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Review Article

Review on Cardiovascular Diseases : Current Status and Disease Economics

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ABSTRACT

Cardiovascular diseases (CVDs) are the most important cause of morbidity and mortality globally, responsible for almost 18 million deaths each year—that's one-third of all deaths worldwide. They include coronary artery disease, stroke, heart failure, and peripheral artery disease, among others. The burden of CVDs keeps increasing globally because of aging populations, urbanization, and growing rates of hypertension, diabetes, obesity, and unhealthy lifestyle. Over 80% of CVD deaths occur in low- and middle-income countries, where healthcare access and preventive strategies remain limited.

INTRODUCTION

Cardiovascular diseases (CVDs) are a diverse collection of cardiovascular and heart disorders. They encompass coronary artery disease (CAD), cerebrovascular disease (stroke), heart failure, hypertension-heart disease, peripheral artery disease, and rheumatic heart disease. Cardiovascular diseases are the number one cause of mortality globally, accounting for about 17.9

million deaths annually, as stated by the World Health Organization (WHO).

These conditions not only represent a tremendous burden to public health but also have significant socio-economic impacts, such as direct healthcare expenses, loss of productivity, and costs of long-term care. The justification for this review lies in synthesizing current data regarding the global and regional CVD epidemiology, principal risk factors, pathophysiologic mechanisms, diagnostic and therapeutic innovations, and — notably — the

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economics of the disease (both direct and indirect costs). The aim is to draw a complete picture of the present situation regarding CVDs and their economic effects, recognize central gaps and challenges, and point out future directions for policy and practice.

EPIDEMIOLOGY AND CURRENT GLOBAL STATUS

Global burden

International data indicate that the population suffering from CVDs is very large and growing. A major dataset indicates that as of 2022, the burden of cardiovascular diseases and risks globally is still high and growing.

Particularly, there were over 500 million prevalent CVD cases in the world in 2019 — nearly twice as many as there were in 1990. The burden of mortality is still high: over a third of deaths from CVD are premature (under 70 years of age)

Regional variations

There is significant heterogeneity by world region, income-level, and demographic characteristics. Over 80% of CVD incidence and mortality fall within low- and middle-income countries (LMICs). For instance, the economic burden due to CVDs in low- and middle-income countries between 2011–2015 was estimated at approximately US\$3.7 trillion.

Healthcare expenses associated with CVD in Europe and the United States are more than €280 billion and US\$400 billion, respectively.

Trends over time

Although mortality from some CVDs has reduced over recent decades in high-income nations, the rate of decline is slowing or even reversing in some

subgroups. Risk factor prevalence for conditions like obesity, diabetes, and hypertension is rising worldwide, with potential to provoke a renewed increase in CVD incidence.

Demographic factors

Age and gender are important: older age is the main non-modifiable risk factor; men develop CVD at earlier ages than women, although results in women following the event tend to be less favorable. Ethnic and socio-economic differences also occur: urban versus rural, high versus low income environments, and access to services vary greatly.

Post-pandemic effect

Growing evidence indicates that the COVID-19 pandemic has had a harmful effect on CVD outcomes—both through infection-mediated cardiovascular harm and disrupted health-care delivery. Although full data are continuing to accumulate, the pandemic may worsen CVD burden in years to come.

A. Major Risk Factors

Modifiable risk factors

The major modifiable risk factors for CVD are hypertension, diabetes, dyslipidaemia, obesity, tobacco smoking, unhealthy diet, inactivity, psychosocial stress, and excessive alcohol use. Emerging risk factors include air pollution, sleep disorders, and socioeconomic deprivation.

Non-modifiable risk factors

These include age, sex, family history, and ethnicity. Some groups (e.g., South Asians) have a higher predisposition to early and severe CVD.

B. Emerging/ Novel risk factors



Inflammation, immune dysregulation, gut microbiome, particulate matter exposure, sleep and circadian rhythm disorders, and social determinants have been linked with CVD.

PATHOPHYSIOLOGY OVERVIEW:

A) Atherosclerosis and endothelial dysfunction:

CVDs such as CAD and peripheral artery disease are primarily caused by atherosclerosis. Plaque buildup in arterial walls arises from endothelial injury, oxidative stress, and inflammation.

1) Inflammation and oxidative stress

Chronic inflammation promotes plaque progression and instability. Oxidative stress damages endothelial cells and lipids.

2) Thrombosis and plaque rupture

Acute cardiovascular events like myocardial infarction and stroke result from plaque rupture and thrombus formation.

3) Heart failure pathogenesis

Heart failure results from myocardial injury, remodeling, and neurohormonal activation (RAAS, SNS).

4) Diagnostic and Therapeutic Advances

Modern imaging (CT, MRI, echocardiography), biomarkers (troponin, NT-proBNP), and therapies (statins, ACE inhibitors, SGLT2 inhibitors, ARNI) have improved outcomes.

B) Disease Economics

1) Global and national health spending on CVDs

Worldwide, the financial burden of CVDs is enormous. In LMICs, the combined cost (2011–2015) was ~US\$3.7 trillion. In the EU, cost ≈ €282 billion/year; in the USA ≈ US\$400 billion/year.

2) Direct costs

Include hospitalisation, drugs, diagnostics, and devices. CHD direct costs vary between 4.9–137% of GDP per capita globally.

3) Indirect costs

Lost productivity, absenteeism, and premature mortality form the largest share of total costs. Example: in Turkey, 2016 total US\$10.2 billion, two-thirds indirect.

4) Cost-effectiveness of interventions

Preventive measures like hypertension and tobacco control yield large savings vs late-stage treatments.

5) Economic disparities

Low- and middle-income countries bear the highest burden due to weak health systems and poor access.

6) Role of health insurance and public policy

Universal coverage, tobacco tax, and salt reduction policies are key.

7) Projections and future cost burden

Future estimates suggest by 2050, CVD care in Europe could exceed US\$1.3 trillion annually.

8) Summary Of Key Economic Findings

CVD care costs ~11% of EU health expenditure; indirect costs often exceed direct ones in LMICs.

C) Health Policy and Global Initiatives



1) Global initiatives

WHO's SDG 3.4 aims to reduce premature deaths from NCDs by one-third by 2030.

2) National programs

India's NPCDCS program aims to prevent and control diabetes, cancer, and CVDs.

3) Role of digital health, telemedicine and AI

AI-driven ECG and retinal image screening improve early detection, especially in resource-limited regions.

4) Future policy advice

Promote prevention, affordable drugs, salt reduction, and population-level physical activity.

5) Obstacles to prevention and treatment

Key issues: poor awareness, limited access, cost barriers, comorbidities, and poor adherence.

6) Aligning personalised medicine and genomics

Precision cardiology, polygenic risk scores, and genomic screening could improve prevention if affordable.

7) New treatments

Gene therapy, stem cells, and device-based therapies hold promise but are costly.

8) Multisectoral solutions

Addressing education, urban design, environmental health, and taxation policies are essential to reduce CVD risk.

OUTLOOK

Without preventive investment, the global CVD and economic burden will rise unsustainably. Prevention, digital health, and policy integration are key.

CONCLUSION

Cardiovascular diseases remain the leading global cause of death, with growing prevalence and unsustainable economic burden. Prevention and cost-effective management are critical to avoid a future healthcare crisis.

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