

The Relationship Between Sleep Quality and the Risk of Type 2 Diabetes Among Nursing Students at the Sumedang Campus of the Indonesia University of Education

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ABSTRACT

Background & Objective: Type 2 diabetes mellitus is a global health issue with a steadily rising prevalence, including in Indonesia. Sleep quality is recognized as a factor that may influence the risk of developing type 2 diabetes mellitus. However, research examining the relationship between sleep quality and the risk of type 2 diabetes mellitus in young adults, particularly college students, remains limited. This study aims to analyze the relationship between sleep quality and the risk of developing type 2 diabetes mellitus among students in the Nursing Program at the University of Education Indonesia, Sumedang Campus. **Method:** This study employed a quantitative approach with an analytical observational design and a cross-sectional method. The study population consisted of 446 students, with a sample size of 294 respondents who met the inclusion criteria. Data collection was conducted using the Pittsburgh Sleep Quality Index (PSQI) questionnaire to assess sleep quality and the Finnish Diabetes Risk Score (FINDRISC) to measure the risk of type 2 diabetes mellitus. Data were analyzed using Spearman's rho correlation test. **Result:** A total of 294 students aged 18–25 years participated in this study, with the majority of respondents being female. The analysis results showed that all respondents had poor sleep quality. Nevertheless, the majority of respondents were in the low-risk category for type 2 diabetes mellitus, totaling 242 individuals (82.31%). The results of the Spearman's rho test showed no significant association between sleep quality and the risk of type 2 diabetes mellitus ($p = 0.876$; $r = -0.009$). **Conclusion:** There is no association between sleep quality and the risk of type 2 diabetes mellitus among nursing students. These findings suggest

that, in the young adult age group, sleep quality is not a dominant factor influencing the risk of type 2 diabetes mellitus. Further research is recommended to examine other factors that may play a more significant role in the risk of type 2 diabetes mellitus.

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Introduction

Diabetes mellitus is a chronic metabolic disease characterized by elevated blood sugar levels in the body that exceed normal standards (hyperglycemia), resulting from a deficiency in insulin secretion, insulin resistance, or a combination of both (Fedillah Nurhafifah, 2023).

Type 2 diabetes mellitus is a disease whose prevalence continues to rise and has become a growing public health concern year after year (Kendek et al., 2023). According to data from the International Diabetes Federation in the 10th edition of the Diabetes Atlas published in 2021, approximately 537 million people worldwide have diabetes mellitus. This number is projected to rise, reaching 643 million by 2030 and even 783 million by 2045 (Diani et al., 2024).

Indonesia has 10.7 million people with diabetes, ranking 7th on the list of the 10 countries with the highest prevalence of diabetes globally. When examining the 2021 IDF data—which reported 537 million people with diabetes worldwide—the group most affected consists of those aged 20 and older (Diani et al., 2024).

The high incidence of type 2 diabetes is often closely linked to an individual's lifestyle, particularly sleep patterns or rest (Elisabeth et al., 2024). Currently, sleep quality has emerged as a global health issue. The National Sleep Foundation (2022) reports that approximately 40% of young adults in 26 countries, including Indonesia, experience sleep problems (Selfia & Hoesny, 2025). This condition is also relevant to the student population, which is categorized as young adults (18–25 years old) (Alifiando et al., 2022).

College students are a group prone to sleep disorders, primarily due to academic workload, a busy campus schedule, social pressure, and excessive technology use. Consequently, sleep disorders have become a common phenomenon among college students (Hutasoit et al., 2024; Sidik et al., 2025).

In this productive age group, poor sleep quality resulting from unbalanced and irregular sleep patterns is one of the causes of increased vulnerability to health issues. These disturbances can lead to metabolic changes, increased sympathetic nervous system activity, and hormonal imbalances that affect glucose regulation and appetite, causing them to increase. Research indicates that insufficient nighttime sleep duration and irregular sleep patterns are associated with impaired glucose tolerance, increased cortisol secretion, decreased leptin levels, and elevated ghrelin levels. Leptin plays a role in promoting a feeling of fullness, whereas elevated ghrelin levels during insufficient sleep can stimulate excessive appetite, leading to increased energy intake and ultimately increasing the risk of developing type 2 diabetes mellitus (Ginting & Mufidah, 2021; Kamila & Dainy, 2023; Tajiwalar et al., 2023).

Objective

This study aims to analyze the relationship between sleep quality and the risk of developing type 2 diabetes among nursing students at the University of Education Indonesia, Sumedang Campus.

Method

This study employed a quantitative approach using an analytical observational design and a cross-sectional approach. The study population consisted of 446 respondents selected through total sampling. The sample comprised respondents who met the inclusion criteria, totaling 294 respondents in this study. Data collection was conducted using the Pittsburgh Sleep Quality Index (PSQI) questionnaire to assess sleep quality and the Finnish Diabetes Risk Score (FINDRISC) to measure the risk of type 2 diabetes mellitus. The data obtained were analyzed using the Spearman Rho statistical test. The study was conducted in November 2025 at the Sumedang Campus of the Indonesia University of Education.

Results

Results of the Univariate Analysis

TABLE 1. Frequency Distribution of Respondent Demographics

Respondent Characteristics	Frequency (n=294)	Percentage (%)
Gender		
Male	31	10,54%
Female	263	89,46%
Total	294	100%
Graduation Year		
2022	85	28,91%
2023	109	37,07%
2024	100	34,01%
Total	294	100%
Age		
18	4	1,36%
19	82	27,89%
20	92	31,29%
21	88	29,93%
22	26	8,84%
23	1	0,34%
24	0	0%
25	1	0,34%
Total	294	100%

Table 1 shows that the proportion of female respondents was 263, representing 89.46%, which reflects the general characteristics of the Nursing Study Program, where the number of female students is higher. The distribution of respondents by cohort also appears fairly proportional, with the 2023 cohort comprising 109 students, representing 37.07%. Regarding age, the 20-year-old age group was the largest, consisting of 92 individuals, representing 31.29%.

TABLE 2. Sleep Quality Distribution

Category	Frequency (n=294)	Percentage (%)
Poor	294	100%
Good	0	0%

Table 2 shows that all respondents were classified as having poor sleep quality, with a total of 294 students, representing 100% of the sample.

TABLE 3. Distribution of Risk for Type 2 Diabetes

Category	Frequency (n=294)	Percentage (%)
Low	242	82,31%
Slightly Higher	48	16,33%
Moderate	3	1,02%
High	1	0,34%
Very High	0	0%
Total	294	100%

Table 3 shows that the highest prevalence of type 2 diabetes among undergraduate nursing students is in the low-risk category, at 82.31%.

TABLE 4. Distribution of Demographic Data and Sleep Quality

Demographic Data	Sleep Quality				Total	
	Good Sleep Quality		Poor Sleep Quality			
	n	%	n	%		
Age	18	0	0	4	1,36	4
	19	0	0	82	27,89	82
	20	0	0	92	31,29	92
	21	0	0	88	29,93	88
	22	0	0	26	8,84	26
	23	0	0	1	0,34	1
	24	0	0	0	0	0
	25	0	0	1	0,34	1
	Total	0	0	294	100	294
Gender	Male	0	0	31	10,54	31
	Female	0	0	263	89,46	263
	Total	0	0	294	100	294
Graduation Year	2022	0	0	85	28,91	85
	2023	0	0	109	37,07	109
	2024	0	0	100	34,01	100
	Total	0	0	294	100	294

Based on Table 4, all respondents in every category reported poor sleep quality (100%); therefore, the analysis focuses on the group with the highest percentage. In the age category, poor sleep quality was most prevalent among those aged 20 (31.29%). Regarding gender, the female group dominated with a poor sleep quality percentage of 89.46%, significantly higher than that of males. Meanwhile, regarding the cohort variable, the highest distribution of poor sleep quality was found in the 2023 cohort (37.07%), followed by the 2022 cohort (28.91%). These findings indicate that the majority of respondents experiencing poor sleep quality are from the 20-year-old age group, are female, and are from the 2023 cohort.

TABLE 5. Distribution of Demographic Data and Risk of Developing Type 2 Diabetes

Demographic Data	Risk of Developing Type 2 Diabetes										Total	
	Low		Slightly Increased		Moderate		High		Very High			
	n	%	n	%	n	%	n	%	n	%		
Age	18	3	1,02	1	0,34	0	0	0	0	0	0	4
	19	65	22,11	18	7,32	0	0	0	0	0	0	82
	20	71	24,15	19	6,46	1	0,34	1	0,34	0	0	92

	21	79	26,87	8	2,72	1	0,34	0	0	0	0	88
	22	23	7,82	1	0,34	2	0,68	0	0	0	0	26
	23	1	0,34	0	0	0	0	0	0	0	0	1
	24	0	0	0	0	0	0	0	0	0	0	0
	25	0	0	1	0,34	0	0	0	0	0	0	1
	Total	242	82,31	48	16,33	3	1,02	1	0,34	0	0	294
Gender	Male	24	8,16	6	14,29	0	0	1	0,34	0	0	31
	Female	218	74,15	42	14,29	3	1,02	0	0	0	0	263
	Total	242	82,31	48	16,33	3	1,02	1	0,34	0	0	294
Graduation Year	2022	76	31,4	6	12,5	3	1,02	0	0	0	0	85
	2023	85	35,1	23	47,9	0	0	1	0,34	0	0	109
	2024	81	33,5	19	39,6	0	0	0	0	0	0	100
	Total	242	82,31	48	16,33	3	1,02	1	0,34	0	0	294

Based on Table 5, the majority of respondents fall into the low-risk category for all characteristics, as indicated by the highest percentage in nearly every group. For the age variable, the 21-year-old age group has the largest proportion of low-risk individuals at 26.87%, indicating that this age group is the most dominant in the low-risk category. For the gender variable, women constitute the group with the highest percentage of low risk (74.15%). Meanwhile, the 2024 cohort shows the largest proportion of low risk (33.5%) compared to other cohorts. These findings indicate that the majority of respondents, particularly those aged 21, women, and the 2024 cohort, tend to fall into the low-risk group for type 2 diabetes.

Results of the Bivariate Analysis

TABLE 6. Relationship Between Sleep Quality and the Risk of Developing Type 2 Diabetes

Category	Mean	SD	P-Value	Spearman's Rho
Sleep Quality	8,150	1,898		
Risk of T2DM	3,952	3,224	0,876	-0,009

Table 6 shows that the respondents' average sleep quality score was 8.150 with a standard deviation of 1.898, indicating generally poor sleep quality with relatively low variation. The average score for the risk of type 2 diabetes was 3.952 with a standard deviation of 3.224, indicating that the respondents' risk level was generally low but with greater variation.

The p-value of 0.876 indicates that there is no significant relationship between sleep quality and the risk of type 2 diabetes. The Spearman's Rho coefficient of 0.009 with a negative direction indicates a very weak relationship, meaning that changes in sleep quality are not associated with changes in the risk of type 2 diabetes.

Discussion

The results of the study involving 294 respondents showed that the majority of respondents were female, accounting for 89.46% or 263 out of 294 respondents. This finding is consistent with other studies reporting that women constitute a larger proportion of the population and tend to have a higher susceptibility to type 2 diabetes mellitus compared to men. This susceptibility is related to hormonal factors (Maharani & Sholih, 2024). As for the characteristics of the respondents based on their graduation year, the results showed that the largest number of respondents were from the class of 2023, totaling 109, or 37.07%.

Findings regarding sleep quality indicate that all 294 respondents (100%) fall into the category of poor sleep quality. This finding suggests that sleep problems are a very common condition among the study population. Based on the results of the sleep

quality questionnaire, the components of sleep duration, sleep disturbances, and sleep latency are the aspects contributing most significantly to the high scores of poor sleep quality in this study. The average sleep duration for respondents was 6–7 hours; the most frequently experienced disturbances included feeling cold at night, waking up in the middle of the night or early morning, having nightmares, feeling hot at night, waking up to use the restroom, coughing or snoring, and experiencing pain while asleep. Additionally, sleep latency—or difficulty falling asleep—in this study averaged 16–30 minutes. The figures derived from sleep duration and sleep latency fall into the abnormal category, as noted by Manoppo et al. (2023), who state that the normal sleep duration for individuals aged 18–25 is 7–9 hours per night, and normal sleep latency ranges from 10–20 minutes.

Furthermore, the study results regarding the risk of type 2 diabetes mellitus indicate that the majority of respondents fall into the low-risk category for type 2 diabetes mellitus, with a total of 242 students (82.31%). This distribution suggests that the majority of students have a relatively low risk of type 2 diabetes mellitus. This low risk of type 2 diabetes among adolescents or young adults was also found in the study by Julliyana et al. (2024), where 92 respondents (72%) aged 18 and older were classified as having a low risk of developing type 2 diabetes.

Theoretically, sleep disturbances have the potential to disrupt metabolic processes. Inadequate sleep duration and irregular sleep patterns have been associated with reduced glucose tolerance, increased cortisol secretion, and changes in leptin and ghrelin levels that drive increased energy intake. These mechanisms of sleep quality disturbances contribute to the development of insulin resistance, thereby increasing the risk of type 2 diabetes (Ginting & Mufidah, 2021; Kamila & Dainy, 2023; Tajiwalir et al., 2023).

However, the results of this study point in a different direction compared to the theories that have explained this relationship; the results of the bivariate analysis using Spearman's rho test indicate that sleep quality is not associated with the risk of type 2 diabetes, with a p-value of 0.876 and a correlation coefficient of -0.009. A p-value well above 0.05 indicates the absence of a statistically significant relationship, while a correlation coefficient very close to zero suggests that variations in sleep quality are not associated with changes in the risk of type 2 diabetes among university students. The findings of this study are inconsistent with a prospective cohort study by Song et al. (2023), which analyzed ELSA data from participants aged ≥ 50 years and identified 411 individuals with a high risk of type 2 diabetes during the follow-up period. This discrepancy in results is likely due to differences in age characteristics, as the study by Song et al. involved an older population with higher metabolic risk, whereas this study involved university students with a much younger average age of 18–25 years.

Students aged 18–25 years fall into the young adult category, a developmental phase when the body is at its peak of physical and metabolic health. During this age period, individuals generally have optimal physiological function, including insulin sensitivity, glucose balance, and a stable endocrine system (Berliana & Rustiawan, 2024).

In addition, physical activity levels in this age group tend to remain fairly high. This contrasts with older adults, as noted in a study by Berliana & Rustiawan (2024), which found that as people age, they often experience a decline in physical activity levels, weight gain, and a loss of muscle mass. This leads to the body developing

increased glucose intolerance, which contributes to the risk of metabolic disorders. Meanwhile, young adults are generally engaged in dynamic daily activities such as attending classes, campus activities, club involvement, light exercise, and high mobility in their daily routines (Payung et al., 2025).

Another reason for the lack of a correlation is that factors such as dietary patterns and psychological factors were not examined in this study. An unbalanced diet, particularly high sugar intake, plays a significant role in the development of type 2 diabetes. The unhealthy lifestyle and haphazard eating habits commonly found among adolescents or young adults can exacerbate this condition. Thus, dietary management is an essential step in maintaining stable blood sugar levels, both for individuals with diabetes and those in high-risk groups (Shawputri et al., 2024).

In addition to physical factors, psychological conditions such as stress and depression – which were not examined in this study – also play a significant role in increasing the risk of metabolic diseases. Research indicates that individuals with high levels of stress or depression tend to have higher blood sugar levels, making attention to mental health a crucial component in the prevention of type 2 diabetes (Shawputri et al., 2024).

Considering these various factors, it can be assumed that, in addition to sleep quality, factors such as age, physical activity, dietary patterns, and psychological factors may have a greater influence on the risk of type 2 diabetes. These factors were not fully controlled for in this study, which may help explain why sleep quality did not show a significant association with the risk of type 2 diabetes among the respondents.

Although this study did not find an association, there were findings indicating variations in predisposing factors within the population that still have the potential to increase risk. Some respondents were noted to have important risk factors, including 6.10% with a high BMI, 8.54% with a large waist circumference, 41.87% with low physical activity, 4.88% taking medication for high blood pressure, 3.25% with a history of high blood sugar, and 35.37% with a family history of a diagnosis of type 1 or type 2 diabetes.

Conclusion

Based on a study conducted on the relationship between sleep quality and the risk of type 2 diabetes among nursing students at the Indonesia University of Education, it can be concluded that 294 undergraduate nursing students at the Sumedang Campus of the Indonesia University of Education, aged 18–25, have poor sleep quality, with the majority being female. This study also showed that the majority of respondents had a low risk of type 2 diabetes mellitus, totaling 242 people or 82.31%. However, a small proportion of respondents exhibited a higher risk. Analysis using Spearman's rho test revealed that sleep quality does not have a significant association with the risk of type 2 diabetes mellitus. A p-value of 0.876 (>0.05) and a correlation coefficient of -0.009 indicate that variations in sleep quality do not influence an increase or decrease in the risk of type 2 diabetes mellitus among the students. This may be influenced by the presence of other more dominant factors in determining the risk of type 2 diabetes, such as age, physical activity, and dietary patterns, which were not fully controlled for in this study. Additionally, the majority of respondents' answers fell into the low and slightly elevated categories, resulting in relatively small

data variation. It is recommended that future research investigate other factors to assess the risk of developing type 2 diabetes in young adults.

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