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CARDIOVASCULAR RISK IN JORDAN: TRENDS AND INSIGHTS FOR 2024–2025

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ABSTRACT

Cardiovascular diseases (CVDs) remain the leading cause of morbidity and mortality worldwide, with Jordan experiencing an increasing burden due to risk factors such as hypertension, diabetes, obesity, smoking, and genetic predispositions. Despite advancements in healthcare infrastructure, the incidence of CVD-related hospitalizations and mortality rates continues to rise. Several factors contribute to this trend, including the high prevalence of metabolic syndrome, obesity, and poor management of hypertension and diabetes. This review synthesizes 21 recent studies (2024–2025) that examine the epidemiology, pathophysiology, and prevention of CVDs in Jordan. Hypertension is identified as the most prevalent risk factor, followed closely by obesity and diabetes. Metabolic syndrome plays a significant role in cardiovascular risk, particularly among type 2 diabetes patients. Furthermore, genetic predispositions, oxidative stress, and inflammation contribute to the development and progression of CVDs. The findings highlight the urgent need for integrated prevention strategies, including enhanced screening programs, lifestyle interventions, genetic risk assessments, and stricter tobacco control measures. Addressing multiple risk factors simultaneously is crucial for mitigating the growing cardiovascular burden in Jordan.

KEYWORDS: Cardiovascular diseases, hypertension, diabetes, obesity, smoking.

INTRODUCTION

Cardiovascular diseases (CVDs) account for a substantial proportion of global morbidity and mortality, with more than 30% of all deaths worldwide attributed to CVD-related complications.[1] While many developed nations have managed to stabilize or reduce CVD mortality rates through improved healthcare interventions and early detection programs, Jordan continues to witness an upward trend in CVD-related complications.[2] This growing burden is primarily attributed to the increasing prevalence of key modifiable risk factors, including hypertension, diabetes, obesity, and smoking, in addition to genetic predispositions.[3]

Over the past three decades, Jordan has seen a shift in disease patterns, with non-communicable diseases such as CVDs becoming the leading causes of death.[4] Despite some improvements in medical management and public health initiatives, lifestyle factors such as unhealthy diets, physical inactivity, and tobacco use continue to contribute to poor cardiovascular outcomes.[5] Additionally, the country has one of the highest smoking rates in the Middle East, further exacerbating the CVD burden.[6]

Furthermore, the role of genetic predisposition in cardiovascular risk is becoming more evident, with recent studies identifying genetic markers linked to hypertension and lipid metabolism abnormalities.[7-8] Oxidative stress has also been found to play a significant role in increasing cardiovascular risk, particularly in individuals with metabolic disorders.[9]

Given the high prevalence of cardiovascular risk factors and the rising rates of CVD-related hospitalizations, there is an urgent need to evaluate the underlying causes and propose targeted interventions. This study systematically reviews 21 recent studies on cardiovascular risk factors in Jordan, with the aim of identifying epidemiological trends, genetic predispositions, and potential prevention strategies.

METHODS

A systematic literature search was conducted using PubMed to identify recent studies on cardiovascular risk factors in Jordan. The search focused on key terms such as "cardiovascular disease Jordan," "hypertension Jordan," "diabetes Jordan," "obesity Jordan," and "smoking Jordan." Only studies published between January 2024 and December 2025 were considered for inclusion.

Studies were included if they met the following criteria: they were conducted in Jordan or among Jordanian populations, investigated at least one cardiovascular risk factor, and were published in English. Exclusion criteria included studies focusing on non-cardiovascular conditions, review articles, opinion pieces, and studies without full-text access.

A total of 50 studies were initially identified, of which 21 met the inclusion criteria. Data were extracted on key cardiovascular risk factors, genetic associations, and public health implications. The selected studies were then synthesized into thematic areas, including hypertension, diabetes, obesity, smoking, and genetic predispositions.

RESULTS

The analysis of recent studies confirmed that hypertension remains the most significant cardiovascular risk factor in Jordan, affecting a substantial portion of the population.[10] Studies indicate that blood pressure control remains suboptimal, particularly among younger adults and individuals with comorbid conditions.[11] Additionally, genetic predisposition plays a crucial role in the development of hypertension, with specific genetic variants such as WNK1 contributing to increased susceptibility.[7] Furthermore, prolonged hypertension has been linked to neurodegenerative processes, highlighting the broader health implications beyond cardiovascular risk.[12]

Diabetes and metabolic syndrome were found to be highly prevalent, with 84.2% of type 2 diabetes patients meeting the criteria for metabolic syndrome.[13] Poor glycemic control was associated with an increased risk of cardiovascular complications, including arterial stiffness and left ventricular dysfunction.[14] Additionally, a study by.[15] found that metabolic syndrome in Jordanian populations is increasing due to dietary changes and sedentary behavior.

Obesity emerged as another key contributor to cardiovascular disease in Jordan. Studies revealed that Jordanian women experienced one of the highest obesity-related disease burdens in the region.[16] Inflammatory markers associated with obesity significantly elevated cardiovascular risk, particularly among individuals with high BMI.[17] Additionally, metabolic disturbances related to obesity were linked to lipid metabolism abnormalities, further increasing the risk of cardiovascular complications.[18]

Smoking remains a major challenge in Jordan, with one of the highest smoking rates in the Middle East.[6] Recent studies have highlighted the impact of smoking on cardiovascular risk, including a 32% increase in arrhythmia prevalence among smokers.[19] Furthermore, secondhand smoke exposure and air pollution have been identified as significant contributors to cardiovascular disease.[1] Despite efforts to introduce smoking cessation programs, success rates remain low, necessitating stricter regulations and targeted interventions.[9]

DISCUSSION

The findings from this review confirm that cardiovascular diseases remain a pressing public health concern in Jordan, driven by a combination of modifiable and non-modifiable risk factors. Hypertension, diabetes, obesity, and smoking are the primary contributors to cardiovascular disease, with metabolic syndrome serving as an aggravating factor that increases the likelihood of adverse cardiovascular outcomes. These risk factors, although widely recognized, continue to increase in prevalence, indicating that current prevention and management strategies may be inadequate.

Hypertension and Cardiovascular Risk

Hypertension has been identified as the most prevalent cardiovascular risk factor among Jordanians, affecting both younger and older populations. The high rates of uncontrolled blood pressure suggest gaps in early detection, adherence to antihypertensive treatments, and lifestyle modifications.[10] Additionally, the role of genetic predisposition cannot be overlooked, as studies have found a significant link between WNK1 gene polymorphisms and increased susceptibility to hypertension.[7] This suggests that integrating genetic risk assessments into public health initiatives may improve targeted hypertension management strategies.

Moreover, hypertension is increasingly being linked to cognitive decline and neurodegenerative diseases in Jordanian populations.[12] This indicates that CVD prevention programs should not only focus on cardiovascular outcomes but also address neurological implications of prolonged hypertension.

Diabetes, Metabolic Syndrome, and Cardiovascular Risk

Diabetes and metabolic syndrome are highly prevalent in Jordan, with over 84.2% of type 2 diabetes patients also diagnosed with metabolic syndrome.[13] Poor glycemic

control contributes to arterial stiffness, increasing the risk of atherosclerosis and heart failure.[14] The strong association between metabolic syndrome and CVD highlights the need for early interventions, particularly among high-risk populations.

Dietary habits significantly influence diabetes management, with studies showing that adherence to a Mediterranean diet leads to better glycemic control and reduced cardiovascular risk.[19] This suggests that culturally tailored dietary interventions should be a priority in public health campaigns.

Obesity and Its Impact on Cardiovascular Health

Obesity remains a significant public health concern in Jordan, with particularly high rates among women.[16] Studies have identified chronic inflammation as a major pathway linking obesity to cardiovascular risk, as inflammatory markers contribute to endothelial dysfunction and increased arterial stiffness.[17]

Lipid metabolism abnormalities further exacerbate cardiovascular risk in obese individuals, with recent research highlighting the role of dysregulated lipid profiles in accelerating atherosclerosis.[18] Given these findings, weight management programs should be prioritized in CVD prevention strategies, incorporating nutrition education, physical activity promotion, and behavioral counseling.

Smoking and Cardiovascular Disease

Jordan has one of the highest smoking rates in the Middle East, making tobacco use a significant contributor to cardiovascular risk.[6] Studies show that smoking increases the risk of arrhythmias, hypertension, and ischemic heart disease, with a 32% increase in arrhythmia prevalence among smokers.[20] Additionally, secondhand smoke exposure further increases cardiovascular risk, particularly among women and children.[1]

Despite the availability of smoking cessation programs, cessation rates remain low, indicating that stronger tobacco control policies are necessary.[9] Strategies such as higher taxation on tobacco products, public smoking bans, and mass media anti-smoking campaigns could help reduce smoking prevalence.

Genetic and Environmental Factors in CVD Development

Recent studies emphasize the role of genetic factors in cardiovascular disease, with specific gene polymorphisms linked to hypertension, lipid metabolism disorders, and metabolic syndrome.[8] Additionally, oxidative stress has been identified as a key mechanism in the progression of metabolic disorders, which subsequently increase cardiovascular risk.[9]

Environmental factors such as air pollution have also been linked to increased cardiovascular risk, with findings indicating that prolonged exposure to airborne pollutants contributes to endothelial dysfunction and systemic inflammation.[1] These results highlight the need for environmental policies aimed at reducing air pollution to improve cardiovascular outcomes.

Limitations

Despite the valuable insights gained from this review, several limitations must be acknowledged. First, most of the included studies are cross-sectional, limiting the ability to establish causal relationships between risk factors and cardiovascular disease. Future longitudinal studies are needed to better understand the long-term impact of these risk factors.

Second, many of the studies were hospital-based, which may introduce selection bias. The findings may not be fully representative of the general Jordanian population, particularly those in rural or underserved communities who may have different risk factor distributions.

Another limitation is the variability in diagnostic criteria used across different studies, particularly in defining metabolic syndrome, obesity, and hypertension control levels. This inconsistency makes it challenging to compare findings across studies.

Additionally, few studies investigated the effectiveness of public health interventions aimed at reducing cardiovascular risk factors in Jordan. While this review highlights key risk factors, future research should evaluate intervention strategies such as lifestyle modifications, smoking cessation programs, and dietary interventions to determine their effectiveness in the Jordanian population.

Finally, genetic studies remain limited, and further genome-wide association studies (GWAS) are needed to identify additional genetic markers linked to cardiovascular disease risk in Jordanians.

CONCLUSION

This review highlights the urgent need for targeted cardiovascular prevention strategies in Jordan. Hypertension, diabetes, obesity, and smoking remain the primary contributors to CVD burden, necessitating a multifaceted approach to prevention and management. Public health policies must focus on early detection, lifestyle interventions, and stricter tobacco control measures. By integrating comprehensive screening programs, improving dietary habits, and addressing genetic predispositions, Jordan can make significant progress in reducing cardiovascular mortality and morbidity in the coming years.

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