

Adolescent Cardiovascular Risk Factors Linked to Sedentary Lifestyle and Dietary Behaviors

Dr. Magesh V¹ Dr. Veda Vijaya T² Divya S³ Regi Cindrella⁴

¹Associate Professor, Cardiology, Meenakshi Medical College Hospital & Research Institute, Meenakshi Academy of Higher Education and Research, Enathur, Kanchipuram, Tamil Nadu 631552. mageshv@maher.ac.in

²Professor, Department of Pharmacology, Meenakshi Ammal Dental College and Hospital, Meenakshi Academy of Higher Education and Research. veda@maher.ac.in

³Assistant Professor, Meenakshi College of Physiotherapy, Meenakshi Academy of Higher Education and Research. divyas@maher.ac.in

⁴M, Tutor, Meenakshi College of Nursing, Meenakshi Academy of Higher Education and Research. regiCM@maher.ac.in

Abstract

Background: Cardiovascular risk factors among adolescents have become an increasing public health concern worldwide. Sedentary lifestyles, prolonged screen time, physical inactivity, and unhealthy dietary behaviors contribute significantly to the early development of cardiovascular diseases. Identifying and addressing these modifiable risk factors during adolescence is essential for preventing future health complications.

Objective: To assess the association between sedentary lifestyle patterns, dietary behaviors, and cardiovascular risk factors among adolescents.

Methodology: A cross-sectional study was conducted among **300 adolescents** aged 12–17 years from selected schools. Data on physical activity, screen time, dietary habits, body mass index (BMI), blood pressure, and lipid profiles were collected using structured questionnaires and clinical assessments. Statistical analyses were performed to determine relationships between lifestyle behaviors and cardiovascular risk indicators.

Findings: The results revealed that 62% of participants engaged in more than 3 hours of daily screen time, while 58% reported low physical activity levels. Unhealthy dietary behaviors were observed in 65% of adolescents. Elevated BMI was identified in 34%, high blood pressure in 21%, and abnormal lipid profiles in 18% of participants. A significant association was found between sedentary behavior, poor dietary habits, and increased cardiovascular risk factors ($p < 0.05$).

Conclusion: Sedentary lifestyles and unhealthy dietary behaviors significantly contribute to the development of cardiovascular risk factors among adolescents. Early lifestyle interventions promoting physical activity and healthy nutrition are essential to reduce future cardiovascular disease burden.

Keywords: Adolescents, Cardiovascular Risk Factors, Sedentary Lifestyle, Dietary Behaviors, Physical Activity, Screen Time, Hypertension, Obesity, Lipid Profile, Health Promotion.

1 Introduction

Cardiovascular diseases (CVDs) remain the leading cause of mortality worldwide and are increasingly recognized as conditions that originate during childhood and adolescence. The presence of cardiovascular risk factors at an early age significantly increases the likelihood of developing chronic cardiovascular conditions later in life [1]. Adolescence is a critical developmental period during which lifestyle habits are established, making it an important stage for the prevention of cardiovascular diseases. Recent evidence suggests that sedentary behavior and unhealthy dietary practices are among the most significant modifiable risk factors contributing to the growing burden of cardiovascular disorders among adolescents [2].

A sedentary lifestyle is characterized by prolonged periods of sitting, excessive screen time, and inadequate physical activity. Technological advancements, increased use of smartphones, television viewing, video gaming, and computer-based learning have substantially reduced physical activity levels among adolescents worldwide [3]. Physical inactivity contributes to obesity, elevated blood pressure, insulin resistance, and abnormal lipid profiles, all of which are recognized cardiovascular risk factors [4]. Studies have reported that adolescents who engage in prolonged sedentary behaviors are more likely to experience adverse cardiovascular health outcomes compared to their physically active peers [5].

Dietary behaviors also play a crucial role in cardiovascular health. Increased consumption of processed foods, sugar-sweetened beverages, fast foods, and high-fat snacks has become common among adolescents. These unhealthy eating patterns are associated with excessive calorie intake, weight gain, dyslipidemia, hypertension, and metabolic abnormalities [6]. Conversely, diets rich in fruits, vegetables, whole grains, and lean proteins have been shown to reduce cardiovascular risk and promote overall health [7]. The interaction between sedentary behavior and poor dietary choices further amplifies the risk of developing cardiovascular complications.

Globally, the prevalence of obesity, hypertension, and metabolic syndrome among adolescents has risen considerably over the past decade. Research indicates that early exposure to cardiovascular risk factors can accelerate atherosclerotic changes and increase the likelihood of premature cardiovascular disease in adulthood [8]. Consequently, public health organizations emphasize the importance of early detection and prevention strategies targeting adolescents [9].

Educational institutions provide an effective platform for promoting healthy lifestyles and reducing cardiovascular risk factors among young populations. School-based health programs focusing on nutrition education, physical activity promotion, and behavioral modification have demonstrated positive effects on cardiovascular health outcomes [10]. Understanding the relationship between sedentary lifestyle patterns, dietary behaviors, and cardiovascular risk factors is therefore essential for developing evidence-based interventions aimed at improving adolescent health and preventing future cardiovascular disease.

1.1 Objectives

1. To assess the prevalence of cardiovascular risk factors associated with sedentary lifestyle behaviors among adolescents.
2. To determine the relationship between dietary behaviors and cardiovascular risk factors among adolescents.

2 Literature review

1. Sedentary Lifestyle and Cardiovascular Risk

Recent studies have identified sedentary behavior as a major contributor to cardiovascular risk among adolescents. Excessive screen time, prolonged sitting, and low physical activity levels are associated with obesity, elevated blood pressure, insulin resistance, and adverse lipid profiles. Research indicates that adolescents spending more than three hours daily in sedentary activities are at significantly greater risk of developing cardiovascular complications later in life [11, 12].

2. Dietary Behaviors and Cardiovascular Health

Unhealthy dietary patterns, including frequent consumption of fast foods, sugar-sweetened beverages, and processed snacks, have been linked to increased cardiovascular risk factors. Current evidence suggests that poor dietary habits contribute to obesity, hypertension, dyslipidemia, and metabolic syndrome among adolescents. Conversely, diets rich in fruits, vegetables, whole grains, and lean proteins support cardiovascular health and reduce disease risk [13, 14].

3. Combined Impact of Sedentary Behavior and Poor Diet

The interaction between sedentary lifestyles and unhealthy dietary behaviors amplifies cardiovascular risk. Studies conducted between 2022 and 2026 demonstrate that adolescents exposed to both risk factors exhibit higher body mass index (BMI), increased blood pressure levels, and unfavorable metabolic profiles compared to those maintaining active lifestyles and balanced diets [15].

4. Prevention and Health Promotion Strategies

School-based health promotion programs, family-centered interventions, and digital health education have shown promising results in reducing cardiovascular risk factors. These approaches encourage physical activity, healthy eating behaviors, and lifestyle modification among adolescents, contributing to long-term cardiovascular health benefits [16, 17].



Figure 1. Conceptual Relationship Between Lifestyle Behaviors and Cardiovascular Risk

Figure 1 illustrates the pathway through which sedentary lifestyle behaviors and unhealthy dietary habits contribute to cardiovascular risk among adolescents. Reduced physical activity and excessive consumption of energy-dense foods promote obesity and metabolic abnormalities. These changes increase blood pressure, impair lipid metabolism, and elevate cardiovascular risk factors. The framework highlights the importance of early lifestyle interventions aimed at improving physical activity levels and dietary practices to prevent future cardiovascular diseases.

3 Methodology

3.1 Research Design

A cross-sectional descriptive research design was employed to investigate cardiovascular risk factors associated with sedentary lifestyle and dietary behaviors among adolescents. This design was selected because it enables the assessment of lifestyle characteristics and cardiovascular health indicators at a specific point in time. The study aimed to identify the prevalence of cardiovascular risk factors and determine their association with physical inactivity and unhealthy dietary practices [18].

3.2 Study Setting and Population

The study was conducted in selected secondary schools among adolescents aged 12–17 years. A total of 300 participants were recruited using a stratified random sampling technique to ensure adequate representation across age groups and gender. Adolescents diagnosed with chronic cardiovascular disorders or severe medical conditions were excluded from participation [14].

3.3 Data Collection Instruments

Data were collected using a structured and validated questionnaire comprising demographic information, sedentary behavior patterns, physical activity levels, and dietary habits. Clinical assessments included measurement of height, weight, body mass index (BMI), blood pressure, and lipid profile parameters. Screen time was recorded in hours per day, while dietary behavior was evaluated based on the frequency of consumption of fruits, vegetables, fast foods, and sugar-sweetened beverages [19].

After obtaining ethical approval and informed consent, participants completed the questionnaire under supervision. Anthropometric measurements and blood pressure assessments were performed by trained health professionals using standardized procedures. Blood samples were collected for lipid profile analysis. The collected data were coded and entered into a statistical software package for analysis.

3.4 Data Analysis

Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize the data. Chi-square tests and Pearson correlation analyses were applied to examine relationships between sedentary lifestyle factors, dietary behaviors, and cardiovascular risk indicators. Statistical significance was established at $p < 0.05$.

Table 1. Demographic Characteristics of Participants (N = 300)

Variable	Category	Frequency (n)	Percentage (%)
Age	12–14 Years	132	44.0

	15–17 Years	168	56.0
Gender	Male	158	52.7
	Female	142	47.3
Screen Time	< 3 Hours/Day	114	38.0
	≥ 3 Hours/Day	186	62.0
Physical Activity	Adequate	126	42.0
	Low	174	58.0

Table 1 presents the demographic profile of the study participants. More than half (56%) belonged to the 15–17-year age group, while males constituted 52.7% of the sample. A substantial proportion of adolescents (62%) reported screen time exceeding three hours daily, and 58% demonstrated low physical activity levels. These findings indicate a high prevalence of sedentary behaviors among participants, which may contribute to increased cardiovascular risk factors during adolescence.



Figure 2. Methodological Framework

Figure 2 illustrates the methodological framework used in the study. Following participant recruitment, adolescents completed questionnaires assessing sedentary lifestyle and dietary behaviors. Anthropometric and clinical measurements, including BMI, blood pressure, and lipid profiles, were obtained using standardized procedures. The collected information was analyzed statistically to identify associations between lifestyle behaviors and cardiovascular risk factors. This systematic process ensured reliable data collection and accurate evaluation of adolescent cardiovascular health indicators.

4 Results & Discussion

The results of this study provide insights into the relationship between sedentary lifestyle behaviors, dietary habits, and cardiovascular risk factors among adolescents. Data collected from 300 participants were analyzed to determine the prevalence of cardiovascular risk indicators and their association with lifestyle characteristics. The findings revealed a high prevalence of sedentary behavior, unhealthy dietary practices, elevated body mass index (BMI), hypertension, and abnormal lipid profiles. The results are presented through tables and figures to facilitate comprehensive interpretation and understanding.

Table 2. Distribution of Cardiovascular Risk Factors Among Adolescents (N = 300)

Cardiovascular Risk Factor	Frequency (n)	Percentage (%)
Elevated BMI	102	34.0
High Blood Pressure	63	21.0
Abnormal Lipid Profile	54	18.0
Normal Cardiovascular Status	81	27.0

Table 2 presents the prevalence of cardiovascular risk factors among the study participants. Elevated BMI was the most common risk factor, affecting 34% of adolescents, followed by high blood pressure (21%) and abnormal lipid profiles (18%). Only 27% of participants exhibited normal cardiovascular health indicators. These findings suggest that cardiovascular risk factors are increasingly prevalent among adolescents and may be influenced by unhealthy lifestyle behaviors.

Table 3. Association Between Sedentary Lifestyle and Cardiovascular Risk Factors

Sedentary Lifestyle Variable	Cardiovascular Risk Present (%)	Cardiovascular Risk Absent (%)
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Screen Time ≥ 3 Hours/Day	72	28
Screen Time < 3 Hours/Day	29	71

Table 3 demonstrates a significant association between sedentary lifestyle and cardiovascular risk factors. Adolescents reporting screen time of three or more hours daily showed a substantially higher prevalence of cardiovascular risk indicators (72%) compared with those spending less than three hours per day in sedentary activities (29%). The findings indicate that prolonged sedentary behavior contributes significantly to adverse cardiovascular health outcomes.

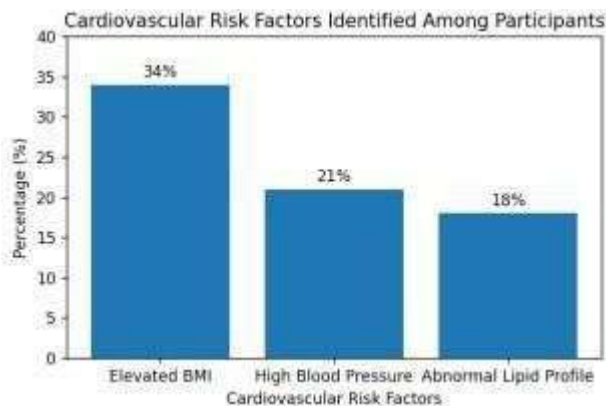


Figure 3. Cardiovascular Risk Factors Identified Among Participants

Figure 3 illustrates the distribution of major cardiovascular risk factors identified among adolescents. Elevated BMI emerged as the most prevalent risk factor, followed by hypertension and abnormal lipid profiles. The findings highlight the early onset of cardiovascular health concerns among adolescents and emphasize the need for preventive interventions. Early identification and management of these risk factors are essential for reducing future cardiovascular disease burden and improving long-term health outcomes.

Table 4. Dietary Behaviors and Cardiovascular Risk Factors

Dietary Behavior	Cardiovascular Risk Present (%)	Cardiovascular Risk Absent (%)
Unhealthy Dietary Habits	68	32
Healthy Dietary Habits	24	76

Table 4 shows a strong relationship between dietary behaviors and cardiovascular risk factors. Adolescents with unhealthy dietary habits exhibited a considerably higher prevalence of cardiovascular risk indicators (68%) compared to those following healthy dietary practices (24%). These results suggest that poor nutrition significantly contributes to obesity, hypertension, and lipid abnormalities among adolescents.

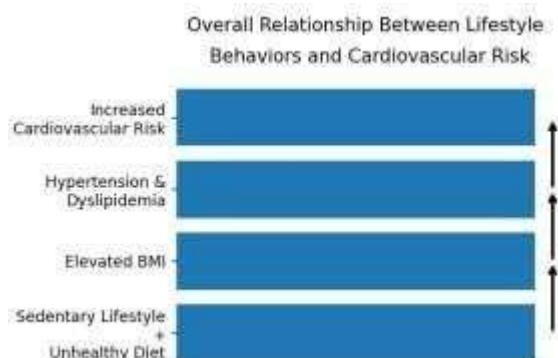


Figure 4. Overall Relationship Between Lifestyle Behaviors and Cardiovascular Risk

Figure 4 summarizes the pathway linking lifestyle behaviors to cardiovascular risk among adolescents. Sedentary activities and unhealthy dietary patterns contribute to weight gain and metabolic disturbances, leading to elevated BMI. These

changes increase the likelihood of developing hypertension and dyslipidemia, which are recognized cardiovascular risk factors. The framework emphasizes the importance of promoting physical activity and healthy nutrition to prevent cardiovascular diseases and improve adolescent health outcomes.

4.1 Discussion

The present study identified a significant association between sedentary lifestyle behaviors, unhealthy dietary habits, and cardiovascular risk factors among adolescents. A high proportion of participants reported excessive screen time, low physical activity levels, and poor dietary practices, which were linked to elevated BMI, hypertension, and abnormal lipid profiles. These findings support existing evidence that lifestyle-related factors play a crucial role in the early development of cardiovascular diseases. Adolescents with healthier dietary patterns and greater physical activity demonstrated lower cardiovascular risk. The results emphasize the importance of implementing school-based and community-focused health promotion programs to encourage healthy lifestyle behaviors and reduce future cardiovascular disease burden.

5 Conclusion

Cardiovascular risk factors are increasingly prevalent among adolescents and are strongly influenced by sedentary lifestyle behaviors and unhealthy dietary practices. The findings of this study revealed that excessive screen time, physical inactivity, and poor nutrition were associated with elevated BMI, high blood pressure, and abnormal lipid profiles. These risk factors may contribute to the development of cardiovascular diseases later in adulthood if left unaddressed. Early identification and modification of unhealthy behaviors are therefore essential for promoting cardiovascular health. Schools, families, and healthcare professionals should work collaboratively to encourage regular physical activity, balanced nutrition, and healthy lifestyle choices among adolescents. Such preventive strategies can significantly reduce cardiovascular risk and improve long-term health outcomes and overall quality of life.

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