 patients with diabetes mellitus in the Dungingi Health Center Working Area, it can be concluded that there is a significant relationship between *sleep hygiene* and anxiety levels. The results of the Spearman's Rho test showed a strong positive correlation ($r = 0.761$) with a p-value of 0.000 ($p < 0.05$), which indicates that the worse the quality of *sleep hygiene*, the higher the level of anxiety experienced by patients with diabetes mellitus.

The level of anxiety in patients with diabetes mellitus varies, but is more common in the moderate to high category. Patients with good *sleep hygiene* tend to have lower levels of anxiety than patients with poor *sleep hygiene*.

Although *sleep hygiene* plays an important role in lowering anxiety, anxiety in patients with diabetes mellitus is also influenced by other psychological and social factors. Therefore, anxiety management requires a comprehensive approach.

Increased education about *sleep hygiene* is needed as part of the treatment of diabetes mellitus patients in primary health services. In addition, health workers are expected to apply a holistic approach by paying attention to the psychological aspects of patients.

Further research is recommended to examine other factors that affect anxiety and use a larger sample number to make the results more representative.

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