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DISCOVERY SCIENTIFIC SOCIETY

The impact of health-promoting behaviors on cardiovascular diseases - a review of the literature

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ABSTRACT

Cardiovascular diseases are one of the most common causes of death worldwide. Despite known risk factors, improved treatment,and advances in medical technology, the number of death from circulatory system causes remains very high. This paper reviews published articles and data indicating that factors such as a healthy diet, regular physical activity, smoking cessation, adequate sleep, stress management, and effective control of concomitant diseases can contribute to reducing the prevalence of cardiovascular disease and the associated risk of mortality. It shows that both primary and secondary prevention have a diametrically opposite impact on reducing cardiac incidents and deaths from cardiovascular events. It also emphasizes the importance of disseminating this information to the public.

Keywords: cardiovascular disease risk factors, mortality, prevention, stroke, myocardial infarction

1. INTRODUCTION

Cardiovascular diseases rank among the top causes of mortality globally. They are estimated to be responsible for nearly one-third of global death. In 2023, approximately 17.9 million individuals lost their lives to cardiovascular diseases worldwide. The risk of developing cardiovascular disease is influenced by both unmodifiable and modifiable factors. Some aspects, such as age, sex, and genetics, cannot be changed. However, a significant portion of cardiovascular risk stems from behaviors and lifestyle choices that can be modified. Changeable risk factors include poor eating habits (Shikany et al., 2015), lack of exercise (Howden et al., 2018), smoking cigarettes (Wilson et al., 2000), heavy drinking, obesity (Csige et al., 2018), high blood pressure (Shams et al., 2025), and poorly managed diabetes (Henning, 2018).

By addressing these risk factors through lifestyle changes and preventive care, there is a valuable opportunity to reduce both the incidence and severity of

cardiovascular diseases. Healthcare professionals are crucial in teaching people about these modifiable risk factors and encouraging long-term changes that support heart health. Research over the decades shows that targeting modifiable risk factors can lead to significant declines in cardiovascular death rates. A well-rounded approach that encompasses prevention, early intervention, and rehabilitation is crucial for addressing the global issue of cardiovascular diseases and promoting healthier, longer lives.

2. REVIEW METHOD

This review gathers information from peer-reviewed literature, systematic reviews, meta-analyses, cohort studies, and consensus statements published between April 2000 and January 2025. Phrases used to find scientific papers and information included: cardiac incidents, "cardiovascular", "cardiovascular disease prevention", "cardiovascular risk", cardiac incidents risk reducing factors". A major database search was conducted on PubMed, JAMA Cardiology, and the European Heart Journal. Sources, such as the World Health Organisation (WHO) and American Heart Association guidelines, provided essential insights. The selection process is illustrated in Figure 1.

3. RESULTS AND DISCUSSION

Healthy diet

Many studies show that a well-balanced diet is essential for preventing CVD. In particular, a low-fat and low-processed, high anti-inflammatory, and high antioxidant diet exerts positive implications for the cardiovascular system. Regarding dietary patterns, adherence to a Mediterranean-type diet has positive implications for the cardiovascular system. One of the well-known studies that looked at compliance with a Mediterranean-type diet was the Lyon Heart Study. It was a randomized, controlled trial, that investigated the potential benefits of a Mediterranean-type diet in reducing the risk of recurrent cardiovascular events in patients after myocardial infarction. An intervention involved 302 patients who followed a Mediterranean-type diet.

The control group, comprising 303 patients, received a more conventional Western-style diet. This diet included a higher proportion of monounsaturated fatty acids, n-3 fatty acids, and cholesterol. In the end, at 27 months of the study, the results showed that the Mediterranean group had a reduced risk of recurrent heart disease between 50% and 70% as compared to the control group. After the study, the Mediterranean group also had less cardiac death by 76% and less non-fatal myocardial infarction by 70%. This diet also has a positive effect on the vascular system and on the stabilization and reduction of atherosclerotic plaques.

A 2021 study on the impact of the Mediterranean diet on intima-media thickness of the common carotid arteries (IMT-CC) found that the diet reduced IMT-CC after 5 years. This effect persisted even after 7 years (Jimenez-Torres et al., 2021). Another diet that benefits the cardiovascular system is the DASH diet. It includes a variety of fruits, vegetables, and low-fat dairy products, while also focusing on limiting sodium intake. Scientific research, including published meta-analyses, has confirmed the diet's effect on lowering blood pressure. The meta-analysis comparing data from over 2,500 participants from 17 randomized controlled trials, found that the DASH diet affected blood pressure values by reducing systolic blood pressure by 6.74 mmHg and diastolic blood pressure by 3.54 mmHg. In people with established hypertension, the reduction was even greater (Saneei et al., 2014).

A diet that may increase the risk of developing cardiovascular disease and may increase the risk of death from this cause is the Southern diet. It contains products such as processed meat, sweet beverages and foods containing saturated fats. Data from participants in Reasons for Geographic and Racial Differences in Stroke study showed that participants who adhered to the Southern diet had a 56% increased risk of acute coronary artery disease, compared to the control group not following this pattern (Shikany et al., 2015).

The scientific literature from research consistently confirms the benefit of a healthy diet in preventing cardiovascular diseases. A diet rich in vegetables, fruits, and antioxidants and low in processed food containing large amounts of fatty acids, sugars, and fats, is a key to protecting the circulatory system, maintaining its health, and reducing the risk of death.

Limited alcohol consumption

Many years of research have shown the harmful impact of alcohol on the circulatory system. Excessive alcohol consumption can contribute to higher risk of hypertension, stroke, myocarditis, atrial fibrillation, exacerbation of coronary heart disease, or heart failure. Alcohol disrupts the body's hormonal mix. It affects lipids, reducing HDL levels, which have a protective effect on the circulatory system and increases LDL levels, high levels of which can affect the progression or deterioration of the current illness.

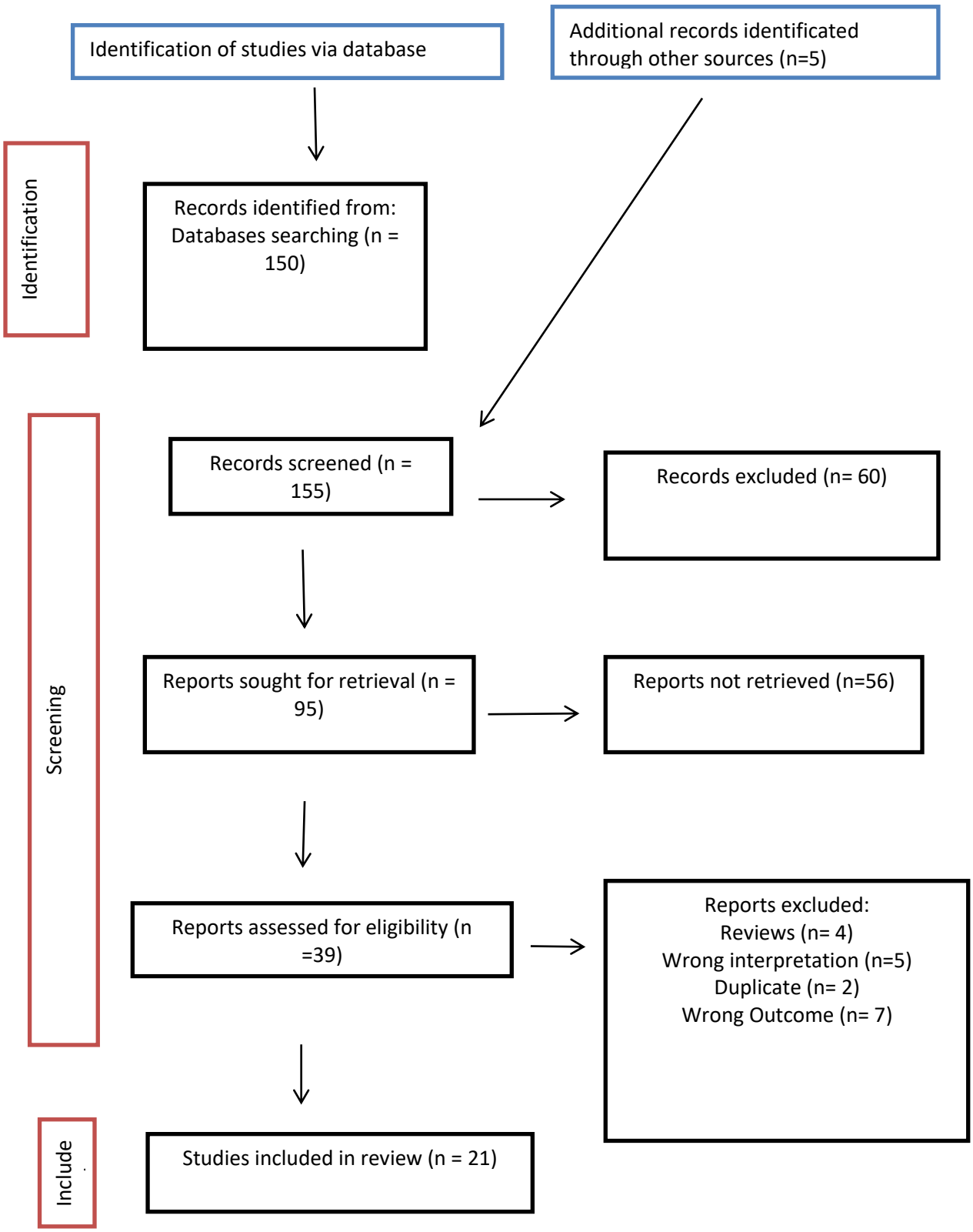

Fig. 1: PRISMA chart of studies selection

Some studies indicate that women may be at higher risk for alcohol-related heart disease than men. Description of the study conducted, published in 2024 in the American College of Cardiology, has shown that women who drink large amounts of alcohol have

a 45 % greater risk of vascular disease than those who drink moderate amounts. Men who drink alcohol heavily also have the highest risk of cardiovascular diseases. The same study indicated that the risk increases by more than 20% compared to those who consume moderate amounts. There are also studies in the literature that suggest that small amounts of alcohol consumption may be associated with a reduced incidence of some cardiovascular diseases. However, these studies remain controversial, and health experts discourage anyone from drinking alcohol solely because of the benefits of preventing heart disease. Alcohol consumption should be limited for the good functioning of the circulatory system and to limit the development of other diseases. Alcohol also has an adverse effect on other organs in the human body.

Smoking Cessation

Smoking has significant effects on the body's systems. The act of smoking serves as a catalyst for systemic inflammation. The functional capacity of endothelial cells lining blood vessels to expand and contract becomes disrupted. The probability of experiencing heart attacks and strokes increases while atherosclerosis progresses more rapidly. The disruption of the lipid system can lead to many diseases related to the circulatory system. Additionally, it may lead to hypertension due to its effect on the sympathetic nervous system. Quitting smoking has many benefits. It can reduce the risk of death from cardiac incidents in people who previously had a heart attack. A meta-analysis of 12 cohort studies that included more than 5000 patients demonstrated that smoking cessation after myocardial infarction was associated with a 46% reduction in mortality (Wilson et al., 2000).

It is hightly important to stop smoking completely instead of just cutting back. One of the study took into account people who limited smoking, stopped smoking, stopped smoking but after some time returned to the addiction. The final stage of the research showed that in people who returned to the addiction after some time, the risk of cardiovascular incidents increased by 42-69% compared to people who did not return to smoking (Jeong et al., 2021).

Scientists also conducted research on the impact of e-cigarettes on the cardiovascular system. E-cigarettes have been shown to have an increasing effect on heart rate, blood pressure, and vasoconstriction.

The collected data from scientific studies show how essential it is to emphasize smoking cessation. Public health initiatives must place the most significant emphasis on informing people about the harmful effects of smoking on the human body to decrease the global burden of cardiovascular disease and many other illnesses.

Adequate Sleep

Sleep disorders affect the state of the human body, including its cardiovascular system. Based on research conducted over the years, it has been established that the quality and quantity of sleep have a remarkable impact on the circulatory system. Science research shows that people with low sleep quality, despite getting enough sleep, have higher rates of hypertension and more arterial stiffness. They are also at greater risk for cardiovascular disease. Chronic sleep deprivation can cause the body to develop an inflammatory response, which contributes to the development of atherosclerosis and the narrowing of the blood vessels in the nervous system, thus increasing the risk of stroke or heart attack. It may also be responsible for increased levels of stress hormones, such as cortisol, adrenaline and noradrenaline. This may lead to disruption of the processes responsible for maintaining normal blood pressure and the development of hypertension. Elevated levels of stress hormones over a long period can also cause insulin resistance, leading to the development of diabetes and increased risk of death from cardiovascular disease. Chronic sleep deprivation can also affect appetite-controlling hormones, such as ghrelin and leptin, leading to increased hunger and disordered eating. This could result in obesity, which is a well-recognized risk factor for cardiovascular disease.

Experts say that a person should sleep optimally 7-8 hours. Studies have shown that people who slept less were at greater risk of cardiovascular death. Short or interrupted sleep can be an independent factor in the formation of multi-site atherosclerosis (Domínguez et al., 2019). However, evidence has also revealed that excessive sleep (more than 9 hours every night) has been linked to increased cardiovascular event risk as well. The mechanisms for this link are not yet fully explained. Still, they can involve symptoms such as depression, chronic disease, and reduced physical activity, which are sometimes seen in people sleeping too much. A scientific study published in the European Heart Journal found that short sleep was associated with a 19% higher risk of cardiovascular morbidity, while long sleep was linked to a 37% higher risk (Krittanawong et al., 2019).

In summary, long and short sleep durations and also low quality of sleep are strong determinants of cardiovascular risk. This explains why proper sleep hygiene is so essential. To ensure that sleep lasts the right amount of time and that its quality is not disturbed. Thanks to this, the risk of death from circulatory system causes could decrease.

Stress Management

Persistent stress may lower the arrhythmia threshold and heighten sympathetic nervous system activation, leading to elevated blood pressure and an increased risk of heart attack or stroke. It can also increase the levels of stress hormones. Chronic high levels of these hormones can lead to an inflammatory response in the body, higher blood pressure, increased clotting reactions, elevated blood sugar, and increased appetite and thirst, as well as sleep disturbances. Many meta-analyses and cohort studies show that chronic stress significantly raises the risk of both fatal and non-fatal cardiovascular events. A study that combined data from six prospective cohort studies discovered that participants who felt high stress had a 27% higher risk of cardiovascular events than those who perceived low stress (Richardson et al., 2012).

Stress hormones have an impact on the human body. Their increased levels can affect the circulatory system. A meta-analysis that compared the results of 33 studies examined the effect of high levels of stress hormones on the risk of cardiovascular disease. Researchers observed that people with high levels of norepinephrine, high levels of cortisol, and high levels of adrenaline had a higher risk of cardiovascular disease, with risk ratios ranging from 1.58 to 1.68 for each hormone, compared to people who had low levels of all these stress hormones (Tsai et al., 2024).

Studies that investigated the impact of stress-related disorders on the cardiovascular system indicated that people with stress-related disorders had a 64% higher risk of developing any cardiovascular disease compared to their siblings who did not have stress-related disorders (Song et al., 2019). Nowadays, stress is present in many aspects of life. However, it is worth remembering that reducing it can have an impact on reducing circulatory system diseases, such as exacerbation of coronary heart disease, atrial fibrillation, exacerbation of heart failure, or stroke.

Regular physical activity

Consistent physical exercise is essential for the proper functioning of the circulatory system. Studies have shown that individuals who engage in moderate-intensity activities, such as walking, swimming, or cycling, have a lower risk of developing cardiovascular disease compared to those who do not exercise. Health professionals and organizations, such as the American Heart Association and the World Health Organization, recommend a minimum of 150 minutes of moderate-intensity aerobic exercise or 75 minutes of vigorous-intensity exercise each week, combined with muscle-strengthening exercises at least twice a week. Numerous clinical studies have demonstrated that physical activity influences lipid metabolism. It lowers triglyceride levels, reduces LDL cholesterol, and increases HDL cholesterol.

One of the most well-known cohort studies, the Framingham Heart Study, provided strong evidence linking physical activity to a protective effect on the incidence of CVD. An observational cohort study published in 2013 described how long-term physical activity affects cardiovascular disease and mortality in participants of the Framingham Heart Study. It indicated that physical activity led to a 17% reduction in mortality from cardiovascular disease compared to people who didn't consider themselves physically active (Shortreed et al., 2013).

Regular physical activity can increase left ventricular end-diastolic volume and improve maximal oxygen uptake. This aspect is important for reducing the risk of cardiovascular events (Howden et al., 2018). Regular physical activity can also help lower blood pressure. Aerobic exercise can lower systolic and diastolic blood pressure by 3-4 mmHg (Whelton et al., 2002).

Managing concomitant diseases

It is essential not only to prevent diseases but also to treat comorbidities such as obesity, insulin resistance, hypertension, or diabetes. They have a negative impact on the cardiovascular system.

Hypertension

Increased blood pressure can lead to atherosclerosis, coronary artery disease, heart attacks, and sudden cardiac death. Chronic hypertension leads to left ventricular hypertrophy, increasing the risk of heart failure. Every 20 mmHg rise in systolic blood pressure or 10 mmHg rise in diastolic blood pressure doubles the risk of cardiovascular events (Shams et al., 2025). In a 2020 study published in JAMA Cardiology, researchers described the results of the influence of increased systolic blood pressure on the development of atherosclerotic cardiovascular disease. The data collected from a cohort study, in which over 1,400 participants took part, demonstrated that a 10 mmHg rise in systolic blood pressure increases the risk of atherosclerotic cardiovascular disease by 53% (Whelton et al., 2020).

By adopting a healthy lifestyle, including regular physical activity and a balanced diet, systolic blood pressure can be reduced by 3.5 mmHg, despite genetic susceptibility to hypertension. An appropriate lifestyle can also reduce the risk of cardiovascular disease by approximately 30% (Ojangba et al., 2023).

Hypertension is also one of the main risk factors for stroke. According to data from many studies, hypertension is diagnosed in approximately 65% of stroke patients. A 2016 study published in the Lancet confirmed the association between hypertension and increased risk of stroke. The study involved almost 27,000 participants from 32 countries and found that hypertension was associated with a 47.9% risk of stroke in the general population, a 91.5% risk of ischemic stroke, and an 87.1% risk of intracerebral hemorrhage (O'Donnell et al., 2016).

Hyperlipidemia

Hyperlipidemia is also a risk factor for cardiovascular disease, such as coronary heart disease and stroke. Studies confirm that people with elevated levels of total cholesterol, LDL, and triglycerides and reduced levels of HDL cholesterol are at greater risk of cardiovascular incidents. Published scientific papers indicate that higher triglyceride levels correlate with nearly 30% increased risk of coronary heart disease events.

Obesity

Obesity is another major factor in death from cardiovascular disease. It raises the risk of hypertension, type 2 diabetes, and atherosclerosis. Many scientific studies emphasize the link between obesity and an increased risk of cardiovascular disease.

Obesity predisposes to the faster development of atherosclerosis, characterized by more advanced changes than those developed in people with a normal BMI. Gaining 10 kg of body weight raises the risk of coronary artery disease by 12%. Obesity may increase the risk of stroke. According to published data, with a one-unit increase in BMI, the risk of ischemic stroke increases by 4% and hemorrhagic stroke by 6% (Csige et al., 2018).

Diabetes

Another disease that affects the circulatory system is diabetes. Patients with this disease have a substantially increased risk of developing cardiovascular diseases and dying from them. Elevated blood sugar levels contribute to increased oxidative stress, inflammation processes, vasoconstriction, or thrombosis. People managing diabetes are also at risk of diabetic cardiomyopathy.

Studies emphasize that proper control of diabetes can significantly lower the risk of death from cardiovascular disease in individuals with this condition. Intensive treatment of type 2 diabetes (T2D) can reduce the risk of major macrovascular and microvascular events by approximately 10% (Henning, 2018). This is why it's essential to raise awareness about this among the general public.

Cardiac rehabilitation

Cardiac rehabilitation is one of the most important topics to discuss for preventing further cardiovascular events. It aims to improve diet, physical activity, and lifestyle to help recover faster and return to health after a cardiac event. Cardiac rehabilitation also helps prevent other heart-related issues in the future. People who took part in rehabilitation after cardiac infarction had a mortality rate that was nearly 27% lower than those who did not join cardiac rehabilitation (Perry et al., 2023).

Currently, there is a growing focus on cardiac recovery for individuals following cardiovascular incidents. Nonetheless, too many individuals do not participate in cardiac rehabilitation and remain unaware of its significant effects on recovery and reducing the chance of cardiovascular events. A summary of the study is presented in Table 1.

Table 1: Sample study summary from April 2000 to January 2025

Studies	Authors	Type of study	Number of participants/studies	Results
Smoking Cessation	Wilson et al., 2000	meta-analysis, Follow-up ranged from 2 to 10 years	Compared twelve studies, collected data from 5878 patients	Smoking cessation after myocardial infarction was associated with a 46% reduction in mortality.

Adequate Sleep	Krittanawong et al., 2019	meta-analysis	19 studies (31 cohorts); 816, 995 patients	short sleep was linked to a 19% higher risk of cardiovascular morbidity, long sleep was associated with a 37% higher risk.
Stress	Richardson et al., 2012	Meta analysis	6 prospective observational cohort studies, 118,696 individuals, followed for an average of more than a decade	participants who felt high stress had a 27% higher risk of cardiovascular events than those who perceived low stress.
Concomittant diseases	O'Donnell et al., 2016	case-control study	26 919 participants that were recruited from 32 countries	hypertension was associated with a 47.9% risk of stroke in the general population, a 91.5% risk of ischemic stroke, and an 87.1% risk of intracerebral hemorrhage.
Cardiac Rehabilitation	Perry et al., 2023	Review	601 099	Adults (65+) with cardiovascular disease who took part in rehabilitation had a mortality rate that was nearly 27% lower than those who did not join cardiac rehabilitation

4. CONCLUSION

Health-promoting practices are exceptionally valuable if used in the promotion of prevention and treatment of cardiovascular disease. Engaging in physical activity, maintaining a healthy diet, abstaining from smoking, managing stress effectively, getting sufficient sleep, and limiting alcohol consumption all contribute to better heart health. Educational and behavioral interventions are necessary for individuals to adopt health-promoting practices. However, barriers exist, including time and limited socio-economic status, even though health-promoting practices should continue to be promoted as much as possible for the prevention and treatment of heart disease.

Author's Contributions

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Conflict of interest
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Data and materials availability
All data associated with this work are present in the paper.

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