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The Relationship Between Sedentary Behavior And Obesity Among Adults: A Systematic Literature Review

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Abstract

Obesity is a growing public health problem in various countries, including Indonesia. Sedentary behavior, characterized by prolonged sitting or lying down with low energy expenditure, has been identified as a major risk factor for obesity in adulthood. This study aims to examine the relationship between sedentary behavior and obesity in adulthood through a literature review. The method used was a literature review with a search of articles published in PubMed and Google Scholar databases between 2023 and 2026. Inclusion criteria included studies discussing sedentary behavior and obesity in the adult population. The study results showed that a high duration of sedentary behavior was significantly associated with increased body mass index (BMI), waist circumference, and the risk of obesity. Adults who spend more than 6–8 hours per day sitting have a greater risk of obesity than individuals with more physical activity. Technological developments, computer-based work, and the use of digital devices are contributing factors to the increase in sedentary behavior. These findings emphasize the importance of increasing physical activity and reducing sitting time as strategies for preventing obesity in adulthood.

Keywords: ***Sedentary Behavior, Obesity, Adulthood***

INTRODUCTION

Obesity is one of the increasingly prevalent public health problems and has become a major global challenge in the 21st century. Obesity is defined as a condition characterized by excessive accumulation of body fat resulting from an imbalance between energy intake and energy expenditure over a prolonged period. This condition not only affects an individual's physical appearance but also increases the risk of various non-communicable diseases, including type 2 diabetes mellitus, hypertension, coronary heart disease, stroke, and several types of cancer. Therefore, obesity has become one of the major risk factors contributing to high morbidity and mortality rates in many countries (World Health Organization, 2025).

According to the World Health Organization (WHO), the prevalence of obesity has increased significantly over the past several decades. In 2022, more than 2.5 billion adults worldwide were overweight, and approximately 890 million of them were living with obesity. Globally, the prevalence of obesity among adults reached 16%, more than doubling since 1990. These data indicate that approximately one in eight people worldwide is living with obesity. This substantial increase has made obesity a major public health issue requiring serious attention from various stakeholders (World Health Organization, 2025).

The increasing prevalence of obesity across countries is influenced by changes in people's lifestyles associated with modernization. Technological development and urbanization have transformed daily activities, leading people to engage increasingly in activities characterized by low energy expenditure. The use of motor vehicles, occupations dominated by computer-based work, and the growing use of digital devices have reduced daily physical activity. These lifestyle changes contribute to an increased risk of overweight and obesity among adult populations (Hallal et al., 2012).

One factor that has been widely associated with the increasing incidence of obesity is sedentary behavior. Sedentary behavior refers to any waking activity performed while sitting, reclining, or lying down with an energy expenditure of ≤1.5 Metabolic Equivalents of Task (METs). Examples of sedentary behavior include watching television, using computers, playing with mobile devices, working in front of screens for prolonged periods, and using motor vehicles for daily mobility. Such

activities have become increasingly common with the advancement of digital technology in modern society (Tremblay et al., 2017).

Sedentary behavior can reduce daily energy expenditure, resulting in an energy imbalance that may lead to the accumulation of body fat. In addition, prolonged sitting has been associated with impaired glucose and lipid metabolism, which may increase the risk of obesity. Various studies have shown that individuals who spend more than six hours per day engaged in sedentary activities have a higher risk of obesity than those who are physically active. Therefore, sedentary behavior is considered a modifiable risk factor in efforts to prevent obesity (Owen et al., 2020).

In addition to contributing to weight gain, sedentary behavior is also associated with various other health problems. Research has demonstrated that individuals with high levels of sedentary behavior have a greater risk of metabolic syndrome, type 2 diabetes mellitus, cardiovascular disease, and mental health disorders. These adverse effects may occur because insufficient physical activity can reduce insulin sensitivity, slow metabolic processes, and increase visceral fat accumulation. Over time, these conditions may further deteriorate an individual's overall health status (Katzmarzyk et al., 2019).

In Indonesia, obesity has also shown a concerning upward trend. Based on the 2023 Indonesian Health Survey, the prevalence of obesity among adults reached 23.4%, an increase from 21.8% reported in the 2018 Basic Health Research (Badan Kebijakan Pembangunan Kesehatan, 2024). In addition, the prevalence of central obesity among individuals aged ≥15 years reached 36.8%. These data indicate that nearly one-quarter of Indonesia's adult population is living with obesity and is consequently at risk of developing various non-communicable diseases associated with this condition (Badan Kebijakan Pembangunan Kesehatan, 2024).

The increasing prevalence of obesity in Indonesia is closely related to changes in lifestyle patterns characterized by declining levels of physical activity. Technological advances have encouraged people to spend more time engaging in screen-based activities for both work and entertainment. The widespread use of the internet, social media, and digital services has contributed to increased daily sitting time. This situation is further exacerbated by dietary patterns characterized by high-calorie and low-fiber food consumption, which are commonly observed in urban environments. The combination of sedentary behavior and unhealthy dietary patterns constitutes an important factor contributing to the increasing incidence of obesity (Badan Kebijakan Pembangunan Kesehatan, 2024).

Various studies at both national and international levels have reported a significant association between sedentary behavior and obesity among adults. Individuals who spend longer periods sitting tend to have higher body mass index (BMI), waist circumference, and body fat percentages than those who are physically active. Nevertheless, existing findings vary according to population characteristics, occupational conditions, and the methods used to measure sedentary behavior (Fitri et al., 2024; Patterson et al., 2018).

Based on the foregoing, sedentary behavior is one of the potential risk factors that may contribute to the development of obesity among adults. The high prevalence of obesity globally and nationally highlights the importance of preventive efforts through the promotion of more physically active lifestyles. Therefore, this study was conducted using a literature review method to examine findings from various studies concerning the association between sedentary behavior and obesity among adults. The findings of this review are expected to provide scientific information and serve as a basis for developing health promotion strategies aimed at reducing the prevalence of obesity in the community.

RESEARCH METHODS

This study employed a literature review method conducted in June 2026. The literature search was performed online using the PubMed and Google Scholar databases, with keywords related to the research topic. The keywords used to identify relevant articles included "sedentary behavior," "obesity," and "sedentary lifestyle." The inclusion criteria were as follows: articles published between 2023 and 2026; studies examining the association between sedentary behavior and obesity among adults; articles available in full-text format; and studies employing quantitative research designs, such as cross-sectional, cohort, or longitudinal studies. The exclusion criteria included studies that examined obesity without measuring sedentary behavior, studies involving children or adolescents, review articles, editorials, and case reports. The retrieved data were subsequently analyzed descriptively to identify the association between sedentary behavior and the occurrence of obesity among adult populations.

RESULTS AND DISCUSSION

Result

The selected studies employed quantitative approaches and were published between 2023 and 2026. The results of the literature review are presented in Table 1 below.

Table 1. Literature Review of Selected Studies

Author(s), Year	Title	Method	Sample	Findings
(Fitri et al., 2024)	The Relationship Between Sitting Duration and Obesity of Administrative Employees at Sultan Ageng Tirtayasa University	Cross-sectional	90 administrative employees at Sultan Ageng Tirtayasa University	Univariate analysis showed that the prevalence of obesity was 57.8%, while the majority of respondents reported sitting for >4 hours per day (84.4%). Bivariate analysis using the Chi-square test showed no significant association between sitting duration and obesity (p = 0.5; OR = 1.4; 95% CI = 0.4–4.5). Nevertheless, respondents who sat for >4 hours had a higher proportion of obesity than those who sat for ≤4 hours.
(Sulastri & Yuliyana, 2024)	The Relationship Between Sedentary Behavior and Dietary Intake with Obesity among Employees	Cross-sectional	98 employees of Khidmat Sehat Afiat Regional General Hospital, Depok City	Univariate analysis showed that 44.9% of respondents were obese and 29.6% had high levels of sedentary behavior. Bivariate analysis indicated a significant association between sedentary behavior and obesity (p = 0.01). Energy, protein, and fat intake were also significantly associated

				with obesity (p = 0.01 for each variable).
(de Victo et al., 2023)	Joint Association between Sedentary Time and Moderate-to-Vigorous Physical Activity with Obesity Risk in Adults from Latin America	Cross-sectional	2,406 adults aged 20–65 years	The study found an association between sedentary behavior, physical activity, and obesity risk. Respondents who did not meet physical activity recommendations had a higher risk of obesity, whereas achieving ≥300 minutes per week of moderate-to-vigorous physical activity had a protective effect against obesity, even among individuals with high sedentary time.
(Ghosh et al., 2023)	Sedentary Lifestyle with Increased Risk of Obesity in Urban Adult Academic Professionals: An Epidemiological Study in West Bengal, India	Cross-sectional	650 urban academic professionals aged 20–65 years in West Bengal, India (456 men and 194 women)	A sedentary lifestyle was associated with an increased risk of obesity. Parental history of obesity and a sedentary lifestyle were significant factors associated with obesity. Physical activity was not significantly associated with BMI or visceral fat because most respondents had low levels of physical activity. Obesity was also associated with comorbidities such as type 2 diabetes mellitus, hypertension, hypothyroidism, and cardiovascular disease. The study concluded that a sedentary lifestyle increases the risk of obesity and metabolic diseases among urban academic professionals.
(Wakasa et al., 2024)	Relationship of Work-Related and Leisure-Based Screen Time with Obesity: A Cross-Sectional Study on Adults Including Older Adults	Cross-sectional	2,488 Japanese adults aged ≥20 years (597 men <65 years, 792 women <65 years, 542 men ≥65 years, and 557 women ≥65 years)	Total screen time was significantly associated with obesity among all participants (PR = 1.07; 95% CI: 1.04–1.10). Work-related screen time was significantly associated with obesity, particularly among men in

	both the <65 and ≥65 age groups. Leisure-time screen exposure was significantly associated with obesity, particularly among participants aged <65 years. The study concluded that longer screen time, whether for work or leisure, was associated with a higher risk of obesity.

Discussion

The findings of this literature review indicate that sedentary behavior is generally associated with a higher risk of obesity among adults, although the strength and statistical significance of the association vary across studies. Of the five studies reviewed, four reported a statistically significant association between sedentary behavior or screen time and obesity, whereas one study found no statistically significant association. These differences suggest that the relationship between sedentary behavior and obesity is complex and may be influenced by physical activity levels, dietary intake, occupational characteristics, age, sex, and differences in the measurement of sedentary behavior.

The study by (Fitri et al., 2024) provides an important example of the variation in findings. Among 90 administrative employees at Sultan Ageng Tirtayasa University, 57.8% were classified as obese and 84.4% reported sitting for more than four hours per day. However, sitting duration was not significantly associated with obesity ($p = 0.5$; OR = 1.4; 95% CI = 0.4–4.5). Nevertheless, the proportion of obesity was higher among respondents who sat for more than four hours per day. This finding suggests that prolonged sitting alone may not adequately explain differences in obesity status. In occupational populations, other factors such as dietary intake, total physical activity, age, sex, sleep, and occupational workload may influence body weight and potentially attenuate the association between sitting duration and obesity.

The absence of a statistically significant association in the Marlita et al. study should therefore not be interpreted as evidence that sedentary behavior is unrelated to obesity. The relatively small sample size and the broad categorization of sitting duration may have reduced the study's ability to detect an association. In addition, the study focused specifically on administrative employees, a relatively homogeneous occupational group in which prolonged sitting was already common. When most participants are exposed to similar levels of sitting, the variability required to detect a statistical association may be limited. The wide confidence interval for the odds ratio (95% CI = 0.4–4.5) also indicates substantial statistical uncertainty around the estimated association.

In contrast, (Sulastri & Yuliyana, 2024) reported a statistically significant association between sedentary behavior and obesity among 98 employees of Khidmat Sehat Afiat Regional General Hospital in Depok City ($p = 0.01$). The study also found significant associations between obesity and carbohydrate, protein, and fat intake. These findings indicate that sedentary behavior should be considered within a broader behavioral context. Prolonged sedentary behavior may contribute to lower energy expenditure, while excessive energy intake may simultaneously increase energy availability for fat storage. Consequently, obesity may emerge from the interaction of multiple behavioral factors rather than from sedentary behavior alone.

The findings from Latin America further demonstrate the importance of considering sedentary time together with physical activity. (de Victo et al., 2023) examined 2,406 adults from eight Latin American countries and assessed sedentary time and moderate-to-vigorous physical activity using accelerometers. The study showed that the combination of sedentary time and moderate-to-vigorous physical activity was associated with indicators of obesity, including BMI, waist circumference, and neck circumference. In particular, meeting higher levels of moderate-to-vigorous physical activity,

including ≥300 minutes per week, was associated with more favorable obesity-related indicators in several sedentary-time categories.

These findings suggest that the relationship between sedentary behavior and obesity cannot be interpreted independently of physical activity. A person may spend substantial time sitting but still achieve sufficient moderate-to-vigorous physical activity, whereas another person may have both prolonged sedentary time and insufficient physical activity. This distinction is important because sedentary behavior and physical inactivity are conceptually different constructs. Sedentary behavior refers to low-energy activities performed while awake, whereas physical inactivity refers to insufficient participation in physical activity. Therefore, interventions aimed at reducing obesity should address both prolonged sitting and inadequate physical activity rather than focusing exclusively on one behavior.

The findings of (Ghosh et al., 2023) are also consistent with the general pattern identified in this review. In their study of 650 urban academic professionals aged 20–65 years in West Bengal, India, a sedentary lifestyle and parental history of obesity were identified as important factors associated with obesity. The study also examined visceral fat, BMI, dietary patterns, and obesity-related metabolic conditions. The occupational context of this population is particularly relevant because academic professionals may spend substantial amounts of time performing computer-based work, teaching, preparing materials, and engaging in other activities that involve prolonged sitting.

The study by (Ghosh et al., 2023) further emphasizes that obesity is a multifactorial condition. The presence of type 2 diabetes mellitus, hypertension, hypothyroidism, and cardiovascular disease among participants with obesity illustrates the broader metabolic consequences associated with excessive adiposity. Therefore, reducing sedentary behavior may have relevance not only for body weight management but also as part of broader strategies for preventing metabolic and cardiovascular diseases.

Another important finding is provided by (Wakasa et al., 2024) who examined work-related and leisure-based screen time among 2,488 Japanese adults, including older adults. Total screen time was significantly associated with obesity, with a prevalence ratio of 1.07 (95% CI = 1.04–1.10) per additional hour of screen time. Work-related screen time was significantly associated with obesity particularly among men, while leisure-based screen time showed significant associations particularly among younger participants. These results demonstrate that the context in which sedentary behavior occurs may be relevant to obesity risk. Screen exposure during work and leisure may represent different behavioral patterns and may be accompanied by different opportunities for movement, dietary behaviors, and breaks from sitting.

The association observed by (Wakasa et al., 2024) also supports the relevance of screen-based sedentary behavior in modern populations. Digitalization has expanded the amount of time individuals spend in front of computers, smartphones, and other devices. Consequently, interventions to reduce sedentary behavior may need to incorporate practical strategies such as taking regular movement breaks during work, reducing unnecessary screen-based leisure activities, increasing active transportation, and incorporating light physical activity throughout the day. However, the findings should still be interpreted cautiously because the study used a cross-sectional design and therefore cannot establish that greater screen time directly causes obesity.

The overall pattern observed in this literature review is supported by broader evidence. A systematic review and meta-analysis involving 23 studies and more than 638,000 adults and older adults found a significant positive association between sedentary behavior and obesity (OR = 1.45; 95% CI = 1.21–1.75). The same analysis also found an association between physical inactivity and obesity (OR = 1.52; 95% CI = 1.23–1.87). However, the authors noted considerable variation in the methods used to measure sedentary behavior and physical activity, including differences between objective measurements and self-reported questionnaires. This methodological variation may partly explain why the studies included in the present review produced different effect estimates and levels of statistical significance.

Evidence from a 2023 systematic review also indicates that adults living with overweight or obesity generally have lower levels of physical activity and greater sedentary behavior. Nevertheless, the review found that relatively few studies specifically examined determinants of sedentary behavior and that the evidence regarding its correlates was inconsistent. This finding reinforces the importance of examining sedentary behavior as a multidimensional behavior influenced by individual, social, occupational, and environmental factors.

From a physiological perspective, prolonged sedentary behavior may contribute to obesity through reduced energy expenditure and the accumulation of periods of inactivity throughout the day. Extended sitting may also replace opportunities for light-intensity physical activity that could otherwise contribute to daily energy expenditure. In addition, sedentary behavior may frequently occur alongside other behaviors that promote positive energy balance, such as prolonged screen exposure, snacking, and consumption of energy-dense foods. The significant association between sedentary behavior and dietary intake observed by (Sulastri & Yuliyana, 2024)illustrates the importance of considering these behaviors together.

Recent evidence also provides support for examining specific types of sedentary behavior rather than treating all sedentary activities as identical. A 2024 Mendelian randomization study reported evidence supporting causal relationships between several specific sedentary behaviors including leisure screen time, television viewing, computer use, and driving and obesity risk. Although this evidence differs methodologically from the observational studies included in the present review, it strengthens the rationale for distinguishing between different sedentary activities when designing obesity-prevention interventions.

Overall, the literature reviewed suggests that sedentary behavior is an important behavioral factor associated with obesity among adults, but it should not be considered an isolated determinant. The strongest interpretation of the available evidence is that prolonged sedentary behavior may coexist with insufficient physical activity and unhealthy dietary patterns, thereby contributing to conditions that favor excess body weight. The findings also indicate that the association may differ according to occupational context, age, sex, type of sedentary activity, and measurement method.

Nevertheless, several limitations should be considered when interpreting these findings. Most of the studies included in this review used a cross-sectional design, which limits the ability to establish temporal sequence and causal relationships. In addition, differences in sample characteristics, definitions of sedentary behavior, measurement instruments, obesity criteria, and potential confounding variables make direct comparisons between studies difficult. Therefore, the findings should be interpreted as evidence of association rather than definitive evidence that sedentary behavior causes obesity.

From a public health perspective, the findings support the development of multifaceted obesity-prevention strategies that combine reductions in prolonged sedentary time with increased physical activity and improvements in dietary behavior. Workplace interventions may include regular movement breaks, active commuting, standing or walking meetings where feasible, and opportunities to reduce uninterrupted sitting. At the population level, health promotion programs can encourage individuals to reduce unnecessary screen time and incorporate physical activity into daily routines. Such approaches are more consistent with the multifactorial nature of obesity and may be more effective than interventions that focus on sedentary behavior alone.

CONCLUSION

Based on the findings of the literature review, sedentary behavior is generally associated with obesity among adults, although the strength and statistical significance of the association vary across studies. Longer periods of sedentary activity tend to be associated with higher body mass index, waist circumference, and obesity risk. Factors such as increased technology use, computer-based occupations, prolonged screen time, and insufficient physical activity contribute to sedentary behavior

in modern populations. However, the relationship between sedentary behavior and obesity is multifactorial and may also be influenced by dietary intake, age, sex, occupational characteristics, and overall physical activity levels. Therefore, comprehensive promotive and preventive strategies are needed, including health education, increased physical activity, regular movement breaks, and reduction of prolonged daily sitting and screen time. Given that most studies reviewed employed cross-sectional designs, further longitudinal research is recommended to clarify the temporal and causal relationships between sedentary behavior and obesity among adults.

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