Nurse and Holistic Care,
Vol. 5, No 1, April 2025
www.journal2.unusa.ac.id/index.php/nhc

Original Articles: Quantitative Research

THE EFFECT OF SLEEP HYGIENE ON INSOMNIA IN DIABETES MELLITUS PATIENTS AT ROYAL PRIMA HOSPITAL MEDAN 2024

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Article history:
Received: March, 27, 2025
Accepted: May, 01, 2025

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Keywords:
Diabetes Mellitus, Sleep Hygiene, Insomnia.

Page Number: 50-60

Abstract

Introduction: Diabetes mellitus (DM) is a metabolic disorder characterized by hyperglycaemia due to abnormalities in insulin secretion, insulin action, or both. Insomnia is a common complication among DM patients and may worsen their overall condition.

Objective: This study aimed to examine the effect of sleep hygiene on insomnia in 36 patients with diabetes mellitus at RSU Royal Prima Medan in 2024.

Methods: A quasi-experimental one-group pre-test post-test design was employed. A total of 36 DM patients were selected using purposive sampling. Data were collected through questionnaires and analyzed using the Wilcoxon signed-rank test.

Results: Before the intervention, 77.8% of patients experienced severe clinical insomnia. Following the sleep hygiene intervention, 97.2% of patients reported moderate insomnia, indicating a significant reduction in severity ($p < 0.05$).

Conclusions: Sleep hygiene intervention significantly reduced insomnia levels in patients with diabetes mellitus. However, the study was limited by its small sample size and single-site setting, which may affect the generalizability of the results. Further research involving larger, multicenter samples is recommended.

INTRODUCTION

Hyperglycaemia is a hallmark of a group of metabolic disorders known as diabetes mellitus (DM), which is caused by abnormalities in insulin secretion, insulin action, or both (Persatuan Endocrinology Indonesia [PERKENI], 2021). As one of the most common non-communicable degenerative diseases, diabetes continues to rise globally, posing a serious health threat in the 21st century (Haryati et al., 2023). Diabetes mellitus is classified into several types, including type 1, type 2, and other specific types (PERKENI, 2021). According to the International Diabetes Federation (IDF, 2021), 537 million adults aged 20–79 worldwide were living with diabetes in 2021. Alarmingly, over

75% of these individuals reside in low- and middle-income countries, with numbers projected to increase to 643 million by 2030 and 783 million by 2045.

In 2021, diabetes was responsible for the deaths of 6.7 million people, occurring as frequently as every 1 to 5 seconds. Additionally, the global cost of diabetes-related healthcare has reached USD 966 billion over the past 15 years. The World Health Organization (2023) reported that 541 million people currently have impaired glucose tolerance (IGT), placing them at risk of developing type 2 diabetes. In Indonesia alone, there were 8.4 million diabetes cases in 2021, and that number is expected to rise to 21.3 million by 2030. Moreover, diabetes is linked to 60% of global deaths and 43% of deaths in Indonesia.

The Indonesian Ministry of Health (2020) estimates that 19.5 million people in the country currently have diabetes, with projections showing an increase to 28.5 million by 2045. A major contributing factor is the public's strong preference for sugary foods. Overconsumption of sweet foods significantly raises the risk of developing diabetes, hypertension, and other related conditions. According to Basic Health Research (Riskesdas, 2018), the prevalence of diabetes in Indonesia has increased from 6.9% in 2013 to 8.5% in 2018. In 2022, Indonesia recorded 41,817 individuals with type 1 diabetes, the highest among ASEAN countries.

Complications from diabetes mellitus can include both macrovascular and microvascular issues, as well as nervous system disorders (Soelistijo et al., 2019). Yarnita et al. (2023) further emphasized that these complications are among the most serious problems for people with DM. Stress is another factor that can exacerbate diabetes symptoms and can also lead to insomnia, a common sleep disorder. Insomnia is characterized by dissatisfaction with the quantity or quality of sleep, often involving difficulty falling asleep, staying asleep, or returning to sleep after waking (Hossain, 2020). Even when sleep duration is adequate, poor sleep quality can impair daytime functioning.

Sleep hygiene refers to a set of behavioural and environmental practices aimed at promoting better sleep quality. Wonga (2022) found a significant relationship between poor sleep hygiene and insomnia. Good sleep hygiene, such as regular sleep schedules and a healthy sleeping environment, has been shown to help people fall and stay asleep more easily. PERKENI (2021) also noted that both daytime and nighttime habits affect sleep quality. Rahmawati et al. (2020) discovered a positive correlation between sleep hygiene and sleep quality among type 2 diabetes patients in community health centres.

Further research supports the benefits of sleep hygiene in improving sleep quality across various patient populations. For example, Hasibuan (2022) found a significant relationship between sleep hygiene and sleep quality in coronary heart disease patients. Esmayanti et al. (2023) showed improvements in sleep quality after sleep hygiene interventions in haemodialysis patients. Similarly, Rahmani et al. (2024) demonstrated the effectiveness of sleep hygiene interventions in reducing insomnia among stroke patients. These findings suggest that sleep hygiene may also be beneficial for diabetic patients who experience sleep disturbances.

Given the high prevalence of insomnia among people with diabetes, researchers are increasingly interested in exploring the potential of sleep hygiene interventions for this population. Sleep disorders can worsen diabetes management and overall health outcomes, making effective interventions critical. Therefore, this study aims to investigate the impact of sleep hygiene on insomnia among diabetic patients. The goal is to provide evidence-based insights that could lead to better management of sleep problems in individuals with diabetes.

METHODS

Study Design

This study employed a quantitative approach using a quasi-experimental design. Specifically, a one-group pre-test post-test methodology was applied (Seniati et al., 2005). Data were collected through a pre-test conducted before the intervention and a post-test administered afterward. The purpose of this design was to assess the effect of sleep hygiene on insomnia in individuals with diabetes mellitus.

Settings

This study was conducted at Royal Prima Medan, located in North Sumatra Province, Indonesia. The research took place between December 2024 and January 2025. All procedures were carried out according to the planned schedule.

Research subject

This study initially involved 170 patients with diabetes mellitus at RSU Royal Prima over three months. A non-probability sampling technique, specifically purposive sampling, was used based on predetermined criteria (Sugiyono, 2019). The selected participants were diabetes mellitus patients at RSU Royal Prima. Sampling was conducted purposively, and the Slovin formula was applied to determine the appropriate sample size, as Figure 1. As a result, a total of 36 participants were included in this study.

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{40}{1 + 40(0{,}05)^2}$$

$$n = \frac{40}{1 + 40(0{,}0025)}$$

$$n = \frac{40}{1 + 0{,}1}$$

$$n = \frac{40}{1{,}1}$$

$$n = 36{,}36 \approx \mathbf{36}$$

Figure 1. Slovin Formula

Instruments

The research data were collected through direct interviews using questionnaires.

Intervention and Data Collection

Before data collection, the researchers obtained informed consent from the respondents to participate in the study. Once the data were collected, they were analyzed using appropriate statistical software.

Data Analysis

The data analysis process involved both univariate and bivariate approaches. Univariate analysis was conducted to describe the demographic characteristics of the respondents, and the results were presented in the form of frequency distributions and percentage tables to illustrate the distribution of each variable category.

Bivariate analysis was used to examine the relationship between the independent variable (sleep hygiene) and the dependent variable (insomnia). Before conducting the bivariate analysis, a data normality test was performed using the Kolmogorov–Smirnov test. If the data were normally distributed, a parametric test (paired t-test) was used. If the data were not normally distributed, a non-parametric test (Wilcoxon signed-rank test) was applied.

The significance level was set at $p \leq 0.05$. A p-value less than or equal to 0.05 indicated that the null hypothesis (H_0) was rejected and the alternative hypothesis (H_a) was accepted, signifying a statistically significant effect of sleep hygiene on insomnia. Conversely, a p-value greater than 0.05 indicated that H_0 was accepted and H_a was rejected, suggesting no significant effect between the variables.

Ethical Consideration

In the process of implementing this research, the researcher asked for the willingness of respondents to become research subjects by explaining the implementation of this research. The researcher also received permission to conduct research at RSU Royal Prima Medan with the number: 065 / KEPK / UNPRI / XII / 2024 Medan.

RESULTS

Respondent Characteristics

The results presented in Table 1 indicate that among the 36 respondents, the majority (22.7%) were aged 62–71 years, while the smallest group (11.4%) was aged 72–81 years. In terms of gender, females comprised the larger portion of the sample with 20 respondents (55.6%), compared to 16 males (44.4%). Most respondents had completed senior high school (38.9%), followed by college graduates (25.0%). Regarding occupation, housewives represented the largest group (41.7%), followed by civil

servants (19.4%). The majority of participants (61.1%) had been living with diabetes mellitus for more than two years, while the smallest group (16.7%) had been diagnosed for less than one year. These demographic characteristics provide essential context for understanding the impact of sleep hygiene on insomnia among patients with diabetes mellitus.

Table 1. Characteristics of Respondents based on Age, Gender, Education, Occupation, and Long-time Suffering Diabetes Mellitus in RSU Royal Prima Medan from December 2024 until January 2025 (n = 36).

Characteristics of Respondents	Frequency (f)	Percentage (%)
Age		
22-31 years	5	13.9
32-41 years	6	16.7
42-51 years	6	16.7
52-61 years	7	19.4
62-71 years	8	22.4
72-81 years	4	11.4
Gender		
Male	16	44.4
Female	20	55.6
Education		
Elementary School	8	22.2
Junior High School	5	13.9
Senior High School	14	38.9
University/ College	9	25.0
Occupation		
Civil Servants	7	19.4
Housewife	15	41.7
Private Sector	7	19.4
Self-Employed	7	19.4
Others	0	0.0
Long-time Suffering Diabetes Mellitus		
< 1 year	6	16.7
1-2 years	8	22.2
> 2 years	22	61.1

Sources: Primary Data of the Study.

Insomnia Occurrence in Patients Suffering from Diabetes Mellitus Before and After Providing Sleep Hygiene

Based on the data presented in Table 2, it was found that the incidence of insomnia before the implementation of sleep hygiene interventions varied in severity among the respondents. A total of 8 participants (22.2%) experienced moderate levels of insomnia. In contrast, the majority of 28 respondents (77.8%) were identified as having severe insomnia at a clinical level. These findings

highlight the high prevalence and seriousness of insomnia among the study population before any intervention was applied. This underscores the need for effective strategies, such as sleep hygiene, to address and potentially reduce the severity of insomnia in individuals with diabetes mellitus. The results of insomnia after the implementation of sleep hygiene interventions showed a notable improvement among the respondents. A total of 35 respondents (97.2%) experienced a moderate level of insomnia severity, indicating a reduction in more severe symptoms. Only 1 respondent (2.8%) reported borderline difficulty sleeping, suggesting minimal issues with sleep. These findings demonstrate the potential effectiveness of sleep hygiene practices in managing insomnia among individuals with diabetes mellitus. The data highlight a shift toward milder forms of insomnia following the intervention.

Table 2. Insomnia Occurrence in Patients Suffering from Diabetes Mellitus Before and After Providing Sleep Hygiene in RSU Royal Prima Medan from December 2024 until January 2025 (n = 36).

Insomnia	Providing Sleep Hygiene			
	Before		After	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
No Insomnia	0	0.0	0	0.0
Limits of Insomnia	0	0.0	1	2.8
Moderate Severity	8	22.2	35	97.2
Clinical Insomnia	28	77.8	0	0.0
Total	**36**	**100.0**	**36**	**100.0**

Sources: Primary Data of the Study.

Analysis of the Impact of Sleep Hygiene on Insomnia among Diabetic Patients using the Wilcoxon Signed Rank Test

The bivariate analysis in this study was to ascertain whether the independent variable and the dependent variable were related. variable, namely the effect of sleep hygiene on insomnia in people with Diabetes Mellitus.

Table 3. The Impact of Sleep Hygiene on Insomnia among Diabetic Patients using the Wilcoxon Signed Rank Test in RSU Royal Prima Medan from December 2024 until January 2025 (n = 36).

Insomnia	Mean	Median	St. Deviation	Z	Nilai P
Before	3.78	4.00	0.422		
After	2.97	3.00	0.167	- 5.385	0.000
difference value	0.81	1.00	0.255		

Sources: Primary Data of the Study.

The outcomes of the analysis in Table 4 show that the Wilcoxon Z-score test resulted in a value of -5.385. With a significance level of 5%, the p-value was found to be less than α (0.000 < 0.05). This

result indicates that the null hypothesis (H0) is rejected, and the alternative hypothesis (Ha) is accepted. Therefore, there is a statistically significant difference in insomnia levels before and after the implementation of sleep hygiene interventions among individuals with diabetes mellitus. This finding suggests that sleep hygiene has a positive impact on improving sleep quality in this population.

DISCUSSION

Insomnia in Patients Suffering from Diabetes Mellitus Before Sleep Hygiene Intervention

The results of the observation showed that, before the sleep hygiene intervention, the majority of participants experienced severe insomnia. This was primarily due to difficulties in falling asleep, maintaining sleep, and the presence of stress-related conditions such as worry and anxiety. These findings are consistent with research by Simarmata et al. (2020) , which indicated that individuals with diabetes mellitus frequently suffer from insomnia as a result of metabolic disturbances, including symptoms like osmotic diuresis, nocturia, stress, anxiety, and pain. According to Simanjuntak et al. (2018), Stress can lead individuals to try excessively hard to fall asleep, often resulting in frequent awakenings during the night. Researchers Shinalieva et al. (2023) also reported that anxiety activates the autonomic and hypothalamic-pituitary-adrenal (HPA) axes and induces immunoinflammatory dysregulation. Since the hypothalamus plays a key role in regulating the sleep-wake cycle, this can contribute significantly to sleep disturbances.

Several factors contributing to insomnia are related to metabolic disorders such as diuresis, nocturia, stress, and anxiety. Researchers also suggest that age may be a contributing factor, with the majority of affected individuals aged 62–71 years. Additionally, females in this age group often report difficulty maintaining sleep and frequently experience emotional distress, including worry and anxiety. Furthermore, patients reported not taking any specific actions to manage their insomnia. As a result, they often wake up in the early hours of the morning, feel unrefreshed upon waking, and suffer from poor overall sleep quality.

Insomnia in Patients Suffering from Diabetes Mellitus After Sleep Hygiene Intervention

The results of observations conducted after implementing sleep hygiene interventions in patients with Diabetes Mellitus revealed that their insomnia was of moderate severity. This indicates a change following the intervention, which was administered according to the Standard Operating Procedures (SOP) outlined by the Indonesian National Nurses Association. Sleep hygiene refers to practices or habits that influence sleep quality, encompassing behaviors, environmental conditions, and other contributing factors (Rahmawati et al. 2020). These practices can significantly impact the sleep quality of individuals with Diabetes Mellitus, helping maintain normal blood glucose levels (Sumah, 2019).

According to Rohma et al. (2022), practicing good sleep hygiene naturally leads to better sleep quality, which in turn supports overall health and readiness for daily activities. Tarnoto and Purwitasari (2023) emphasized that effective sleep hygiene involves establishing a consistent sleep schedule,

developing a bedtime routine, creating a comfortable sleep environment, avoiding foods that disrupt sleep, and refraining from the use of sleeping pills. Based on the researcher's observations, providing sleep hygiene interventions greatly helps reduce the severity of insomnia experienced by patients. Patients reported feeling more comfortable after reducing activities in bed, managing anxiety through beneficial pre-sleep routines, consuming healthy food, and maintaining proper bed hygiene before sleep.

The Effect of Sleep Hygiene on Insomnia in Patients with Diabetes Mellitus

The results of this study indicate that, before receiving sleep hygiene therapy, participants experienced severe insomnia. However, after the intervention, the severity of insomnia decreased to a moderate level. This suggests that sleep hygiene therapy has a positive effect on reducing insomnia in patients with Diabetes Mellitus. The research of Rahmawati et al. (2020) also showed significant differences between pre-test results and post-intervention outcomes, indicating a meaningful impact of sleep hygiene therapy on improving sleep quality. According to research Patarru et al. (2021) achieving quality sleep does not necessarily require medication or medical therapy. Instead, sleep quality can be improved by practicing good sleep hygiene. Patients with type 2 Diabetes Mellitus who consistently follow sleep hygiene interventions have shown improvements in sleep quality without experiencing any side effects (Harahap et al., 2022).

Based on the researcher's assumptions, the reduction in insomnia severity from severe to moderate occurred because the respondents practiced the sleep hygiene intervention effectively. This intervention is particularly helpful for patients with Diabetes Mellitus who experience insomnia, often caused by anxiety before bedtime. Insomnia can be prevented by adopting good sleep habits, such as maintaining a regular sleep schedule, ensuring a comfortable sleeping environment, eating healthy foods, avoiding sleeping pills, and refraining from overthinking or worrying before sleep.

LIMITATIONS

This study had a relatively small sample size and was conducted at a single hospital, which may limit the generalizability of the findings. Therefore, it is recommended that future research be conducted with larger sample sizes and across multiple healthcare settings to enhance the validity and applicability of the results.

CONCLUSION

This study demonstrated that sleep hygiene interventions significantly reduced the severity of insomnia in patients with diabetes mellitus at RSU Royal Prima Medan. Before the intervention, the majority of participants experienced severe clinical insomnia, which decreased to moderate levels following the implementation of structured sleep hygiene practices. These findings indicate that sleep hygiene is an effective, low-cost, and non-pharmacological approach to improving sleep quality in

diabetic patients. By addressing behavioural and environmental factors contributing to sleep disturbances, sleep hygiene may also support better metabolic control and emotional well-being. However, due to the study's limited sample size and single-site setting, further research involving larger, more diverse populations is recommended to improve the generalizability of the results.

AUTHOR CONTRIBUTION

Putri Karina Tarigan: Conceived and designed the analysis.
Widya Santi Manggalika: Collected the data.
Wirna Wati Halawa: Contributed data or analysis tools.
Selvi Sri Ica Purwasih Zega: Performed the analysis.
Andros Christopher Samosir: Wrote the paper.
Elis Anggeria: Guiding wrote the paper.

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CONFLICT OF INTEREST

The authors declare that there were potential conflicts of interest during the conduct of this study. Author 6, Elis Anggeria, is affiliated with RSU Royal Prima Medan, the hospital where the research was conducted, which may be viewed as an institutional interest. Additionally, the hospital provided logistical support in the form of patient access and facility use; however, it had no involvement in the study design, data analysis, or interpretation of the findings. No financial compensation or sponsorship was received from any commercial entities related to sleep hygiene or diabetes care. The authors confirm that these factors did not influence the integrity or outcomes of the research.

ACKNOWLEDGEMENT

We are grateful to everyone who helped us finish this research and compile this publication.

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