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REVIEW ARTICLE

Epidemiology of ischemic heart disease

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Summary

Ischemic heart disease (IHD), or coronary artery disease, ranks as the primary global cause of mortality and disability.

This narrative review summarizes the epidemiology of IHD, focusing on global distribution, risk factors, and prevention.

A literature search was conducted using PubMed, Scopus, and Google Scholar databases to identify relevant studies from the past decade.

In 2019, IHD affected 197.2 million individuals, resulting in 9.1 million deaths, and 182.0 million disability-adjusted life years (DALYs) worldwide. While age-standardized mortality rates, DALYs, and prevalence have declined, the number of reported cases continues to rise. The highest prevalence was reported in Central and Eastern Europe and Central Asia, while the lowest was in South Asia. Modifiable and non-modifiable risk factors influence IHD. The main causal risk factors, such as hypertension, dyslipidemia, diabetes, smoking, and age, are independently associated with IHD development.

Environmental factors (air pollution, noise exposure, and climate change) further increase the risk of IHD. The emerging concept of the exposome emphasizes that the cumulative and combined influence of environmental risk factors plays a crucial role in the development of IHD.

IHD can be prevented from developing through primordial (targeting social determinants like urbanization, poverty, illiteracy, living conditions) and primary prevention (management of risk factors through lifestyle interventions, pharmacotherapies).

IHD is a growing global health and economic challenge, disproportionately affecting low-income regions, as a result of population aging, limited access to healthcare, and the presence of numerous risk factors that require appropriate prevention and treatment.

Keywords: ischemic heart disease, risk factors, prevention

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INTRODUCTION

Ischemic heart disease (IHD), also referred to as coronary artery disease, ranks as the primary cause of death worldwide and a major contributor to disability (1). IHD had been the leading cause of death worldwide for at least 30 years before the COVID-19 pandemic. In 2019, IHD affected 197.2 million individuals globally, resulting in 9.1 million deaths, and 182.0 million disability-adjusted life years (DALYs). Age-standardized rates of IHD for DALYs, deaths, and prevalent cases declined during the past two decades globally, indicating that the rise in IHD cases is attributable to population growth and aging. However, it is estimated that the age-standardized mortality rate is increasing in many regions (1). The epidemiology of IHD is of relevance not only to public health experts but also to clinicians because IHD places a substantial medical and economic burden on society (2). The financial impact of IHD arises from hospitalizations, medical procedures, clinic and emergency visits, and prescribed medications (3). However, IHD is preventable if the risk factors are effectively controlled. Preventing IHD underscores the interconnected influence of political, economic, and social aspects, alongside health policies, financial structures, risk factor management at both population and individual levels, secondary prevention efforts, and medical education.

This narrative review aims to present the distribution and health burden of IHD, along with its associated risk factors and prevention strategies.

METHODS

A literature search of published studies reporting epidemiological data of IHD was conducted. PubMed, Scopus and Google Scholar databases were searched during January and February 2025 to identify relevant studies published within the last ten years. The keywords used included: ischaemic/ischemic heart disease, coronary heart disease, epidemiology, risk factors, and prevention. The extracted studies were grouped and analyzed with a specific focus on regional and global trends and disease burden, non-modifiable and modifiable risk factors, and prevention strategies. Articles unrelated to the three designated areas of interest were excluded from consideration.

GEOGRAPHICAL DISTRIBUTION OF IHD

Prevalence

It is estimated that 315 million people worldwide were living with IHD in 2022 (4). The age-standardized prevalence was 3,605 per 100,000 population, reflecting a measurable 18% decrease since 1990 (4). The highest age-standardized prevalence was reported in Central Europe, Eastern Europe, and Central Asia, while the lowest was reported in South Asia. Although the age-standardized prevalence rates decreased globally, the number of prevalent cases is rising due to population growth and an aging society (1). Differences in disease prevalence across regions may be attributed to multiple factors, including varying stages of the epidemiological transition, the presence of war, infectious diseases, or genetic predisposition to IHD risk factors (6, 7).

Incidence

In 2019, approximately 5.8 million new cases of IHD were reported across the 57 European Society of Cardiology (ESC) member countries, making IHD the most common form of incident cardiovascular disease (CVD) (8). The median age-standardized IHD incidence estimates were more than twice as high in middle-income countries as in high-income countries (8). During the period from 1990 to 2019, incidence rates significantly declined in all high-income countries, while the declines in middle-income countries were lower or, in some countries, incidence increased. Worldwide, the incidence of IHD decreased by 3.6% from 2010 to 2019, with a more pronounced decline among males compared to females (9).

Mortality

An estimated nine million people died due to IHD in 2019, representing more than 15% of global deaths (10). Around 1 in 7 deaths are caused by IHD worldwide. Although the age-standardized IHD mortality rates have been decreasing globally since 1990, in many areas across South, East, and Southeast Asia, including China, an upward trend has been observed (1). The highest decline was observed in developed Western nations (7). Reduction in major cardiovascular risk factors accounts for 45% to 75% of the decrease in IHD mortality, while advancements in emergency care and secondary prevention contributed to 25% to 55% of the reduction (11). However, over the past 5 years, the decline in mortality of IHD has slowed, plateaued, or even reversed in some high-income countries like the United States and the United Kingdom (1).

IHD among CVD

IHD is the primary contributor of CVD mortality in all regions and both genders, except in females in Sub-Saharan Africa and in both males and females in South Asia, where stroke remains the predominant cause of CVD-related mortality (12). In the United States, IHD is attributable to 40.3% of all CVD deaths (12). In ESC member countries, IHD accounted for 33% of all CVD deaths among females and 40% among males (13). Data from the national Serbian Registry for acute coronary syndrome

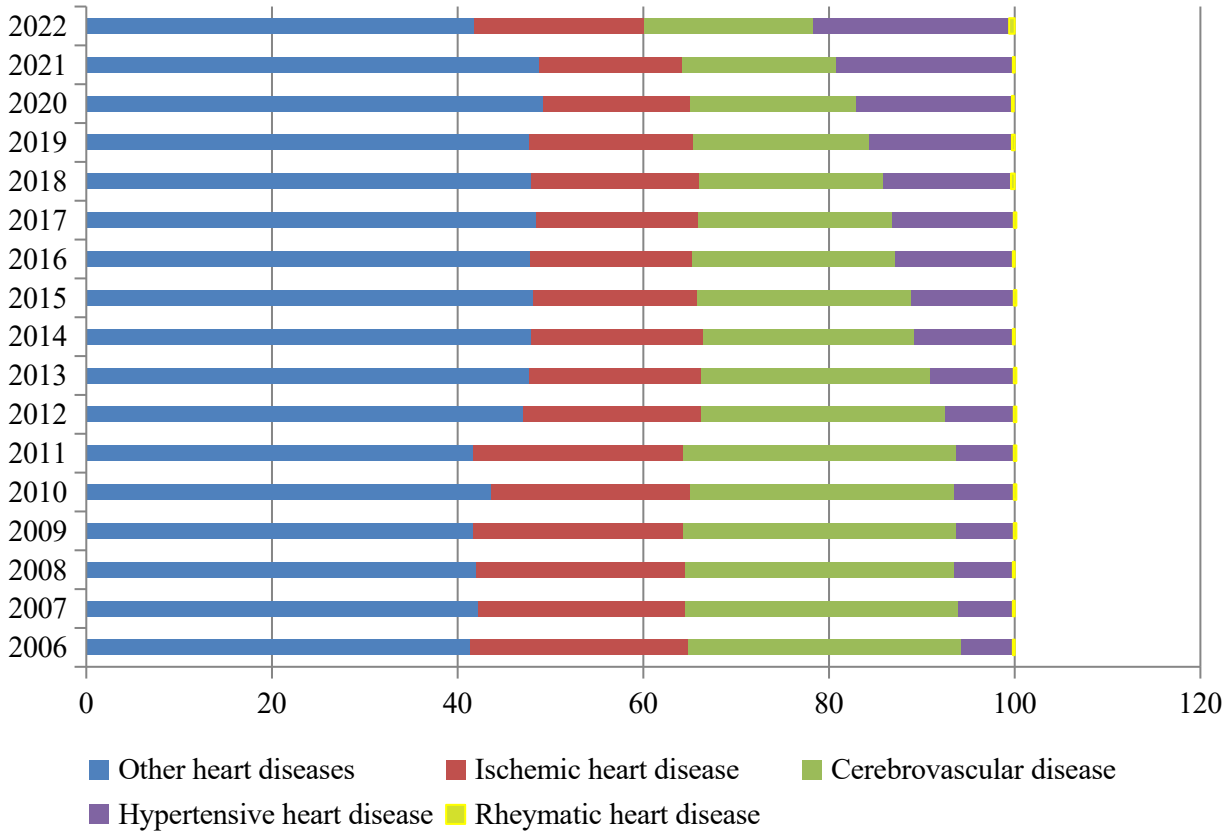

Figure 1. Proportion of ischemic heart disease deaths among all cardiovascular disease mortality in the Republic of Serbia during the period from 2006 to 2022

from 2006 to 2022 showed that other heart diseases are the leading cause of CVD death (14), accounting for 47.1% (range 41.4%-64.5%) of all CVD mortality on average, while cerebrovascular diseases and IHD were responsible for 24.3% and 19.4% of deaths, respectively **(Figure 1)**.

Observed differences in IHD proportion among CVD between Serbia and the rest of Europe may suggest potential reporting inaccuracies and deficiencies in the overall quality of data collection (15). It can also point to systemic issues in the coding of death certificates, including the use of ill-defined codes for CVDs. In 2020 and 2021, the proportion of other heart diseases among all CVDs increased, while the shares of IHD and cerebrovascular diseases declined, likely as a consequence of reduced hospital admissions and cardiovascular interventions during the COVID-19 pandemic, which may have further complicated accurate diagnosis and coding **(Figure 1)**.

Burden of IHD

In 1990 and 2010, IHD was the second leading cause of DALYs, considering all age groups and genders together, while in 2021 it was the third leading cause after COVID-19 and neonatal disorders (16). However, IHD is the leading cause of DALYs among adults (7). Age-standardized DALY rates declined during the period 1990-2019 worldwide (1). Areas with the highest DALY rates are Eastern Europe, Central Asia, Oceania, and the Middle East/North Africa regions (1). At the national level, Uzbekistan, Ukraine, Tajikistan, and several Oceanian islands exhibit the highest DALY rates, whereas Japan, the Republic of Korea, and France record the lowest rates (1). These patterns can be explained by high exposure to risk factors and limited availability of preventive healthcare services.

In 2050, IHD is expected to remain the leading cause of cardiovascular deaths, with approximately 20 million fatalities worldwide, particularly in areas with a lower sociodemographic index (SDI), and high systolic blood pressure will be the most significant cardiovascular risk factor contributing to these deaths (17).

RISK FACTORS FOR IHD

Risk factors for IHD are classified into modifiable and non-modifiable risk factors.

Modifiable risk factors

Modifiable risk factors include physical inactivity, tobacco use, diet, hyperlipidemia, hypertension, diabetes mellitus, psychosocial stress, and being overweight. Non-modifiable risk factors are those that cannot be changed through lifestyle adjustments or medical treatments.

These include age, sex, ethnicity, genetic predisposition, and the patient's family history (17). Research from 2019 shows that while age, sex, and race are responsible for up to 80% of IHD occurrence, interventions targeting modifiable risk factors have still significantly reduced its prevalence (18).

To better reflect the complexity of IHD etiology, risk factors can also be grouped into: sociodemographic characteristics, lifestyle, environmental, and clinical risk factors (8).

Since the launch of the Framingham study in the mid-20th century, numerous risk factors have been identified (19). The INTERHEART case-control study, published in 2004 and conducted in 52 countries, including 15152 cases and 14820 controls, revealed that nine modifiable risk factors contributed to the majority of myocardial infarction (MI) risk across all populations worldwide (20).

In the Serbian population, risk factors for MI included favorable socioeconomic conditions, alcohol consumption, exposure to one or more stressful life events, hypertension, reduced levels of high-density lipoprotein cholesterol (HDL), and family history of MI. At the same time, prior participation in leisure sports activities was associated with a reduced risk (21).

In 2019, the top three risk factors contributing to the burden of IHD worldwide include elevated systolic blood pressure (54.6%), high low-density lipoprotein (LDL) cholesterol levels (46.6%), and tobacco use (23.9%) (5). In 2021, ambient particulate matter pollution emerged as one of the top three contributors to IHD-related deaths and DALYs (22).

Although genetic predisposition and lifestyle choices remain important, growing evidence suggests they do not fully account for the multifactorial nature of IHD and cardiovascular risk. Heart health is shaped by a complex web of external influences from the air we breathe to the communities we inhabit (24).

In recent years, the concept of the exposome has emerged as a comprehensive framework that integrates all environmental and internal exposures an individual experiences throughout life (24). This approach helps researchers understand how cumulative exposures interact and evolve, emphasizing the importance of timing, duration, and intensity in shaping cardiovascular outcomes (25). By considering the full spectrum of exposures from conception onward, it provides a more comprehensive view of cardiovascular risk and supports more effective, equitable prevention strategies (24, 25).

Non-modifiable risk factors

Advancing age significantly increases the risk of developing IHD partly due to prolonged exposure to various risk factors over time (26). The onset of IHD typically begins around the age of 30, but clinical symptoms often do not appear until the age of 50 (7). As individuals grow older, structural and functional alterations in the cardiovascular system, such as endothelial dysfunction and increased arterial stiffness, contribute to a higher incidence of IHD (26).

Men generally develop IHD at an earlier age compared to women, likely due to the protective effects of estrogen in premenopausal women. However, postmenopausal women experience a rapid increase in risk, often presenting with atypical symptoms and worse clinical outcomes (27). A positive family history is an independent risk factor for IHD, highlighting the significant role of genetic predisposition in its development. Genome-wide association studies have identified multiple genetic loci associated with an elevated risk of IHD, especially variants in genes related to lipid metabolism, inflammation, and vascular function (28). Individuals with a first-degree relative who had IHD before age 55 in men or 65 in women face a considerably elevated risk of the disease progressing (28).

Hypertension

Hypertension is a well-established and significant risk factor for IHD, contributing to the development and progression of atherosclerosis, MI, and heart failure. High blood pressure increases the mechanical stress on arterial walls, leading to endothelial dysfunction, vascular inflammation, and accelerated atherogenesis (29). Chronic hypertension promotes left ventricular hypertrophy and arterial stiffness, both of which elevate myocardial oxygen demand while reducing coronary perfusion, thereby heightening the risk of ischemic events (304). In addition, hypertension is often linked to other cardiovascular risk factors, which further exacerbate the risk of IHD (30. Clinical trials have shown that effective blood pressure control significantly decreases the incidence of MI and cardiovascular mortality (30). Between 1990 and 2019, Europe and the Americas saw a 41% increase in the number of hypertensive adults, while Southeast Asia and the Western Pacific experienced a dramatic 144% rise (31). Despite its prevalence, hypertension remains underdiagnosed and undertreated: only 54% of affected adults are diagnosed, 42% receive treatment, and merely 21% achieve adequate blood pressure control (31).

In the Serbian population, the standardized prevalence of elevated blood pressure and hypertension was 40.6% and 34.5%, with 57.8% of individuals with hypertension receiving medical treatment (32).

Dyslipidemia

Dyslipidemia is a key contributor to both the onset and progression of IHD. It encompasses several lipid abnormalities, including high LDL cholesterol levels, decreased HDL cholesterol, and increased triglycerides. LDL cholesterol ("bad" cholesterol) particles are a major

contributor to atherosclerotic plaque formation by delivering cholesterol to the arterial walls, where it can be oxidized and trigger inflammatory responses. Statins, which lower LDL cholesterol, have been proven to reduce the incidence of MI and improve cardiovascular outcomes (33). HDL cholesterol, known as "good" cholesterol, plays a crucial role in clearing excess cholesterol from the bloodstream and preventing plaque buildup in the arteries (33). Elevated triglycerides are often seen in individuals with obesity, insulin resistance, and metabolic syndrome, and they are strongly associated with the progression of atherosclerosis and endothelial dysfunction (34). Dyslipidemia is often not a single abnormality but a combination of lipid issues. Individuals with high LDL cholesterol and low HDL cholesterol levels are at an even higher risk of IHD than those with isolated lipid abnormalities (35). There is considerable regional variability in cholesterol levels and trends. Historically, non-optimal cholesterol was most prevalent in high-income countries such as those in northwestern Europe, North America, and Australasia (12). However, recent data show that the highest cholesterol-related risk is now concentrated in middle-income countries in East and Southeast Asia, as well as parts of Central Latin America (12).

Diabetes

Diabetes is a significant and independent risk factor for IHD. Adults with diabetes are about twice as likely to develop IHD, mainly due to metabolic and inflammatory processes that trigger atherosclerosis through oxidative stress, inflammation, and lipid imbalances (36). Diabetes and IHD share several common risk factors, including hypertension, dyslipidemia, obesity, and a sedentary lifestyle (364). Managing blood glucose levels and addressing associated risk factors can significantly reduce the likelihood of adverse cardiovascular events in individuals with diabetes. The global diabetes burden has surged over the past three decades, with cases rising from 200 million in 1990 to 830 million in 2022 (37). The highest age-standardized rates were recorded in North Africa and the Middle East. Alarmingly, over half of those affected did not receive medication (38). Type 2 diabetes accounts for the vast majority of cases (96.0%) in 2021 and 95.4% of diabetes-related DALYs, particularly among older adults. In the Republic of Serbia, an estimated 700,000 adults (12.2%) have diabetes, with a comparative prevalence of 9.1% (39).

Clinical conditions

Certain clinical conditions contribute to the development and progression of IHD, either directly or indirectly, by influencing vascular health, metabolic status, or increasing the burden on the cardiovascular system. These conditions include chronic kidney disease (CKD), atrial fibrillation (AF), heart failure (HF), and cancer. CKD affects over 10% of the global population and is more common among older adults, women, racial minorities, and those with diabetes or hypertension (41). The burden is especially high in low- and middle-income countries. (41). AF affects up to 1 in 3–5 people over age 45. Between 2010 and 2019, global prevalence increased from 33.5 million to 59 million (42). HF incidence is stabilizing or declining in industrialized countries, but prevalence is rising due to population aging, better survival from IHD, and life-prolonging therapies (43). The highest HF prevalence is seen in Central Europe, North Africa, and the Middle East, with lower rates in Eastern Europe and Southeast Asia (43). Cancer increases IHD risk through the pro-inflammatory effects of cancer and treatments like chemotherapy, which can induce cardiotoxicity and worsen endothelial dysfunction, further promoting atherosclerosis (44). Cancer patients often have comorbidities such as obesity and hypertension, which further elevate cardiovascular risk (44). Approximately one in five men or women develops cancer in a lifetime.

Tobacco

Cigarette smoking is one of the most important factors for IHD. Research also shows that even alternative forms of tobacco use, such as low-tar cigarettes and smokeless tobacco, are linked to a heightened risk of cardiovascular events in comparison with non-smokers (45, 46).

Additionally, secondhand smoke (environmental tobacco smoke) poses a significant health risk. Even at significantly lower levels of exposure (1/100th of direct smoking), individuals exposed to secondhand smoke face about a 30% higher risk of developing IHD compared to non-smokers. This risk is still substantial, given that active smokers experience around an 80% increase in their risk for IHD (47). Even brief exposure to secondhand smoke is harmful to cardiovascular health and contributes to increased rates of heart disease (48). Cigarette smoking is associated with IHD due to the detrimental effects of nicotine, carbon monoxide, and other toxic substances present in tobacco smoke. These substances contribute to the development of atherosclerosis by promoting endothelial dysfunction, increasing oxidative stress, and stimulating inflammation, all of which accelerate the process of plaque formation in the arteries (45).

Furthermore, smoking is linked to higher levels of blood pressure, dyslipidemia, and blood clotting factors (47). Global smoking prevalence dropped from 22.7% in 2007 to 17% in 2021, yet there are still over one billion smokers worldwide due to population growth (49). In Serbia, tobacco use causes the premature death of approximately 15,000 people annually. The prevalence of tobacco product use among individuals aged 15 and older was 31.9% in 2019 (50).

Alcohol

Alcohol consumption has a dose-dependent effect on IHD. Moderate drinking may offer protective benefits by exerting antioxidant and anti-inflammatory effects, increasing HDL cholesterol, reducing LDL cholesterol, and lowering the risk of thrombosis (51). However, excessive alcohol consumption significantly elevates the risk of IHD through mechanisms like hypertension, dyslipidemia, oxidative stress, and myocardial injury (51). This leads to a distinctive two-phase, "J-shaped" risk pattern. Chronic heavy drinking can lead to arrhythmias and cardiomyopathy, although the clinical signs typically appear after more than a decade of alcohol abuse. (52). Drinking patterns, rather than the total quantity consumed, play a crucial role in determining IHD risk. Irregular binge drinking is linked to a higher cardiovascular risk compared to individuals who distribute their alcohol intake evenly across the week through moderate daily consumption (52). According to ESC guidelines, the recommended maximum for alcohol consumption is around 100g of pure alcohol per week (53). Global alcohol per capita consumption fluctuated between 2010 and 2019, with an overall decline of less than 5% (54). The highest levels of alcohol consumption were recorded in European countries, whereas the lowest were found in predominantly Muslim countries across Northern Africa, the Middle East, and parts of Asia (55). In Serbia, 50.7% of the population does not consume alcohol (39.3% have never tried it, and 11.4% did not consume it in the past 12 months) (50).

Diet

Diet plays a significant role in both the onset and progression of IHD, and eating habits provide clearer insights than isolating individual nutrients or food items (56). Evaluating general dietary patterns is now considered a leading method for understanding the role of nutrition in IHD (57). In high and upper-middle SDI countries, the primary dietary risk factors for IHD include excessive intake of red and processed meats, high sodium intake, and insufficient intake of legumes (57). High consumption of red and processed meats is associated with elevated levels of saturated fats and cholesterol. Excessive sodium intake, typical in many Western diets, is closely linked to hypertension (57).

In contrast, low and lower-middle-income SDI countries face different dietary challenges. The key dietary risks in these regions are inadequate intake of fiber, fruits, nuts, seeds, polyunsaturated fatty acids (PUFAs), and omega-3 fatty acids from seafood, as well as vegetables and whole grains. Specifically, omega-3 fatty acids, found in seafood, are known to have anti-inflammatory properties and improve lipid profiles, thus reducing IHD risk (57). Insufficient intake of fruits and vegetables, which are rich in antioxidants and fiber, also contributes to an increased risk of developing IHD. The Mediterranean diet, characterized by a high consumption of minimally processed plant-based foods and monounsaturated fats from olive oil, along with a lower consumption of saturated fats, meat, and dairy, is considered an excellent nutritional approach for supporting heart health (56). Consumption of full-fat dairy products, eggs, and processed meat increased the risk of MI, while consumption of fish and poultry more than twice a week, along with a daily intake of fresh vegetables, has been shown to significantly reduce the risk of MI in the Serbian population (58). Both the American Heart Association (AHA) and the European Society of Cardiology(ESC) emphasize plant-based diets for IHD prevention, recommending more fruits, vegetables, nuts, whole grains, and fish, while limiting salt, sugary drinks, processed meat, and alcohol (59). In Serbia in 2019, 50.2% of the population consumed vegetables and 39.4% consumed fruit daily (50). Fish was consumed one to three times a week by 33.3% of the population, and 6.0% reported never eating fish. Additionally, every eleventh person stated they add salt to food before tasting it (50).

Body mass index and physical activity

Body mass index (BMI) and physical inactivity are both significant determinants of IHD risk. The global burden of IHD linked to high BMI and low physical activity (PA) has risen in absolute numbers from 1990 to 2021, despite a decline in age-standardized DALYs and mortality rates, indicating that the prevalence of obesity and PA continues to increase (60). Obesity contributes to IHD through various genetic, physiological, and biochemical pathways. It is linked to both traditional risk factors like type 2 diabetes, hypertension, and dyslipidemia, as well as novel factors such as insulin resistance, inflammation, and clotting abnormalities (61). Central obesity, a core feature of metabolic syndrome, is a major contributor to cardiovascular risk and is now acknowledged as an independent risk factor for IHD (61). In 2022, 43% of adults were overweight, including 1 in 8 people globally who were living with obesity (62). This marks a significant rise from 1990, when only 25% of adults were overweight (74). Regional prevalence varies from 31% in Southeast Asia and Africa to 67% in the Americas. In Serbia in 2019, 40.5% of the population aged 15 and older had a normal nutritional status, while more than half were overweight (50).

PA decreases the risk of IHD by improving key risk factors such as blood pressure, blood lipids, insulin sensitivity, and obesity. Additionally, exercise enhances vascular health, reduces inflammation, improves endothelial function, and decreases arterial stiffness, all of which contribute to cardiovascular protection (63). It also alleviates stress and depression. PA is strongly linked to the burden of IHD, with low PA contributing significantly to higher deaths and DALYs, particularly in females and re-

gions with lower SDIs. Increasing PA is crucial for reducing IHD-related mortality and morbidity (60). In 2022, 31% of adults worldwide were physically inactive, a 5% increase since 2010 (64). Women are less active than men, and inactivity rises after age 60. In Serbia (2019), 75.2% of people walked daily for at least 10 minutes, while only 8.8% engaged in fitness or sports at least three times a week, with men more than women (50).

Environmental factors

Drawing upon the exposome concept, recent research has highlighted air pollution, noise pollution, and climate change as major contributors to IHD.

Air pollution consists of diverse particles and gases introduced into the environment as a result of human activities. It encompasses both outdoor (ambient) pollution and indoor (household) pollution (65). The association between air pollution and IHD can be attributed to various mechanisms, including the induction of oxidative stress, inflammation, disruptions in autonomic and neuroendocrine systems, heightened vasoconstriction and blood clotting, and the infiltration of particulate matter into the bloodstream (66). Brief exposure to particulate air pollution elevates the risk of acute cardiovascular events by approximately 1% to 3% within days. In contrast, extended exposure significantly amplifies this risk, around 10%, partly due to the onset of cardiometabolic disorders such as hypertension and diabetes (65). Countries across East, South, and Southeast Asia experience the heaviest cardiovascular burdens from air pollution (66). Ambient air pollution has become the leading environmental cause of disease and premature death worldwide, surpassing even traditional risk factors such as tobacco smoking (24).

Noise exposure negatively impacts cardiovascular health by activating the stress axis and releasing hormones like cortisol and adrenaline, which contribute to hypertension, atherosclerosis, and other heart conditions. It also disrupts sleep, increases sympathetic activity, and promotes inflammation, endothelial dysfunction, gene regulation abnormalities, metabolic imbalances, and psychological stress, all of which worsen cardiovascular health (67). Over 100 million people worldwide are exposed to noise levels above 60 decibels, with traffic noise being the main source in urban areas, affecting over 85% of residents (67).

Synergistic effects of PM2.5 and traffic noise, particularly during nighttime, exacerbate risks for atherosclerosis and IHD. Additionally, climate change, driven by fossil fuel use and global warming, contributes to increased cardiovascular risks through higher temperatures, natural disasters releasing PM2.5, and its interplay with other environmental hazards, creating a compounding effect on health (68).

Psychosocial stress

Emerging evidence from epidemiological and clinical studies indicates that psychosocial factors independently influence the risk of IHD, even after adjusting for classic cardiovascular risk factors (69). Persistent psychosocial stressors, including work-related pressure, family life challenges, insufficient social support, negative emotions like depression and hostility, caregiving responsibilities, and low socioeconomic status (SES), have been identified as significant contributors to the risk of IHD. Stress can influence IHD both directly, through neuroendocrine and platelet activation, and indirectly, by increasing the likelihood of unhealthy behaviors. Work-related stress and financial difficulties have been identified as leading psychosocial factors strongly linked to an increased risk of IHD in the Serbian population (69). A global survey of 300,000 participants from 131 countries found that 35.1% experience stress, which is strongly linked to income instability, health problems, and food insecurity (70). Psychosocial factors have been shown to influence both mortality and survival after IHD, and patients who live alone have higher long-term all-cause mortality following MI (71, 72).

IHD incidence and mortality rates are lowest in high-development areas, where they have also declined the most (73). In upper-middle-income regions, IHD incidence remained relatively stable until 2000, after which a notable decline occurred, likely due to the implementation of comprehensive public health policies (73). Individuals from lower SES groups often exhibit higher prevalence of risk factors, although some studies indicate an independent association. Beyond traditional risk factors, other contributors to increased IHD risk in lower SES populations include limited health literacy, barriers to healthcare access, inadequate treatment, poorer physical and mental health, and adverse environmental conditions in disadvantaged neighborhoods (13).

ESTIMATION OF RISK FOR IHD

Risk estimation for IHD is essential for early detection and prevention, helping to identify persons at high risk for adverse cardiovascular events. Several tools and models have been developed to predict the likelihood of IHD based on various clinical and demographic factors. A widely used tool, the Framingham Risk Score (FRS), assesses the 10-year CVD risk by incorporating key factors such as cholesterol levels, blood pressure, smoking habits, and diabetes status. The European Society of Cardiology developed Systematic Coronary Risk Evaluation SCORE2 and SCOREop. The SCORE2 model is an improved version of the original SCORE tool, designed to predict the 10-year risk of fatal and non-fatal cardiovascular events, including IHD. It is primarily used among

adults between 40 and 69 years of age and incorporates traditional risk factors such as age, sex, blood pressure, cholesterol levels, smoking status, and diabetes. SCORE2 provides regional risk estimates specific to different European countries, accounting for variations in cardiovascular disease prevalence (74). SCOREop is a specialized version of the SCORE model tailored for individuals aged 70 and older (75). Both SCORE2 and SCOREop help clinicians make informed decisions about preventive interventions specifically tailored to the individual's age and regional cardiovascular risk profile.

So far, no widely used clinical risk score includes environmental exposures such as air pollution or noise, even though these factors are increasingly recognized as relevant in the development of IHD. Including this dimension could further emphasize the importance and potential of the exposome approach in improving risk prediction in the future.

PREVENTION OF IHD

IHD is a preventable disorder if the risk factors are effectively controlled (76). It can be prevented through primordial prevention in populations, as well as on an individual level through primary prevention. These strategies involve lifestyle modifications, medical interventions, and public health policies. The primordial strategy addresses societal influences on health, including political, economic, and social conditions such as unregulated urban growth, lack of education, poverty, and workplace and living environment challenges (76). The primary prevention focus is on modification of risk factors through lifestyle interventions and pharmacotherapies. An adequate diet has been shown to reduce IHD risk (77) significantly. Regular physical activity is one of the most effective ways to prevent IHD. The World Health Organization (WHO) advises engaging in a minimum of 150 minutes of moderate-intensity aerobic exercise each week for reducing IHD risk (78). Even modest increases in physical activity lead to significant reductions in cardiovascular events. Quitting smoking significantly reduces the risk of IHD, with the greatest benefits seen in individuals who stopped at a younger age (54).

Statin therapy is a cornerstone for reducing LDL cholesterol and preventing IHD. Statins have been shown to reduce both primary and secondary cardiovascular events (54). Effective management of hypertension with ACE inhibitors, angiotensin receptor blockers, and calcium channel blockers can significantly reduce the risk of IHD (54). Additionally, patients with diabetes or high cholesterol often benefit from medications that improve lipid profiles or insulin sensitivity.

Early detection of risk factors such as hypertension, dyslipidemia, and diabetes is essential for IHD prevention, and routine screening is recommended to identify persons at high risk (54).

Policies targeting smoking reduction, such as smoking bans, tobacco taxes, and public health campaigns, have been effective in reducing IHD incidence (79). Public health campaigns that focus on lifestyle modifications, such as increasing physical activity and improving dietary habits, can significantly reduce IHD risk. Public health policies should also focus on improving access to preventive care, particularly for high-risk populations (79).

Secondary prevention involves treatments designed to avert additional cardiac damage in individuals with a history of IHD.

CONCLUSION

IHD continues to pose a significant challenge to public health, causing a huge medical burden and economic loss. While age-standardized rates of IHD have declined in many high-income countries due to advancements in healthcare and public health initiatives, the overall burden continues to expand, driven by both population growth and aging. The disease disproportionately affects individuals in lower-income regions, where access to preventive care is limited, and risk factors such as hypertension, smoking, and poor diet are more prevalent. Efforts to decrease the global burden of IHD must focus on addressing modifiable risk factors, improving access to healthcare, and implementing comprehensive prevention strategies that take into account the social, economic, and environmental determinants of health.

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EPIDEMIOLOŠKE KARAKTERISTIKE ISHEMIJSKIH BOLESTI SRCA

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Sažetak

Ishemijska ili koronarna bolest srca (IBS) je vodeći uzrok smrti i nesposobnosti na globalnom nivou. Cilj ovog preglednog rada je da pruži uvid u epidemiologiju IBS sa fokusom na distribuciju, faktore rizika i prevenciju.

Pretraga literature je sprovedena korišćenjem PubMed, Scopus i Google Scholar baza podataka kako bi se identifikovale relevantne studije objavljene u poslednjih deset godina.

U 2019. godini od IBS bolovalo je 197.2 miliona ljudi, uzrokovale su 9,1 miliona smrtnih ishoda i 182,0 miliona DALY-ja (engl. disability-adjusted life years). Iako su standardizovane stope mortaliteta, DALY-ja i prevalencije od IBS u svetu opale, broj registrovanih slučajeva i dalje raste. Najviša prevalencija IBS se beleži u Srednjoj i Istočnoj Evropi i Centralnoj Aziji, a najniža u Južnoj Aziji.

Faktori rizika za IBS se mogu podeliti na promenljive i nepromenljive. Glavni nezavisni faktori rizika kao što su pušenje, hipertenzija, dislipidemija, dijabetes, starost uzročno su nezavisno povezani sa nastankom oboljenja. Sredinski faktori (aerozagađenje, buka, klimatske promene) dodatno povećavaju rizik od IBS-a. Novonastali koncept eksposoma ukazuje da je za nastanak IBS važna kumulativna izloženost i zajednički uticaj svih faktora rizika u životnoj sredini.

Nastanak IBS se može sprečiti primordijalnim (mere usmerane prema socijalnim determinantama zdravlja kao što su: urbanizacija, siromaštvo, pismenost, uslovi života i rada) i primarnim merama prevencije (modifikacija faktora rizika promenom načina života, medikamentozna terapija).

IBS predstavljaju sve veći globalni zdravstveni problem, pogotovo u nerazvijenim zemljama, što je posledica starenja populacije, ograničenog pristupa zdravstvenoj zaštiti i prisustva brojnih faktora rizika što zahteva adekvatnu prevenciju i lečenje.

Ključne reči: ishemijska bolest srca, faktori rizika, prevencija

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