Review Article

Cardiovascular Disease: A Comprehensive Review of Risk Factors, Diagnosis and Management

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ABSTRACT

Cardiovascular disease (CVD) is the leading cause of death worldwide, accounting for millions of deaths annually. CVD encompasses various conditions that affect the heart and blood vessels, including coronary artery disease, heart failure, stroke, and peripheral artery disease. The primary cause of CVD is the accumulation of lipids in the artery wall, known as atherosclerotic plaque, which can obstruct blood supply and lead to various disorders. Risk factors for CVD include hypertension, high cholesterol, smoking, diabetes, obesity, and physical inactivity. Prevention and management strategies involve adopting a healthy lifestyle, including a balanced diet, regular exercise, and stress management. Medical procedures, such as medications, cardiac rehabilitation, and surgical interventions, are also essential in managing CVD. This review aims to provide an overview of CVD, its risk factors, prevention, and management strategies, highlighting the importance of early detection and treatment.

Keywords: Cardiovascular disease, risk factor, prevention, strategies, hypertension, stroke, coronary artery disease.

INTRODUCTION

Cardiovascular disease (CVD), the world's largest cause of death, encompasses a variety of conditions that impact the heart and blood arteries. One of the accumulation of lipids in the artery wall, known as atherosclerotic plaque, is the primary cause of CVD. Several disorders, including peripheral artery disease, cardiovascular disease, and coronary artery disease, can develop when plaque accumulation obstructs the blood supply [1]. In 2019, cardiovascular disease accounted for 35% of all female deaths, making it the top cause of death for women. The extent of cardiovascular illness in women has been brought to light via decades of grassroots initiatives. Additionally, during this time, significant shifts and initiatives that support women's agency and health have gained momentum [2]. Heart disease is responsible for one-third of fatalities worldwide, according to figures from the WHO. Around 17.9 million individuals globally die from CVDs each year, with a higher prevalence throughout Asia, according to the European Cardiology Society (ESC), 3.6 million persons are diagnosed with cardiac disease annually, and 26 million adults globally have received a diagnosis. About 3% of the whole health care budget goes on treating heart disease, and about half of all patients with the diagnosis pass away within a year or two [3]. Targeting molecular structure and metabolic pathways that control cellular defence against oxidative stress, especially the glutathione-dependent antioxidant arrangement, has been demonstrated to prevent cardiovascular disease in animal models. Chronic oxidative stress has in fact been connected to the development of cardiovascular conditions [4]. The primary cause of death worldwide is cardiovascular diseases (CVDs), and as the world's population ages, the prevalence of CVDs has been steadily rising. The risk for CVDs can be raised by physiological/pathological disorders and lifestyle choices, including high blood pressure, diabetes, obesity, inactivity, smoking, especially excessive alcohol consumption [5]. Using ECG signals is one of the popular techniques for predicting cardiovascular disease. Cardiac imaging for CVD prediction can also be used for image-based diagnosis. Similarly, other researchers have predicted cardiovascular illnesses using other traits [6]. Interventions must be culturally appropriate, adapted to the requirements and resources of the community, and carried out through active collaboration with community members to lessen the burden of CVD in rural areas [7].

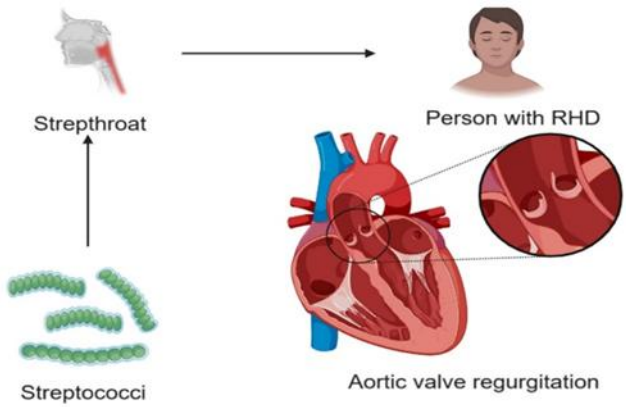

Figure 1: A compressive review of cardiovascular disease [8].

TYPES OF CVD

Coronary artery disease:

An acute coronary event, which often happens when a plaque breaks apart and a blood clot occurs, is the result of atheromatous obstruction of the coronary vessels, which causes coronary artery disease (CAD). More than 50% of deaths in western nations are attributed to CAD, a known cause of major cardiovascular events, while the majority of

CAD patients do not exhibit any symptoms [9]. The declining positivity rate, the incapacity to capture the various sources of ischemic patient vulnerability, and the ease of use of the new parameters are the three main cardiological reasons for a prompt shift in the current SE practice to move beyond the traditional qualitative/visual measurement of local and international heart function at rest and peak anxieties [10].

Heart failure:

Heart failure (HF) is a significant health burden in Western nations, comparable to cancer in terms of hospitalizations, mortality, along with potential years of existence lost. Patients with heart failure have highly comparable case-fatality rates estimates of early years of life lost when compared to patients with prevalent cancer types. Further, growing rates of obesity, diabetes mellitus, and hypertension are contributing to an increase in the responsibility of risk factors linked to heart failure [11]. Globally, the prevalence of heart failure (HF), a diverse clinical condition, is rising. This rise in prevalence and rising average life expectancy together represent a growing health care issue [12].

Stroke:

It's important to realize that stroke and a Transient Ischemic Attack (TIA) are examples of clinical symptoms, as well as the vascular brain injury can manifest through a variety of pathways that are connected to numerous risk factors and disease processes. As a result, "stroke" while "TIA" are not conclusive diagnoses; rather, they constitute a starting point for rational investigation and treatment [13]. Stroke has a significant effect on the lives of individuals and the community at large, making it the second leading cause of illness and death worldwide. Despite the modest improvement made in treating bleeding stroke, thrombolysis treatment and, in recent times, mechanical coagulation chambers for large blood vessel occlusion have contributed to our ability avoiding permanent boundaries from stroke triggered by acute ischemic engage in eligible patients [14]. Stroke is linked to significant financial expenses and is a major global cause of disability, dementia, and death. One in four persons worldwide will experience a stroke at some point in their lives [15].

Peripheral artery disease:

The build-up of fatty deposits in the arteries results in peripheral arterial disease (PAD), which is the constriction or blocking of the arteries. It has a significant morbidity and mortality rate and is one of the main causes of cardiovascular diseases worldwide. One it is a strong indicator of cardiovascular and all-cause mortality. According to reports, PAD increases the chance of cardiovascular fatalities by 96%, coronary artery disease by 45%, developing cerebrovascular disease by 35%, and all-cause mortality by 60% [16]. Peripheral arterial disease, also known as PAD, is characterized by stenosis or blockage of the arteries supplying blood throughout the lower limbs. PAD is becoming a more serious worldwide public health issue because to its high and rising frequency and association with detrimental consequences such as functional decrease, immobility, and cardiovascular diseases such as infarction of the heart, stroke, amputation, and mortality [17].

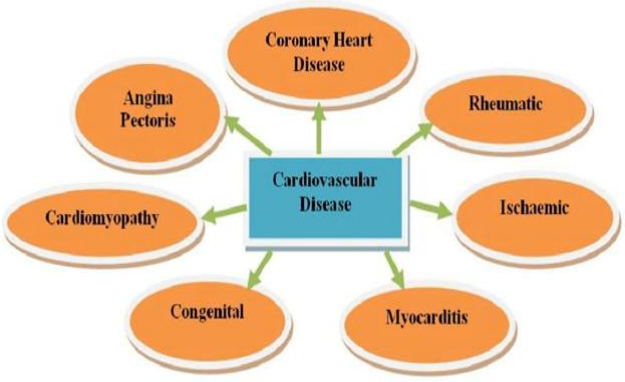

Figure 2: Types of cardiovascular disease [18].

RISK ELEMENTS

Hypertension:

One of the main avoidable causes of early morbidity and death is hypertension. Because they are more vulnerable, individuals who have hypertension and established cardiovascular disease may benefit from lowering their blood pressure below recommended levels. Although myocardial mortality and morbidity could be decreased with this approach, adverse events could also rise. It is still unclear what the ideal blood pressure goal is for those with hypertensive and established cardiovascular disease [19].

High cholesterol:

There is no doubt that pharmacologically reducing low-density lipoprotein cholesterol, mostly by statin medication, influences lowering atherosclerotic cardiovascular illnesses. One However, even with apparently modest levels, statin-treated people have been found to have significant residual cardiovascular risk [20].

Smoking:

Smoking is the primary cause of autoimmune cardiovascular disease. Smoking cigarettes contains two harmful chemicals: nicotine and nitrogen oxides. The blood vessels may be affected by the elevated heart rate practically immediately. It is commonly recognized that smoking accelerates the build-up of fat deposits in the blood arteries, damages the arterial lining, and causes oxidative stress. It increases the risk of low-density lipoprotein oxidation, inflammatory changes, and unexpected thrombotic events [21].

Diabetes:

Diabetes mellitus has a major detrimental effect on the cardiovascular system, especially microvascular and microvascular problems, and is associated with an increasing risk of complications [22].

Obesity:

More than 40% of Americans were considered obese in 2017–2018, reflecting the rise in obesity incidence in the US over the previous few decades. Obesity is linked to an increased risk of heart disease, especially atherosclerotic cardiovascular disease, according to several prospective studies. Several cardiovascular risk factors, including diabetes, dyslipidaemia, and hypertension, contribute to the association between obesity and CVD [23].

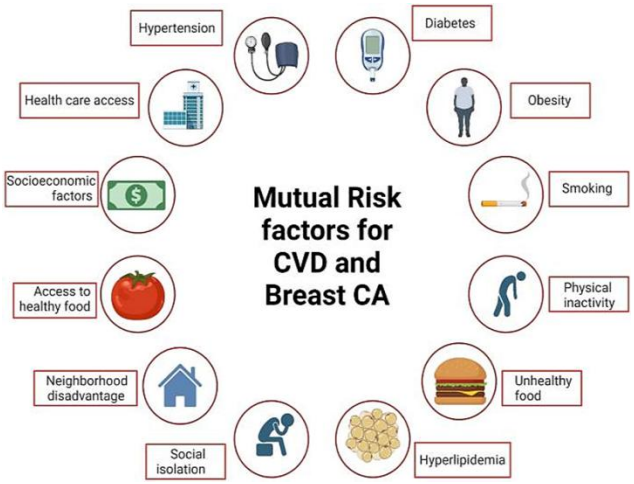

Figure 3: Risk factors for CVD Disease [24].

SIGN AND SYMPTOMS

Chest pain: Bad lifestyle choices have been linked to a poor prognosis and various forms of coronary artery disease. However, the evidence that is currently available does not strongly establish a link with bad lifestyle decisions and chest pain. Assessing the relationship amongst improper eating habits and the prevalence of chest discomfort and the general death rate among patients in present with chest pain [25].

Shortness of breath: Cardiovascular disease (CVD) is the leading cause of sickness and death, accounting for 18 million deaths annually worldwide. Cardiovascular disease (CVD) is responsible for 48% of all fatalities in Greece. Patients with CVD may have a variety of physical symptoms, including fatigue, dyspnoea, or soreness in the chest. Their standard of life is greatly diminished by these symptoms, which also affect their social, mental, and physical health [26].

Fatigue: The three main signs of heart failure are fatigue, hyperactivity, and discomfort. Although cardiac reserve is impaired in all Heart Failure patients, it's important to consider how multisystem dysfunction contributes to exercise resistance [27].

Pain in arm: Discomfort in the vertebral column, jaw, arms, and upper abdomen. Typically, women with cardiac disorders have shortness of breath, which becomes more pronounced during physical activities. They have discomfort in either of the two arms. Cardiac discomfort is associated with the left hand [28].

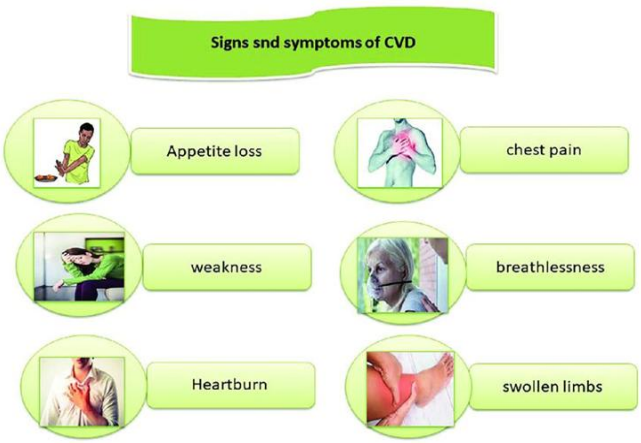

Figure 4: Symptoms of CVD [29].

PREVENTION AND MANAGEMENT

Healthy diet: A diet rich in vegetables, whole grains, fruits, and healthy fats is essential for heart health. Eating less sodium and sugar and more fiber can help regulate blood pressure and cholesterol levels [30].

Cigarette smoking: Smoking speeds up atherosclerosis and increases your risk of coronary artery disease and stroke [31].

Limited alcohol consumption: Alcohol use increases disability, in accordance with Health-Adjusted Life Years, which represent 6.3% of the global burden of disease [32].

RISK FACTOR MANAGEMENT

The risk factors for cardiovascular disease should be routinely evaluated in all diabetic patients at least once a year to prevent and treat both heart failure. A family history of pre-mature coronary heart disease, chronic renal disease, smoking, obesity/overweight, hypertension, dyslipidaemia, and albuminuria are some of these risk factors [33].

Table 1: Risk-factors contributing to cardiovascular diseases[36].

Major modifiable risk factors	**Other modifiable risk factors**
• Unhealthy Diet • Hypertension • Diabetes • Dyslipidaemia • Obesity • Physical inactivity	• Mental health • Psychosocial stress • Low socio-economic status • Smoking • Alcohol consumption • Use of certain medication
Non modifiable risk factors	**Newly identified risk factors**
• Age • Gender • Ethnicity • Genetic/hereditary factors	• High blood homocysteine levels • Inflammatory markers (C-reactive protein)

Preventive strategies for cardiovascular diseases (CVD) are had traditionally focused on traditional risk factors. Well-known risk factors for the development of CVD include family anxiety, stress, depression, hostility, dissatisfaction job stress social isolation, a lack of life purpose, and a lack of social support [34]. Iron is a necessary trace element found in almost all living forms and plays a role in a variety of biological functions, such as energy metabolism and the creation and repair of nucleotides. Up to 75% of heart failure patients have iron insufficiency, which is the most common malnutrition-related disease in humans [35].

MEDICAL PROCEDURE

Medications: Patient factors A patient's personal beliefs about their illness, which include the idea that their condition can be controlled without the need of pharmaceuticals or that they would have negative side effects, affect their compliance with treatment regimens [37].

Cardiac rehabilitation: A key component of the second type of prevention of cardiovascular diseases (CVD) is comprehensive Cardiac Rehabilitation (CR). Comprehensive heart disease rehabilitation has received the highest classification of suggestions and level of information in the European Society of Heart disease guidelines as an effective treatment for patients with heart failure, chronic coronary syndrome, myocardial revascularization following myocardial infarction, and for preventing cardiovascular disease in clinical practice [38].

Surgical interventions: Myocardial Blood vessel Bypass Grafting is the most used surgical technique for treating coronary artery disease. Common postoperative symptoms that are strongly associated with patient recovery include anxiety, tension, and pain [39].

PREVENTION STRATEGIES

Numerous physiological functions, including vasodilation and managing blood pressure, as well as therapeutic functions, including neurodegenerative illnesses and heart conditions, are influenced by nitric oxide. Numerous diseases are caused by oxidative stress, which is the disruption of redox signalling, and molecular damage, which are caused by an imbalance between the production of permitted radicals/oxidants and antioxidant defences [40]. Examining, evaluating, and assessing wearable technology and mobile health in relation to preventing heart attack and stroke (CVD) is the aim of this review. It also seeks to evaluate the reliability and correctness of cardiovascular biomarkers identified by wearable sensors. Usability, privacy, ongoing involvement issues, and upcoming developments and trends in digital healthcare will also be covered in the review. Future study, regulation, and clinical applications are also intended to be informed by this review[41].

CONCLUSION

Cardiovascular disease is a significant global health burden, and understanding its risk factors, prevention, and management strategies is crucial in reducing its impact. By adopting a healthy lifestyle, including a balanced diet, regular exercise, and stress management, individuals can reduce their risk of developing CVD. Early detection and treatment are also essential in managing CVD, and medical procedures such as medications, cardiac rehabilitation, and surgical interventions can help improve outcomes. Furthermore, addressing modifiable risk factors, such as hypertension, high cholesterol, and smoking, can help prevent CVD.

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