

SEDENTARY BEHAVIOR AND JUNK FOOD CONSUMPTION AMONG WORKING AGE ADULTS WITH HYPERTENSION

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Abstract

Hypertension is one of the most prevalent non-communicable diseases worldwide, with an increasing burden among working-age adults. Sedentary behavior and dietary patterns, including food consumption based on the NOVA classification, are considered important lifestyle factors that may contribute to hypertension. This study aimed to describe respondent characteristics, sedentary behavior, dietary patterns based on the NOVA food classification, and the distribution of hypertension among working-age adults. A quantitative descriptive study with a cross-sectional design was conducted among 37 working-age adults with hypertension recruited using accidental sampling. Data were collected using the Adolescent Sedentary Activity Questionnaire (ASAQ), a NOVA-based food frequency questionnaire, and blood pressure measurements. Data were analyzed descriptively using frequency distributions and percentages. Most respondents were late-middle-aged adults, female, housewives, and non-smokers. Grade I hypertension was observed in 51.3% of respondents, while 48.6% had Grade II hypertension. Moderate sedentary behavior was the most common category. Based on the NOVA classification, respondents frequently consumed foods from NOVA Group 1 and NOVA Group 2, whereas foods from NOVA Group 3 and NOVA Group 4 were consumed less frequently. The findings suggest that hypertension among working-age adults is a multifactorial condition influenced by multiple risk factors. Hypertension prevention strategies should therefore promote healthy lifestyle behaviors through increased physical activity, reduced sedentary behavior, healthier dietary practices, and regular blood pressure monitoring.

Keywords: hypertension, sedentary lifestyle, junk food lifestyle

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1. Introduction

Hypertension remains one of the leading causes of premature mortality worldwide and represents a major public health challenge [1]. In 2020, an estimated 1.56 billion adults were living with hypertension, contributing to approximately eight million deaths annually. In Indonesia, the 2018 National

Basic Health Survey reported that 34.1% of adults aged ≥ 18 years had hypertension, yet only a small proportion had been formally diagnosed or were receiving treatment, highlighting substantial gaps in detection and management [2]. Similar trends have been observed in Central Java Province,

where hypertension continues to impose a considerable disease burden. In 2018, 2,807,407 individuals (11.03%) were reported to have hypertension [3]. In Tegal City, Bandung Subdistrict in South Tegal District recorded one of the highest numbers of hypertension cases, accounting for 2,515 registered patients (17.7%) [4].

Although hypertension is commonly regarded as a disease of older adults, its prevalence among working-age adults (18–45 years) has also increased, accounting for approximately 5.73% of all hypertension cases in Indonesia. Hypertension often develops gradually and remains asymptomatic during its early stages, allowing many individuals to continue their daily activities without recognizing the condition. Consequently, hypertension among working-age adults is frequently underdiagnosed until complications occur. This situation is particularly concerning because uncontrolled hypertension during productive years increases the lifetime risk of cardiovascular disease, stroke, chronic kidney disease, and premature mortality [5].

Sedentary behavior is characterized by prolonged sitting or low levels of physical activity and has become an important public health concern. Numerous studies have demonstrated that sedentary behavior is a significant risk factor for hypertension, vascular disorders, and metabolic diseases, while also contributing substantially to the growing burden of healthcare costs [6].

In addition to sedentary behavior, several lifestyle-related factors contribute to elevated blood pressure among working-age adults. Occupational demands, economic stress, inadequate rest, and smoking habits further increase the risk of developing hypertension. The combination of chronic stress, insufficient sleep, physical inactivity, and unhealthy dietary habits places continuous strain on the cardiovascular system. Over time, blood vessels gradually lose their elasticity, leading to a progressive increase in blood pressure

until hypertension is eventually diagnosed, often after symptoms such as headaches, dizziness, fatigue, or even cardiovascular complications have developed [5].

The long-term accumulation of unhealthy lifestyle behaviors, including sedentary behavior, together with limited awareness of routine blood pressure screening and the common misconception that hypertension affects only older adults, often delays the early detection and management of hypertension among working-age individuals. Consequently, this population is particularly vulnerable to developing hypertension and experiencing cardiovascular complications at an earlier age if preventive lifestyle modifications are not implemented [5].

One of the major contributors to the increasing prevalence of hypertension among working-age adults is an unhealthy lifestyle associated with busy daily routines. Such behaviors not only compromise overall health but also substantially increase the risk of hypertension. Lifestyle-related risk factors include physical inactivity, inadequate consumption of fruits and vegetables, smoking, alcohol consumption, and unhealthy dietary patterns characterized by excessive salt intake [5].

A previous study reported that 41.1% of individuals with hypertension had poor lifestyle behaviors, whereas 58.9% demonstrated healthy lifestyle practices. These findings indicate that a considerable proportion of patients continue to engage in unhealthy behaviors despite having already been diagnosed with hypertension¹. Another study found that 65.2% of working-age adults regularly consumed junk food. Individuals with frequent junk food consumption exhibited a higher prevalence of hypertension than those who consumed such foods less frequently, suggesting that the high sodium and fat content of junk food

contributes to elevated blood pressure among working-age adults [7].

Wulandari (2024) reported that although 64% of women exhibiting sedentary behavior had normal triglyceride levels, 36% showed elevated triglyceride concentrations. These findings suggest that although metabolic abnormalities may not occur in every individual with sedentary behavior, a substantial proportion remains at risk of developing metabolic disorders [8].

Sedentary behavior does not necessarily lead to elevated triglyceride levels in every individual. Nevertheless, prolonged sedentary behavior may contribute to disturbances in lipid metabolism, vascular dysfunction, hypertension, and other metabolic disorders over time [8]. These findings suggest that the adverse health effects of sedentary behavior may extend beyond metabolic abnormalities alone, potentially increasing the risk of cardiovascular disease.

Despite growing evidence regarding lifestyle-related risk factors for hypertension, evidence describing the coexistence of sedentary behavior and junk food consumption among working-age adults with hypertension remains limited, particularly in primary healthcare settings in Indonesia. Understanding these lifestyle patterns is important because multiple unhealthy behaviors often coexist and may collectively contribute to poor blood pressure control and an increased risk of future cardiovascular complications.

Therefore, hypertension among working-age adults should be recognized as a multifactorial health problem that is strongly influenced by lifestyle behaviors. Accordingly, this study was conducted to analyze sedentary behavior and junk food consumption among working-age adults with hypertension in the Bandung Primary Health Center catchment area, South Tegal District.

2. Method

This study used a quantitative descriptive design with a cross-sectional approach. Data on sedentary behavior, junk food consumption, and hypertension status were collected at the same time point. The study population consisted of working-age adults with hypertension (15–64 years) who routinely attended the Bandung Primary Health Center, South Tegal District. Participants were recruited using an accidental sampling technique. The total population comprised 108 eligible individuals. Based on Slovin's formula, the required sample size was 85 respondents. However, due to time constraints during the data collection period, only 37 respondents were successfully recruited. This limited sample size is acknowledged as one of the limitations of the present study. Sedentary behavior was assessed using the Adolescent Sedentary Activity Questionnaire (ASAQ). Junk food consumption was assessed using a food frequency questionnaire to determine how often respondents consumed specific food items (e.g., daily, weekly, or monthly). The food items were classified according to the NOVA food classification system.

3. Results and Discussion

This study was conducted in the Bandung Primary Health Center catchment area, South Tegal District, Tegal City. Bandung Primary Health Center is a primary healthcare facility that provides promotive, preventive, curative, and rehabilitative health services to the local community.

a. Respondent Characteristics

Table 1. Characteristics of the Respondents

Characteristics	f	%
Age		
20–30 year	4	10.8
31–40 year	7	18.9
41–50 year	6	16.2

51–64 year	20	54.1
Total	37	100
Sex		
Male	5	18.5
Female	32	86.5
Total	37	100
Occupation		
Housewife	30	81.1
Civil servant	2	5.4
Private-sector employee	2	5.4
Manual laborer	3	8.1
Total	37	100
Smoking Status		
Non-smoker	35	94.6
Smoker	2	5.4
Total	37	100

Based on the findings, the respondents with hypertension in the Bandung Primary Health Center catchment area, South Tegal District, Tegal City were predominantly late-middle-aged adults, female, housewives, and non-smokers.

Advancing age is a well-established contributor to elevated blood pressure because the aging process is associated with reduced arterial elasticity, thickening of the arterial walls, and increased peripheral vascular resistance, all of which contribute to the development of hypertension [9]. The predominance of female respondents may also be explained by hormonal changes occurring during the perimenopausal and menopausal periods. Declining estrogen levels diminish their protective effects on the cardiovascular system, thereby increasing susceptibility to hypertension [10].

Furthermore, the large proportion of respondents who were housewives suggests that their daily activities were primarily centered within the household, which may influence both physical activity and dietary patterns. As the primary individuals responsible for preparing family meals, housewives play an important role in determining the use of salt, sugar, and cooking oil in daily

food preparation. Consequently, these dietary practices may contribute to the development and progression of hypertension [11][12].

Although smoking is a well-established risk factor for hypertension through mechanisms such as endothelial dysfunction, vasoconstriction, and increased cardiac workload, most respondents in this study were non-smokers. This finding suggests that hypertension among the study population was more likely influenced by other factors, including advancing age, sex, dietary habits, physical activity, and a history of hypertension.

Overall, the respondent characteristics indicate that hypertension among working-age adults in this study was predominantly observed among late-middle-aged women and homemakers. Despite the low prevalence of smoking, respondents remained at risk of hypertension because of the combined influence of physiological changes and other lifestyle-related risk factors [11][12].

b. Hypertension

Table 2. Distribution of Hypertension Grades

Hypertension	Frequency (f)	Percentage %
Grade I - hypertension	19	51.35
Grade II - hypertension	18	48.65
Total	37	100

As presented in table 2, most respondents had Grade 1 hypertension (systolic blood pressure of 140–159 mmHg), accounting for 19 respondents (51.35%).

This finding indicates that most respondents had mild to moderate elevations in blood pressure that nevertheless require appropriate clinical attention. Grade I - hypertension reflects blood pressure levels above the normal range and, if

left uncontrolled, may progress to more severe hypertension, thereby increasing the risk of target organ damage involving the heart, kidneys, and blood vessels. Meanwhile, respondents with Grade II - hypertension had more severe elevations in blood pressure and were consequently at a greater risk of developing cardiovascular complications. The predominance of Grade I - hypertension observed in this study may be associated with several contributing factors, including age, dietary habits, sedentary behavior, and a previous history of hypertension. These findings underscore the importance of blood pressure control through lifestyle modification and regular health monitoring to prevent disease progression and reduce the risk of hypertension-related complications [13].

c. Sedentary Behavior

Table 3. Distribution of Sedentary Behavior

Sedentary Behavior	Frequency (f)	Percentage%
Low	14	37.84
Moderate	18	48.65
High	5	13.51
Total	37	100

As presented in Table 3, most respondents were classified as having moderate sedentary behavior (48.65%), followed by low (37.84%) and high sedentary behavior (13.51%).

These findings indicate that many respondents regularly engaged in low-energy activities such as prolonged sitting, watching television, using mobile phones, and other activities involving minimal physical movement. Sedentary behavior is defined as any waking behavior characterized by an energy expenditure of ≤ 1.5 metabolic equivalents (METs) while sitting, reclining, or lying down. Prolonged

sedentary behavior has been consistently associated with an increased risk of non-communicable diseases, including hypertension and cardiovascular disease. Therefore, the predominance of moderate sedentary behavior observed in this study suggests that insufficient physical activity may contribute to poor blood pressure control if maintained over time [14].

d. Junkfood Consumption

Table 4. Frequency of Junk Food Consumption

Junk Food Consumption	Frequent		Infrequent	
	f	%	f	%
NOVA 1	26	70.3	11	29.7
NOVA 2	31	83.8	6	16.2
NOVA 3	13	35.1	24	64.9
NOVA 4	5	13.5	32	86.5

As shown in Table 4, respondents most frequently consumed foods classified as NOVA Group 2, with 83.8% reporting frequent consumption. These foods include processed culinary ingredients such as salt, sugar, honey, butter, and cooking oil.

According to the NOVA classification system, NOVA Group 1 consists of unprocessed or minimally processed foods, including fruits, vegetables, rice, tubers, eggs, fish, fresh meat, milk, and legumes. These foods are recommended as the foundation of a healthy diet because they largely retain their nutritional value and contribute to the prevention of non-communicable diseases [15]. The high proportion of respondents reporting frequent consumption of NOVA Group 1 foods suggests that fresh foods remain an important component of their daily dietary intake.

NOVA Group 2 comprises processed culinary ingredients,

including cooking oil, sugar, salt, butter, and spices, which are extracted from natural foods and primarily used in household food preparation. The high frequency of NOVA Group 2 consumption observed in this study may reflect the characteristics of the study population, most of whom were homemakers responsible for preparing family meals. Consequently, the regular use of cooking oil, salt, and sugar is likely to be part of routine household cooking practices. Although these ingredients are essential for food preparation, excessive consumption of salt, sugar, and fat has been associated with an increased risk of hypertension and cardiovascular disease [16].

In contrast, most respondents reported infrequent consumption of NOVA Group 3 foods (64.9%). This group includes processed foods such as bread, cheese, salted fish, canned vegetables, and other products prepared by adding salt, sugar, or oil to improve shelf life and palatability [16]. These findings suggest that processed foods are not a predominant component of the respondents' usual dietary patterns.

Similarly, 86.5% of respondents reported infrequent consumption of NOVA Group 4 foods, which comprise ultra-processed products such as sugar-sweetened beverages, instant noodles, fast food, sausages, nuggets, potato chips, biscuits, and other ready-to-eat products¹⁶. This relatively low intake of ultra-processed foods is encouraging because numerous studies have demonstrated that excessive

consumption of ultra-processed foods is associated with an increased risk of obesity, hypertension, type 2 diabetes mellitus, cardiovascular disease, and premature mortality [17]. In addition, ultra-processed foods are typically high in sodium, added sugars, saturated fats, and energy density while being low in dietary fiber, vitamins, and minerals, thereby contributing to the development of non-communicable diseases when consumed excessively [11].

Overall, the findings indicate that respondents' dietary patterns were predominantly characterized by the consumption of unprocessed foods and culinary ingredients, whereas the intake of ultra-processed foods remained relatively low. This pattern generally reflects dietary practices that are closer to healthy eating recommendations. Nevertheless, the frequent use of NOVA Group 2 ingredients warrants attention, as excessive consumption of salt, sugar, and cooking oil during food preparation may increase the risk of hypertension even when meals are prepared using fresh ingredients. Therefore, nutrition education emphasizing the appropriate use of salt, sugar, and fats during household food preparation remains an important strategy for hypertension prevention.

e. Sedentary Behavior According to Hypertension Grade

Table 5. Distribution of Sedentary Behavior by Hypertension Grade

Sedentary Behavior	Grade I - hypertension		Grade II- hypertension	
	f	%	f	%
Low	6	16.2	8	21.6
Moderate	11	29.7	7	18.8

High	2	5.4	3	8.1
Total	19	51.3	18	48.65

As presented in Table 5, respondents with Grade I - hypertension were most commonly classified as having moderate sedentary behavior (29.7%), whereas those with Grade II - hypertension were more frequently classified as having low sedentary behavior (21.6%).

Respondents with high sedentary behavior represented the smallest proportion in both hypertension grades. These findings indicate that hypertension was observed across all categories of sedentary behavior rather than being concentrated exclusively among individuals with high sedentary behavior. This pattern suggests that blood pressure status in the present study may reflect the combined influence of multiple factors, including age, sex, family history of hypertension, dietary habits, nutritional status, and other metabolic risk factors [11][12].

Nevertheless, sedentary behavior remains an important modifiable risk factor for hypertension. Prolonged sitting and other low-energy activities, such as watching television and prolonged mobile phone use, may reduce energy expenditure, impair metabolic function, increase insulin resistance, and contribute to elevated blood pressure and cardiovascular disease risk [11]. Therefore, hypertension prevention strategies should emphasize not only increasing physical activity but also reducing prolonged sedentary time while promoting a healthy lifestyle, including a balanced diet and regular blood pressure monitoring.

f. Junk Food Consumption According to Hypertension Grade

Table 6. Distribution of NOVA Food Consumption According to Hypertension Grade

Junk Food Consumption	Grade I - hypertension		Grade II - hypertension	
	f	%	f	%
NOVA 1				
Infrequent	8	21.6	3	8.1
Frequent	11	29.7	15	40.5
Total	19	51.3	18	48.6
NOVA 2				
Infrequent	4	10.8	2	5.4
Frequent	15	40.5	16	43.2
Total	19	51.3	18	48.6
NOVA 3				
Infrequent	11	29.7	13	35.1
Frequent	8	21.6	5	13.5
Total	19	51.3	18	48.6
NOVA 4				
Infrequent	17	45.9	15	40.5
Frequent	2	5.4	3	8.1
Total	19	51.3	18	48.6

Among respondents with Grade I - hypertension, frequent consumption was most evident for NOVA Group 1 (29.7%) and NOVA Group 2 (40.5%), whereas infrequent consumption was more common for NOVA Group 3 (29.7%) and NOVA Group 4 (45.9%). A comparable distribution was observed among respondents with Grade II - hypertension, in whom frequent consumption of NOVA Group 1 (40.5%) and NOVA Group 2 (43.2%) predominated, while NOVA Group 3 (35.1%) and NOVA Group 4 (40.5%) were more often consumed infrequently.

Overall, respondents' dietary patterns were characterized by frequent consumption of unprocessed or minimally processed foods (NOVA Group 1) and processed culinary ingredients (NOVA Group 2), whereas processed foods (NOVA Group 3) and ultra-processed foods (NOVA Group 4) were consumed less frequently. The high consumption

of NOVA Group 1 foods represents a favorable dietary pattern because these foods are recommended as the basis of a healthy diet. In contrast, the frequent consumption of NOVA Group 2 ingredients is likely related to the routine use of cooking oil, salt, and sugar in household meal preparation [15][16].

Although the reported consumption of ultra-processed foods was relatively low, hypertension was observed across nearly all dietary categories. These findings suggest that hypertension among the respondents may not be explained solely by the frequency of ultra-processed food consumption but may also reflect other contributing factors, including the quantity of salt, sugar, and cooking oil used during food preparation, as well as age, physical activity, nutritional status, family history of hypertension, and other lifestyle-related factors. The World Health Organization has identified excessive sodium intake as one of the major contributors to elevated blood pressure, regardless of whether sodium originates from processed foods or from salt added during home cooking. Therefore, in addition to encouraging the consumption of fresh foods, nutrition education should also emphasize limiting the use of salt, sugar, and fats during household food preparation as part of comprehensive hypertension prevention and control strategies [11][12].

4. Conclusion

The findings indicate that sedentary behavior and dietary patterns based on the NOVA food classification

provide an overview of the lifestyle characteristics of working-age adults with hypertension. However, hypertension in this population is a multifactorial condition influenced by the combined effects of multiple risk factors. Therefore, hypertension prevention strategies should promote healthy lifestyle behaviors, including increased physical activity, reduced sedentary behavior, moderation in the use of salt, sugar, and fats during food preparation, and regular blood pressure monitoring.

This study has several limitations. The relatively short data collection period limited participant recruitment, resulting in a final sample of only 37 respondents. Consequently, the findings should be interpreted with caution and may not be generalizable to the broader population.

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