INSIGHTS-JOURNAL OF
LIFE AND SOCIAL SCIENCES

INSIGHTS-JLSS
Insights-Journal of Life and Social Sciences

PREVALENCE OF PHYSICAL INACTIVITY AND CARDIOVASCULAR RISK FACTORS AMONG URBAN ADULTS

Original Article

Abdul Rehman[1]*, Akif Saeed Ch[2]*, Hafzah Shah[3], Asma Abdul Rehman[4], Muhammad Naseeb Ullah Khan[5], Um E Habiba[6], Zara Batool[7], Bashir Ahmed[8]

[1]Shifa International Hospital Limited, Faisalabad, Pakistan.
[2]Director Medical Services & Research, Hope Family Clinic & Rehab, Faisalabad, Pakistan.
[3]Post-Doctorate Scholar, Kings College London, UK.
[4]National Institute of Food Science and Technology, University of Agriculture, Faisalabad, Pakistan.
[5]Director, Sport & Exercise Science Institute, Lahore, Pakistan.
[6]Consultant Physiotherapist, Qamar Hospital, Gujrat, Pakistan.
[7]PhD Scholar, Department of Chemistry, The Women University, Multan, Pakistan.
[8]MBBS, Dow University of Health and Sciences; MSPH, Ziauddin University, Karachi, Pakistan.

Corresponding Author: Abdul Rehman, Shifa International Hospital Limited, Faisalabad, Pakistan, ary631782@gmail.com
Akif Saeed Ch, Director Medical Services & Research, Hope Family Clinic & Rehab, Faisalabad, Pakistan, drmuhammadakif8@gmail.com

Conflict of Interest: None

Grant Support & Financial Support: None

Acknowledgment: The authors thank all participants for their valuable time and cooperation.

ABSTRACT

Background: Physical inactivity is a globally recognized modifiable risk factor for cardiovascular disease, especially in urban populations undergoing rapid lifestyle transitions. In Pakistan, urbanization has contributed to increasing sedentary behaviors, yet limited data exist on its direct association with cardiovascular risk factors in urban adults.

Objective: To assess the prevalence of physical inactivity and its association with major cardiovascular risk factors among urban adults in Islamabad, Pakistan.

Methods: A community-based cross-sectional study was conducted over eight months among 370 urban adults in Islamabad using multistage random sampling. Physical activity levels were measured using the Global Physical Activity Questionnaire (GPAQ), and cardiovascular risk factors including hypertension, diabetes, dyslipidemia, and obesity were evaluated through standard clinical assessments and laboratory investigations. Statistical analyses included descriptive statistics, chi-square tests, and multivariate logistic regression, with significance set at $p<0.05$.

Results: Among participants, 41.1% were physically inactive, 36.3% had moderate activity, and 22.6% were highly active. The prevalence of hypertension, diabetes, dyslipidemia, and obesity was 32.2%, 21.7%, 44.8%, and 29.5%, respectively. Physical inactivity showed statistically significant associations with all cardiovascular risk factors ($p<0.01$). Adjusted logistic regression revealed increased odds of hypertension (OR=1.89), diabetes (OR=1.66), dyslipidemia (OR=2.10), and obesity (OR=1.74) among the physically inactive population.

Conclusion: Physical inactivity is highly prevalent among urban adults in Islamabad and is significantly associated with increased cardiovascular risk. These findings underscore the need for targeted public health interventions promoting physical activity to reduce cardiovascular disease burden in urban Pakistani settings.

Keywords: Cardiovascular Diseases, Cross-Sectional Studies, Hypertension, Obesity, Physical Activity, Risk Factors, Urban Population.

INTRODUCTION

Physical inactivity has emerged as a critical public health issue across the globe, contributing significantly to the burden of non-communicable diseases, particularly cardiovascular conditions. In urban environments, where sedentary lifestyles have become increasingly prevalent due to technological advancements, occupational patterns, and infrastructural limitations, the risk associated with physical inactivity has been further exacerbated (1). Amid growing urbanization and lifestyle transitions, adults residing in metropolitan areas often find themselves confined to routines that offer minimal scope for physical exertion. This shift, though subtle in individual experience, has produced a collective consequence with wide-reaching implications for cardiovascular health (2). A mounting body of evidence has established a direct link between physical inactivity and major cardiovascular risk factors, including hypertension, diabetes mellitus, dyslipidemia, and obesity (3). Studies have consistently demonstrated that individuals who fail to meet the recommended levels of physical activity are at a higher risk of developing these conditions, which in turn contribute to increased cardiovascular morbidity and mortality (4,5). The World Health Organization (WHO) has identified physical inactivity as the fourth leading risk factor for global mortality, responsible for approximately 3.2 million deaths annually. Despite these alarming figures, there remains a significant gap in region-specific and population-specific data that adequately captures the scale of this issue in diverse urban contexts (6,7). In many low- and middle-income countries, rapid urbanization has altered traditional patterns of work and mobility, often leading to a decline in physical activity levels. This is particularly evident in densely populated urban centers where environmental constraints—such as lack of green spaces, unsafe walking conditions, and traffic congestion—hinder routine engagement in physical activity (8). Simultaneously, increased screen time, reliance on motorized transport, and desk-bound occupations have reduced opportunities for incidental physical exertion. While these trends are broadly acknowledged, empirical data on their specific association with cardiovascular risk factors in various urban populations remain sparse, especially in rapidly developing regions (9).

Furthermore, cultural, socioeconomic, and behavioral determinants play a significant role in influencing physical activity levels. For instance, individuals from lower socioeconomic strata often encounter barriers such as limited access to recreational facilities, lack of time due to multiple jobs, and minimal awareness regarding the health implications of a sedentary lifestyle (10). Conversely, those in higher income groups may have access to exercise resources but still fail to engage due to motivational or psychosocial factors. Such nuances underscore the importance of context-specific investigations that go beyond broad generalizations and offer targeted insights for public health interventions (11). Previous research has largely focused on isolated cardiovascular risk factors or treated physical inactivity as a secondary variable, rather than examining it as a primary concern with its own set of correlates and implications. There is also a dearth of integrated analyses that simultaneously consider multiple cardiovascular risk indicators in conjunction with physical inactivity (12,13). This fragmented understanding hampers the development of comprehensive urban health policies and community-level programs aimed at mitigating cardiovascular risk through lifestyle modifications. This study seeks to address these critical gaps by assessing the prevalence of physical inactivity among urban adults and exploring its association with key cardiovascular risk factors. By adopting a cross-sectional approach, the research aims to provide a snapshot of current trends in physical activity and cardiovascular health within an urban adult population. The findings are expected to contribute valuable insights into the interplay between sedentary behavior and cardiovascular risk, thereby informing more effective strategies for disease prevention and health promotion in urban settings. With growing recognition of lifestyle as a modifiable determinant of health, there is an urgent need for evidence-based guidance that reflects the lived realities of urban populations. This study is particularly timely as public health systems increasingly prioritize preventive care to reduce the burden of chronic diseases. The objective of the present research is, therefore, to determine the prevalence of physical inactivity among urban adults and examine its association with major cardiovascular risk factors such as hypertension, diabetes, dyslipidemia, and obesity, thereby laying the groundwork for targeted, contextually relevant interventions.

METHODS

This cross-sectional study was conducted over a period of eight months in various urban localities of Islamabad, Pakistan, with the objective of assessing the prevalence of physical inactivity and its association with cardiovascular risk factors among adults. A population-based approach was employed, focusing on residents aged 18 years and older from diverse socioeconomic backgrounds to ensure representation of the broader urban population. The study was designed in alignment with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines to enhance the transparency and replicability of observational research. The sample size was determined using the WHO sample size calculator, assuming a confidence level of 95%, an anticipated prevalence of physical inactivity at 30% based on regional estimates, a 5% margin of error, and an additional 10% added to account for potential

non-response or incomplete data. This yielded a minimum sample size of 370 participants (1,2). A multistage sampling technique was adopted, beginning with random selection of urban sectors within Islamabad, followed by systematic random sampling of households within those sectors. Within each household, one eligible adult was invited to participate using the Kish grid method to eliminate selection bias. Inclusion criteria encompassed adults aged 18 years and above, residing in urban Islamabad for at least one year, and who provided informed written consent. Individuals with known physical disabilities preventing participation in physical activity, pregnant women, and those with a history of diagnosed psychiatric illness were excluded to avoid confounding influences on physical activity levels and cardiovascular health.

Data collection was carried out by trained research assistants through face-to-face interviews and on-site health assessments. A structured questionnaire was used to collect sociodemographic data, personal and family medical history, and lifestyle habits, including smoking status, dietary patterns, and alcohol consumption. Physical activity levels were assessed using the Global Physical Activity Questionnaire (GPAQ), developed by the World Health Organization. The GPAQ captures physical activity in three domains—work, transport, and leisure—and has been validated for use in various low- and middle-income country settings, including South Asia. Anthropometric measurements were taken following standard protocols. Weight was measured using a calibrated digital scale, and height was recorded using a stadiometer. Body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters. Waist circumference was measured to assess central obesity. Blood pressure was measured using a standardized digital sphygmomanometer, with two readings taken five minutes apart and the average recorded (14,15). Participants were instructed to fast for at least 8 hours prior to blood sample collection for biochemical analysis. Venous blood samples were drawn to measure fasting blood glucose, total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglycerides, using enzymatic methods in a certified clinical laboratory (16). Cardiovascular risk factors were defined as follows: hypertension was diagnosed if systolic blood pressure was ≥140 mmHg or diastolic pressure was ≥90 mmHg or if the participant was on antihypertensive medication; diabetes was defined by a fasting glucose level ≥126 mg/dL or current use of antidiabetic medication; dyslipidemia was identified through elevated LDL, low HDL, or elevated triglycerides based on ATP III criteria; and obesity was classified as BMI ≥30 kg/m² (17).

Data entry and analysis were performed using SPSS version 26. Descriptive statistics were used to summarize demographic and clinical characteristics. Means and standard deviations were calculated for continuous variables, while frequencies and percentages were reported for categorical variables. Since data were normally distributed, inferential statistics included independent sample t-tests for comparing means and chi-square tests for associations between categorical variables. Pearson correlation coefficients were calculated to examine linear relationships between physical activity levels and individual cardiovascular risk factors. Additionally, multivariate logistic regression analysis was conducted to assess the independent association of physical inactivity with the presence of cardiovascular risk factors, adjusting for potential confounders such as age, sex, socioeconomic status, and smoking. Ethical approval for the study was obtained from the Institutional Review Board of the relevant institute. All participants were informed about the purpose of the study, and confidentiality was ensured. Written informed consent was obtained prior to data collection, and participants were given the option to withdraw at any stage without any consequences. Through this systematic and ethically grounded methodology, the study aimed to provide reliable and generalizable insights into the patterns of physical inactivity and their association with cardiovascular risk factors among urban adults in Islamabad, thereby contributing to the growing body of evidence needed to guide public health interventions in urban Pakistan.

RESULTS

Out of a total of 370 participants, the mean age was 39.4 years (±12.3), with a near-equal gender distribution—52.4% were male and 47.6% female. The average body mass index (BMI) was 27.1 kg/m² (±4.5), indicating a trend toward overweight status in the sample. Approximately 30.7% of participants reported active smoking, and the mean reported monthly income was PKR 58,000 (±12,000), reflecting a diverse socioeconomic representation within the urban adult population of Islamabad. Regarding physical activity levels, 41.1% of participants were categorized as physically inactive (low activity), 36.3% had moderate levels of activity, and only 22.6% reported high physical activity levels. These classifications were derived based on total weekly metabolic equivalents (METs) using the Global Physical Activity Questionnaire (GPAQ). The prevalence of cardiovascular risk factors was substantial. Hypertension was identified in 32.2% of participants, while 21.7% were found to have diabetes mellitus. Dyslipidemia emerged as the most common risk factor, affecting 44.8% of individuals, followed by obesity at 29.5%. These findings highlight the significant burden of non-communicable risk factors in the urban adult demographic. Bivariate analysis using the chi-square test revealed statistically significant associations between physical inactivity and all assessed cardiovascular risk factors. Hypertension (χ^2=10.35, p=0.0013), diabetes

mellitus (χ^2=8.47, p=0.0036), dyslipidemia (χ^2=12.88, p=0.0003), and obesity (χ^2=9.16, p=0.0025) were each significantly more prevalent among physically inactive individuals compared to their active counterparts. Multivariate logistic regression analysis further reinforced these associations after adjusting for confounding variables such as age, sex, smoking status, and income. Physically inactive individuals were nearly twice as likely to have hypertension (adjusted OR=1.89, 95% CI: 1.29–2.77, p=0.001) and dyslipidemia (adjusted OR=2.10, 95% CI: 1.44–3.08, p=0.0002). Similarly, the odds of diabetes mellitus (adjusted OR=1.66, 95% CI: 1.12–2.48, p=0.011) and obesity (adjusted OR=1.74, 95% CI: 1.18–2.56, p=0.006) were also significantly elevated among the physically inactive group. These results provide compelling evidence of a strong and statistically significant association between physical inactivity and the presence of multiple cardiovascular risk factors in the study population. Visual representation of the physical activity distribution and the prevalence of cardiovascular risks can be seen in the accompanying charts.

Table 1: Demographic Characteristics

Characteristic	Value
Total Participants	370
Mean Age (years)	39.4 ± 12.3
Male (%)	52.4%
Female (%)	47.6%
Mean BMI (kg/m²)	27.1 ± 4.5
Smokers (%)	30.7%
Mean Monthly Income (PKR)	58,000 ± 12,000

Table 2: Physical Activity Levels

Activity Level	Number of Participants (n)	Percentage (%)
Low	152	41.1%
Moderate	134	36.3%
High	84	22.6%

Table 3: Prevalence of Cardiovascular Risk Factors

Risk Factor	Prevalence (%)
Hypertension	32.2%
Diabetes Mellitus	21.7%
Dyslipidemia	44.8%
Obesity	29.5%

Table 4: Chi-Square Test Between Inactivity and Risk Factors

Risk Factor	Chi-square (χ^2)	p-value
Hypertension	10.35	0.0013
Diabetes Mellitus	8.47	0.0036
Dyslipidemia	12.88	0.0003
Obesity	9.16	0.0025

Table 5: Multivariate Logistic Regression Analysis

Risk Factor	Adjusted Odds Ratio (95% CI)	p-value
Hypertension	1.89 (1.29–2.77)	0.001
Diabetes Mellitus	1.66 (1.12–2.48)	0.011
Dyslipidemia	2.10 (1.44–3.08)	0.0002
Obesity	1.74 (1.18–2.56)	0.006

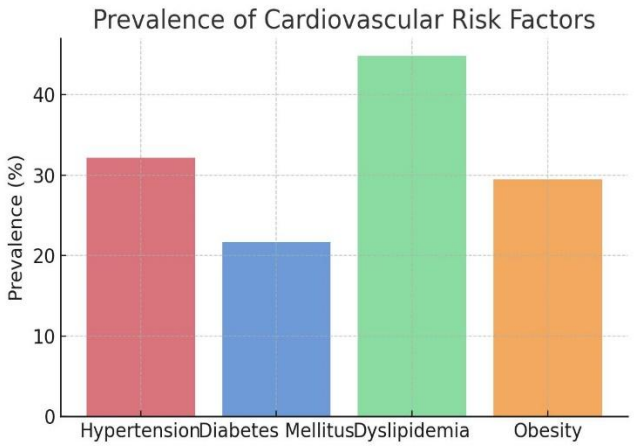

Figure 1 Prevalence of Cardiovascular Risk Factor

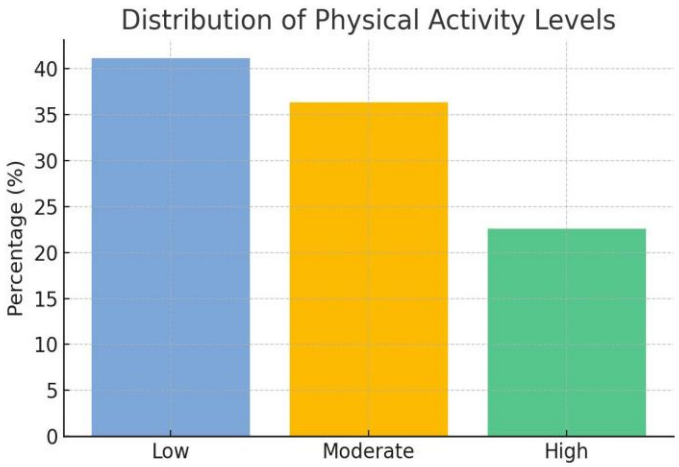

Figure 2 Distribution of Physical Activity Levels

DISCUSSION

The findings from this study offer critical insight into the interplay between physical inactivity and cardiovascular risk factors in an urban adult population. The observed high prevalence of physical inactivity (41.1%) aligns with global and regional trends in urbanized settings, where sedentary lifestyles have become increasingly common. These results are consistent with recent epidemiological data from semi-urban Nigeria, which reported similarly elevated levels of physical inactivity among adults and linked them with insufficient dietary intake and poor cardiovascular outcomes (18). The strong associations observed between low physical activity and the presence of hypertension, diabetes mellitus, dyslipidemia, and obesity reaffirm findings from recent global studies. For example, a study highlighted that moderate-to-vigorous physical activity exceeding 150 minutes per week was significantly protective against cardiovascular risk, particularly in individuals over 30 years of age (19). Similarly, data from Saudi Arabia demonstrated that inactive older adults exhibited nearly double the prevalence of hypertension and diabetes compared to their active counterparts (20). This study's logistic regression findings also parallel national-level data, where physical inactivity has been significantly correlated with higher cardiovascular mortality, particularly among middle-aged adults and males (21). Notably, a large-scale study in China identified a synergistic effect of physical inactivity and poor dietary habits on increasing risks of dyslipidemia, hypertension, and diabetes, indicating that lifestyle behaviors may compound cardiovascular burden beyond their individual effects (22).

This study benefits from a robust sampling method, inclusion of both anthropometric and biochemical assessments, and the use of validated tools such as the GPAQ for physical activity and standardized WHO definitions for cardiovascular risk factors. These elements enhance the internal validity and applicability of the findings in similar urban contexts across South Asia. Furthermore, the use of multivariate analysis allowed for the control of confounding variables, strengthening the conclusions regarding independent associations. Nonetheless, some limitations must be acknowledged. The cross-sectional design restricts causal inferences; while associations are strong, they cannot confirm temporal relationships between inactivity and cardiovascular risk. Additionally, reliance on self-reported physical activity may be subject to recall bias or social desirability bias, although the GPAQ's prior validation mitigates some concerns. The study also did not assess other contributing factors such as stress, dietary intake, or genetic predisposition, which could have influenced cardiovascular risk. Generalizability may be limited due to the single-city setting, despite efforts to capture diversity within Islamabad. Expanding future research to include multi-city or rural comparisons would allow for broader applicability. Moreover, a longitudinal study design would help elucidate causal pathways and better inform policy-level interventions.

These findings underscore the urgent need for context-sensitive public health strategies to address sedentary behavior in urban populations. Integrating routine physical activity promotion into primary healthcare, urban planning (such as safe walking spaces), and workplace wellness programs may help mitigate the rising burden of cardiovascular disease. In addition, targeted education for both healthcare providers and the public can play a pivotal role in shifting behavioral norms around physical activity. Future studies should explore the impact of culturally tailored interventions, perhaps leveraging mobile health technologies or community-based peer support models (23). Given the multifactorial nature of cardiovascular disease, a multidisciplinary approach incorporating nutrition, physical

activity, mental health, and environmental design is warranted. In summary, the findings reinforce that physical inactivity is not only prevalent among urban adults but is also closely linked with major cardiovascular risk factors. Addressing this modifiable behavior through policy and public health initiatives could significantly reduce the burden of non-communicable diseases in urban Pakistan and comparable settings.

CONCLUSION

This study highlights a significant prevalence of physical inactivity among urban adults in Islamabad and its strong association with key cardiovascular risk factors including hypertension, diabetes, dyslipidemia, and obesity. These findings emphasize the urgent need for targeted public health interventions promoting physical activity in urban populations to mitigate the escalating burden of cardiovascular disease.

AUTHOR CONTRIBUTION

Author	Contribution
Abdul Rehman*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Akif Saeed Ch*	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Hafzah Shah	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Asma Abdul Rehman	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Muhammad Naseeb Ullah Khan	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Um E Habiba	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Zara Batool	Contributed to study concept and Data collection Has given Final Approval of the version to be published
Bashir Ahmed	Writing - Review & Editing, Assistance with Data Curation

REFERENCES

1. Ajufo E, Kany S, Rämö JT, Churchill TW, Guseh JS, Aragam KG, et al. Accelerometer-Measured Sedentary Behavior and Risk of Future Cardiovascular Disease. J Am Coll Cardiol. 2025;85(5):473-86.
2. Paterson C, Higgins S, Sikk M, Stone K, Fryer S, Stoner L. Acute sedentary behavior and cardiovascular disease research: standardizing the methodological posture. Am J Physiol Heart Circ Physiol. 2023;324(1):H122-h5.
3. Yang Y, Wang Y, Yang L. Association between physical activity and sedentary behavior and depression in US adults with cardiovascular disease: NHANES 2007-2016. J Affect Disord. 2024;367:342-9.
4. Liang ZD, Zhang M, Wang CZ, Yuan Y, Liang JH. Association between sedentary behavior, physical activity, and cardiovascular disease-related outcomes in adults-A meta-analysis and systematic review. Front Public Health. 2022;10:1018460.
5. Sheng C, Huang W, Wang W, Lin G, Liao M, Yang P. The association of moderate-to-vigorous physical activity and sedentary behaviour with abdominal aortic calcification. J Transl Med. 2023;21(1):705.
6. Li S, Lear SA, Rangarajan S, Hu B, Yin L, Bangdiwala SI, et al. Association of Sitting Time With Mortality and Cardiovascular Events in High-Income, Middle-Income, and Low-Income Countries. JAMA Cardiol. 2022;7(8):796-807.
7. Velde GT, Plasqui G, Willeboordse M, Winkens B, Vreugdenhil A. Associations between physical activity, sedentary time and cardiovascular risk factors among Dutch children. PLoS One. 2021;16(8):e0256448.

8. Ahmadi MN, Hamer M, Gill JMR, Murphy M, Sanders JP, Doherty A, et al. Brief bouts of device-measured intermittent lifestyle physical activity and its association with major adverse cardiovascular events and mortality in people who do not exercise: a prospective cohort study. Lancet Public Health. 2023;8(10):e800-e10.
9. Ahmadi MN, Coenen P, Straker L, Stamatakis E. Device-measured stationary behaviour and cardiovascular and orthostatic circulatory disease incidence. Int J Epidemiol. 2024;53(6).
10. Paudel S, Ahmadi M, Phongsavan P, Hamer M, Stamatakis E. Do associations of physical activity and sedentary behaviour with cardiovascular disease and mortality differ across socioeconomic groups? A prospective analysis of device-measured and self-reported UK Biobank data. Br J Sports Med. 2023;57(14):921-9.
11. Ahmadi MN, Rezende LFM, Ferrari G, Del Pozo Cruz B, Lee IM, Stamatakis E. Do the associations of daily steps with mortality and incident cardiovascular disease differ by sedentary time levels? A device-based cohort study. Br J Sports Med. 2024;58(5):261-8.
12. Islam H, Gibala MJ, Little JP. Exercise Snacks: A Novel Strategy to Improve Cardiometabolic Health. Exerc Sport Sci Rev. 2022;50(1):31-7.
13. Abohashem S, Sayed A, Aldosoky W, Dar T, Abbasi T. Impact of physical inactivity on cardiovascular mortality in united states: county-level analysis from 2011 to 2019. European Journal of Preventive Cardiology. 2022.
14. Wu H, Wei J, Chen W, Chen L, Zhang J, Wang N, et al. Leisure Sedentary Behavior, Physical Activities, and Cardiovascular Disease Among Individuals With Metabolic Dysfunction-Associated Fatty Liver Disease. Arterioscler Thromb Vasc Biol. 2024;44(9):e227-e37.
15. Schmidt-Trucksäss A, Lichtenstein AH, von Känel R. Lifestyle factors as determinants of atherosclerotic cardiovascular health. Atherosclerosis. 2024;395:117577.
16. Bovolini A, Garcia J, Andrade MA, Duarte JA. Metabolic Syndrome Pathophysiology and Predisposing Factors. Int J Sports Med. 2021;42(3):199-214.
17. Melo EAS, Ferreira LES, Cavalcanti RJF, Botelho Filho CAL, Lopes MR, Barbosa RHA. Nuances between sedentary behavior and physical inactivity: cardiometabolic effects and cardiovascular risk. Rev Assoc Med Bras (1992). 2021;67(2):335-43.
18. Aduroja P, John-Akinola Y, Oluwasanu M, Oladepo O. Prevalence of physical activity and dietary patterns as risk factors for cardiovascular diseases among semi-urban dwellers in Ibadan, Nigeria. African Health Sciences. 2022;22:336-48.
19. S G, Nagaraj N. Prevalence of cardiovascular risk factors and risk profiling among urban adults of a southern Indian city. Indian Journal of Forensic and Community Medicine. 2024.
20. Alodhialah A, Almutairi A, Almutairi M. Physical Inactivity and Cardiovascular Health in Aging Populations: Epidemiological Evidence and Policy Implications from Riyadh, Saudi Arabia. Life. 2025;15.
21. Han J, Ju YJ, Lee SY. Physical activity, sedentary behavior, and cardiovascular disease risk in Korea: a trajectory analysis. Epidemiol Health. 2023;45:e2023028.
22. Chang Q, Zhu Y, Liu Z, Cheng J, Liang H, Lin F, et al. Replacement of sedentary behavior with various physical activities and the risk of all-cause and cause-specific mortality. BMC Med. 2024;22(1):385.
23. Dunstan DW, Dogra S, Carter SE, Owen N. Sit less and move more for cardiovascular health: emerging insights and opportunities. Nat Rev Cardiol. 2021;18(9):637-48.

