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Original Article

The Relationship Between Sedentary Lifestyle and the Risk of Type 2 Diabetes Mellitus in Generation Z

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Abstract

Approximately 90% of diabetes cases in Indonesia are classified as type 2 diabetes mellitus (T2DM). In Indonesia, particularly among Generation Z, sedentary lifestyles are becoming increasingly prevalent. The primary aim of this study was to examine the association between sedentary lifestyle and the risk of type 2 diabetes mellitus among Generation Z. A cross-sectional design was employed, with 135 respondents selected through purposive sampling. The study participants were undergraduate students from the 2023 cohort of the Accounting Study Program, Faculty of Economics, University of West Sulawesi. Data were collected using the *Adolescent Sedentary Activity Questionnaire* (ASAQ) and the *Finnish Diabetes Risk Score* (FINDRISC). The findings revealed that 101 respondents (74.8%) demonstrated a high sedentary lifestyle, while 5 respondents (3.7%) exhibited a high risk of developing type 2 diabetes mellitus. Results from the Chi-square test indicated a p-value of 0.861, which is greater than $\alpha = 0.05$, suggesting that there is no significant relationship between sedentary lifestyle and the risk of type 2 diabetes mellitus in Generation Z. In conclusion, this study found no significant association between sedentary lifestyle and the risk of type 2 diabetes mellitus among Generation Z.

Keywords: type 2 diabetes mellitus; sedentary lifestyle; generation z

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Introduction

Type 2 diabetes mellitus (T2DM) has shown a significant increase over the past few decades. According to data from the International Diabetes Federation (IDF, 2021), there were 537 million adults living with diabetes worldwide, with a global prevalence of 9.3%. Of all diabetes cases, approximately 90% are classified as T2DM. The rising prevalence is not only a global concern but also evident in Indonesia (Ministry of Health, Republic of Indonesia, 2018). This condition affects not only individuals diagnosed with diabetes but also places a considerable economic burden on healthcare systems due to associated complications, including cardiovascular disease, kidney failure, and visual impairment (Rif'at et al., 2023). Although T2DM commonly develops in adults and older populations, its prevalence has recently been increasing among younger populations, including Generation Z (Barakat et al., 2021).

Generation Z refers to individuals born between 1995 and 2012. University students today are part of this generation, growing up in a digital era and becoming highly familiar and comfortable with various technological devices such as smartphones, tablets, and laptops in their daily lives, including in online interactions (Zis et al., 2021). The frequent use of gadgets and the internet has become an integral part of their lifestyle, indirectly influencing their health behaviors. One of the most prominent lifestyle patterns among Generation Z is a sedentary lifestyle.

According to Indonesia's Basic Health Research (*RISKESDAS*) report (Ministry of Health, Republic of Indonesia, 2018), the prevalence of diabetes mellitus among adults over the age of 15 was 8.5%, an increase from 6.9% reported in the 2013 survey. In West Sulawesi Province, the prevalence of diabetes mellitus was recorded at 0.86%, with specific rates of 0.75% in Majene, 1.37% in Polewali Mandar, 0.32% in Mamasa, 0.34% in Mamuju, 0.77% in North Mamuju, and 1.03% in Central Mamuju. Meanwhile, the World Health Organization (WHO, 2016) reported that 27% of adults globally engage in a sedentary lifestyle. In Indonesia, 33.5% of the population was reported to have sedentary behaviors, an increase from 26.1% in 2013. In West Sulawesi, sedentary lifestyle prevalence was 31.9% in Polewali Mandar, 33.1%

in Mamuju, 32.2% in Majene, and 33.8% in Mamasa.

A preliminary survey using the *Adolescent Sedentary Activity Questionnaire* (ASAQ) was conducted among 10 students at the University of West Sulawesi. The findings showed that 1 out of 10 students (10%) reported a moderate sedentary lifestyle, while 9 out of 10 students (90%) reported a high sedentary lifestyle. Additionally, a preliminary survey assessing T2DM risk using the *Finnish Diabetes Risk Score* (FINDRISC) among 9 students revealed that 2 students (22.2%) were at low risk, 3 students (33.3%) were at slightly increased risk, and 4 students (44.5%) were at high risk of developing T2DM.

Previous studies have highlighted similar concerns. Refandi et al. (2022) found that the highest prevalence of sedentary lifestyle was observed among university students. Kadim (2022) reported that undergraduate students constitute the majority group with high sedentary lifestyle levels. Furthermore, Andini (2023) revealed that 20% of students were at slightly increased risk of T2DM, while Berthiana (2019) showed that 42.1% of students were at high risk. These findings underscore that sedentary lifestyle among university students is a significant issue requiring serious attention.

Given the limited number of studies specifically examining the relationship between sedentary lifestyle and the risk of T2DM among Generation Z, particularly university students, this study is considered timely and important. A deeper understanding of this relationship is expected to contribute to the development of effective interventions and preventive programs targeted at younger populations. Consequently, the results of this study may serve as a valuable scientific reference for designing preventive strategies aimed at reducing the risk of T2DM and promoting the long-term health of Generation Z.

Method

Study Design

This study employed a quantitative research design with a descriptive correlational approach and a cross-sectional method. A cross-sectional design refers to data collection conducted at a single point in time based on specific measurement attributes (Widodo, 2023).

Population

The target population of this study comprised undergraduate students from the 2023 cohort of the Accounting Study Program, Faculty of Economics, University of West Sulawesi, totaling 207 students. University students were selected as the study population because of the significant lifestyle changes they experience during the transition to higher education, which contribute to the increased risk of adopting a sedentary lifestyle (Zulka et al., 2023).

Sample

A sample is a subset or representation of the population under study. Researchers selected only a portion of the population to represent the whole (Salim & Haidir, 2019).

Sample Size Estimation

The sample size was determined using Isaac & Michael's formula (Rudini & Asmi, 2023):

$$s = \frac{\lambda^2 \cdot N \cdot P \cdot Q}{d^2(N-1) + \lambda^2 \cdot P \cdot Q}$$

With a population size of 207 students, the calculation was as follows:

$$s = \frac{3.841 \cdot 207 \cdot 0.5 \cdot 0.5}{0.0025(207-1) + 3.841 \cdot 0.5 \cdot 0.5}$$

$$s = \frac{198.771}{1.47525} \approx 135$$

Thus, the final sample size consisted of 135 respondents.

Sampling Technique

This study used purposive sampling, a method in which participants are selected based on predetermined criteria relevant to the phenomenon being investigated (Sugiyono, 2016).

Instruments

1. **Sedentary Lifestyle:** Measured using the *Adolescent Sedentary Activity Questionnaire* (ASAQ). Results were categorized as low (mean < 2 hours/day), moderate (mean 2–5 hours/day), and high (mean > 5 hours/day). The instrument was validated (r count > r table, p < 0.05) and demonstrated reliability (Cronbach's Alpha = 0.782).
2. **Risk of Type 2 Diabetes Mellitus:** Measured using the *Finnish Diabetes Risk Score* (FINDRISC). Scores range from 0 to 28, categorized into low (score < 7) and high (score 7–28). The instrument was also validated and

found to be reliable (Cronbach's Alpha = 0.646).

Data Analysis

1. **Univariate Analysis:** Conducted to summarize the distribution of each variable individually and present descriptive information (Saparina & Nangi, 2020).
2. **Bivariate Analysis:** Conducted to test the relationship or association between variables (Saputra et al., 2024). The Chi-square test was used to examine the association between sedentary lifestyle and the risk of type 2 diabetes mellitus, with a significance level set at $p < 0.05$.

Results

Univariate Analysis

Characterisics of Respondents in Generation Z

Based on Table 1, the majority of respondents in this study were female and predominantly in the early young adult age group, which physiologically belongs to the productive age category. This age group is particularly vulnerable to lifestyle changes that may affect long-term health risks.

Table 1. Characteristics of Respondents by Age and Gender

Variabel	n	%
Age (Years)		
19 years	13	9.6%
20 years	112	83.0%
21 years	10	7.4%
Gender		
Male	19	14.1%
Female	116	85.9%

(Source: Primary Data, 2025; n = 135)

Sedentary Lifestyle Among Generation Z

As shown in Table 2, the majority of respondents had a high sedentary lifestyle, totaling 101 respondents (74.8%). Meanwhile, 21 respondents (15.6%) had a moderate sedentary lifestyle, and 13 respondents (9.8%) reported a low sedentary lifestyle.

Table 2. Distribution of Sedentary Lifestyle Among Generation Z

Variabel	n	%
Low	13	9.8%
Moderate	12	15.6%
High	101	74.8%
Total	135	100%

(Source: Primary Data, 2025; n = 135)

Risk Level of Type 2 Diabetes Mellitus Among Generation Z

According to Table 3, the majority of respondents (77 or 57.0%) had a low risk of developing type 2 diabetes

mellitus. In contrast, 58 respondents (43.0%) were identified as having a high risk of T2DM.

Table 3. Distribution of Type 2 Diabetes Mellitus Risk Among Generation Z

Variabel	n	%
Low	13	9.8%
High	101	74.8%
Total	135	100%

(Source: Primary Data, 2025; n = 135)

the risk of type 2 diabetes mellitus among Generation Z.

This result implies that although sedentary lifestyle is often associated with an increased risk of type 2 diabetes mellitus, the data from this study do not support a strong influence of sedentary lifestyle on T2DM risk within the studied population.

Table 4. Relationship Between Sedentary Lifestyle and the Risk of Type 2 Diabetes Mellitus Among Generation Z

Sedentary lifestyle	Risk of Type 2 Diabetes Mellitus				Total		p-value
	Low		High				
	n	%	n	%	n	%	
Low	8	5.9%	5	3.7%	13	9.6%	
Moderate	11	8.1%	10	7.4%	21	15.6%	0.861
High	58	43.0%	43	31.9%	101	74.8%	

(Source: Primary Data, 2025; n = 135)

Bivariate Analysis

The relationship between sedentary lifestyle and the risk of type 2 diabetes mellitus among Generation Z was tested using the Chi-square test, with a significance level set at $p < 0.05$.

As presented in Table 4, the Chi-square test results indicated a p-value of 0.861, which is greater than $\alpha = 0.05$. This finding suggests that the null hypothesis (H_0) is accepted, and the alternative hypothesis (H_a) is rejected. Thus, no significant relationship was found between sedentary lifestyle and

Discussion

This study investigated the association between sedentary lifestyle and the risk of type 2 diabetes mellitus (T2DM) among Generation Z, with a focus on students in the Accounting Study Program at the University of West Sulawesi. The findings revealed that the majority of respondents (74.8%) reported a high sedentary lifestyle. This result is consistent with previous studies conducted by Julliyana et al. (2024) and Kadim (2022), both of which highlighted

the high prevalence of sedentary behaviors among adolescents and university students. Such lifestyle patterns are strongly influenced by the digital era, in which gadgets and internet use dominate academic, social, and recreational activities (Zis et al., 2021).

Although sedentary lifestyle was prevalent in this population, the bivariate analysis demonstrated no statistically significant association between sedentary lifestyle and the risk of T2DM (p = 0.861). This contrasts with several earlier studies, which reported that low levels of physical activity were significantly associated with an increased incidence of T2DM (Sari & Purnama, 2019; Wijayanti et al., 2020; Murtiningsih et al., 2019). From a theoretical perspective, sedentary behavior is expected to elevate T2DM risk through mechanisms such as insulin resistance and fat accumulation due to minimal energy expenditure (Park et al., 2020). Nevertheless, the results of the present study align with other research that also failed to establish a significant relationship between physical inactivity and T2DM risk (Ningrum et al., 2023). These divergent findings emphasize the multifactorial nature of T2DM, where both modifiable and non-modifiable factors interact to shape disease risk (Widiasari et al., 2021).

Several health indicators within the respondent group may help explain the absence of a significant relationship. The majority of students demonstrated normal body mass index (BMI), normal blood pressure, and normal waist circumference, suggesting that obesity and central adiposity were not predominant risk factors in this population. Additionally, fasting blood glucose levels were generally within normal ranges, indicating no widespread glucose intolerance. The relatively young age of respondents, all under 45 years, also supports efficient glucose metabolism, thereby reducing T2DM susceptibility. Moreover, most respondents reported no family history of T2DM, minimizing genetic predisposition as a contributing factor. These protective characteristics may explain why a high sedentary lifestyle did not translate into an elevated T2DM risk within this cohort.

Limitations

This study has several limitations that must be considered in interpreting the findings. The use of a cross-sectional design restricts causal inference, as the

relationship between sedentary lifestyle and T2DM risk was observed at a single point in time. Data collection relied on self-reported questionnaires (ASAQ and FINDRISC), which may introduce recall bias and social desirability bias. Furthermore, the study sample was limited to accounting students from a single university, thereby restricting the generalizability of results to the broader Generation Z population. Important confounding factors, such as dietary habits, sugar consumption, sleep quality, and genetic predisposition, were not controlled. Lastly, technical inconsistencies during data collection, despite standardized procedures, may have influenced measurement reliability.

Implications

Despite these limitations, the study provides several implications. From a research perspective, expanding the sample size to include students across multiple study programs and institutions, while controlling for confounding variables, would yield more comprehensive insights into the association between sedentary behavior and T2DM risk. From a public health perspective, the findings highlight the importance of promoting active lifestyles within academic settings. Universities should consider implementing health promotion strategies, such as providing sports facilities, encouraging balanced nutrition, and integrating physical activity into daily routines. Scientifically, the absence of a significant relationship in this study underscores the complexity of T2DM risk, which cannot be attributed to a single behavioral factor but rather reflects the interplay of biological, behavioral, and environmental determinants. Future multidisciplinary research is therefore essential to better capture these dynamics.

Conclusion

In conclusion, this study found no significant relationship between sedentary lifestyle and the risk of type 2 diabetes mellitus among Generation Z students in the Faculty of Economics, University of West Sulawesi. Although most respondents exhibited a high sedentary lifestyle, the majority were classified as having a low risk of developing T2DM. These findings suggest that other protective health factors, such as normal BMI, blood

pressure, and young age, may mitigate the potential impact of sedentary behavior on T2DM risk in this population.

Recommendations

The study recommends that individuals increase physical activity as a preventive measure against T2DM. Educational institutions are encouraged to adopt health promotion programs that emphasize the benefits of active living. Future research should explore additional risk factors, including dietary patterns, sleep quality, and genetic predisposition, to provide a more comprehensive understanding of T2DM risk among younger populations.

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Conflict of Interests Statement

The author declares that there are no conflicts of interest related to the publication of this article.

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