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Does Modern Era Globally Prevent Cardiovascular Diseases Among Growing Population- A Comprehensive Review

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Abstract.

Purpose: This comprehensive review intends to explore the possible precautionary measures and interactions of modern era for the prevention of cardiovascular diseases (CVD) among growing population.

Methodology: For the current study, online sources like national and international journals MEDLINE/PubMed, SCOPUS, PsycINFO, Google Scholar, British Heart Foundation, National Institute for Health and Care Excellence (NICE), American Heart Association (AHA) & American College of Cardiologists (ACC) and Sports Discuss, the review encompasses articles published up to December 2023.

Findings: The results of this comprehensive review are based on twenty-three eligible articles that met the review's eligibility criteria and included both qualitative and quantitative research, suggesting that the CVD continues to rise as a result of changing lifestyles, an ageing, expanding population and increased heart attack and stroke survival rates. If these trends continue, the number of people affected by these conditions will also increase. Although some research articles show the need of more focus on this particular problem.

Conclusion: All disorders of the heart and circulation are together referred to as heart and circulatory diseases. It covers everything from inherited or birth problems to illnesses including coronary heart disease, irregular heartbeats, heart failure, stroke and vascular dementia that arise later in life. Globally, there are around 620 million individuals who suffer from heart and circulation disorders. This figure has been steadily increasing due to alterations in lifestyle, population ageing and increased heart attack and stroke survival rates. If these patterns continue to exist, the number of individuals affected by these conditions will also move up. An estimated 1 in 13 people worldwide suffer from a cardiac or circulatory condition. Globally, 260 million men and 290 million women (53%) respectively were affected by heart and circulatory illnesses

in 2019. If we improve the infrastructure, increase access to care, reconsider how we produce and consume food and purify the air we breathe, we can potentially prevent up to 80% of cardiovascular disease.

Key words: Cardiovascular Diseases, Preventive measures, Life style, Global Health and Population.

Introduction

Prevention of cardiovascular disease in children in the modern era is a global priority. It is necessary to treat cardiovascular illnesses as societal issues that extend beyond the responsibility of healthcare institutions [1]. Obesity, hypertension and dyslipidaemia are among the cardiovascular risk factors that are more common in children and can cause adult cardiovascular events to occur prematurely [2]. To stop atherosclerosis from progressing and to guarantee a healthy future, primary and primordial prevention techniques must be implemented in the paediatric population [3] Atherosclerosis is distinguished by a protracted interval between the beginning and the development of clinical symptoms. There is proof that changes in prenatal development cause CVD to start before birth. During certain stages of life (prenatal, perinatal and early childhood), interactions between genetic and environmental factors may result in altered developmental plasticity, epigenetic changes and faulty phenotypic expression of genetic information without changing the DNA sequence. Nutritional imbalances and other environmental cues may induce intrauterine development delay, decreased gestational age, low birth weight and postnatal catch-up growth. Atherosclerosis risk and progression have been linked to foetal exposure to maternal hypercholesterolemia [8]. Children's cardiovascular health can be adversely affected by lifestyle factors and unsuitable surroundings, underscoring the necessity of preventative initiatives including healthcare providers, parents and educational institutions [4]. It is feasible to lower the prevalence of chronic non-communicable diseases, such as cardiovascular disease by concentrating on their management and prevention [5]. The present projects strive to interact with health practices, policies and systems in order to promote health, reduce inequities and defend against global dangers. Given the current epidemiological shift occurring in low and middle-income countries, as well as the growing epidemiological significance of cardiovascular and other non-communicable diseases to the detriment of infectious diseases and nutritional deficiencies, there has been an increase in interest in global health research [6]. It is known that vascular damage starts in childhood and progresses silently for many years before the occurrence of clinical events like myocardial infarction or stroke. Numerous postmortem studies have demonstrated this and in the present period, intravascular ultrasonography is being used to corroborate it. Numerous traditional risk factors have an impact on the development and course of vascular disease beginning in childhood. Research with a long-term focus has demonstrated that risk factor levels assessed during childhood are indicative of risk factor levels and cardiovascular disease in adulthood [7]. Both Ayurveda and modern medicine emphasise the need of prevention for maintaining human health. Three key preventive pillars are highlighted by Ayurveda: lifestyle (vihara), medications (aushadhi), and nutrition (ahara). Modern medicine recognizes the importance of prevention in cardiovascular diseases (CVD) and encompasses numerous measures such as maintaining a

clean healthy environment, personal hygiene, immunization, lifestyle changes, and the use of medications [9].

Rheumatic Heart Disease (RHD).

Rheumatic heart disease, which is frequently disregarded by the media and decision-makers, is a significant burden in poor nations where it accounts for the majority of youth cardiovascular morbidity and mortality, resulting in around 250,000 deaths annually globally. An aberrant autoimmune reaction to a group A streptococcal infection in a genetically vulnerable host causes the disease. The antecedent of rheumatic heart disease, acute rheumatic fever, can damage several organs and cause irreversible valve damage as well as heart failure. Penicillin works well to prevent the disease, but treating cases that have progressed requires a lot of resources, which makes managing disease particularly difficult in developing countries. Antibiotic prophylaxis against recurring episodes of acute rheumatic fever has thus been stressed in guidelines, and it appears to be a practical and cost-effective treatment. If those at risk for rheumatic heart disease in endemic areas are screened, early detection and focused therapy may be feasible. If those at risk for rheumatic heart disease in endemic areas are screened, early detection and focused therapy may be feasible. Active surveillance using echocardiography-based screening may become essential in this situation [11]. Chronic RHD may result from persistent valve damage caused by an incident of ARF or from recurrent ARF episodes that exacerbate the damage. There is a notable morbidity and mortality rate associated with this well-established illness type. In a registry of 388 Indian children with RHD, mitral regurgitation was the most frequent lesion (48.7%), followed by combined mitral and aortic valve disease (35.3%). [12]. Just 1% of the children in the registry had isolated aortic regurgitation, compared to 4.9% who had pure multiple sclerosis [13]

The inflammation and scarring produced by rheumatic fever damage the heart muscle and valves, resulting in rheumatic heart disease. An abnormal reaction of the body to a streptococcal bacterial infection, which typically manifests in youngsters as tonsillitis or sore throats, causes rheumatic fever. Children in poor nations, particularly those where poverty is pervasive, are primarily affected by rheumatic fever. Rheumatic heart disease is linked to around 2% of cardiovascular disease-related fatalities worldwide.

WHO response to (RHD)

The WHO Member States reached a consensus in 2013 on global strategies to lower the burden of preventable Non-Communicable Diseases (NCDs), which included a "Global action plan for the prevention and control of NCDs 2013-2020". With the help of nine voluntary worldwide targets, this plan seeks to cut the number of early deaths from NCDs by 25% by 2025. Two of the goals are specifically centred on stopping and managing CVDs.

Goal 6: Between 2010 and 2025, reduce the prevalence of elevated blood pressure by 25% worldwide.

Goal 8: By 2025, at least 50% of those who qualify should have medication therapy and counselling, which includes glycaemic management, in order to avoid heart attacks and strokes.

Target 9 further stipulates that in both public and private facilities, there should be 80% availability of the reasonably priced basic technology and necessary medications, including generics, required to treat major NCDs.

It will take major funding and system upgrading to meet these goals for health care.

In order to provide guidance in these crucial areas, WHO is actively working on expanding the normative guidelines that are already available for the management of acute coronary syndrome and stroke [10]

Congenital Heart Disease (CHD)

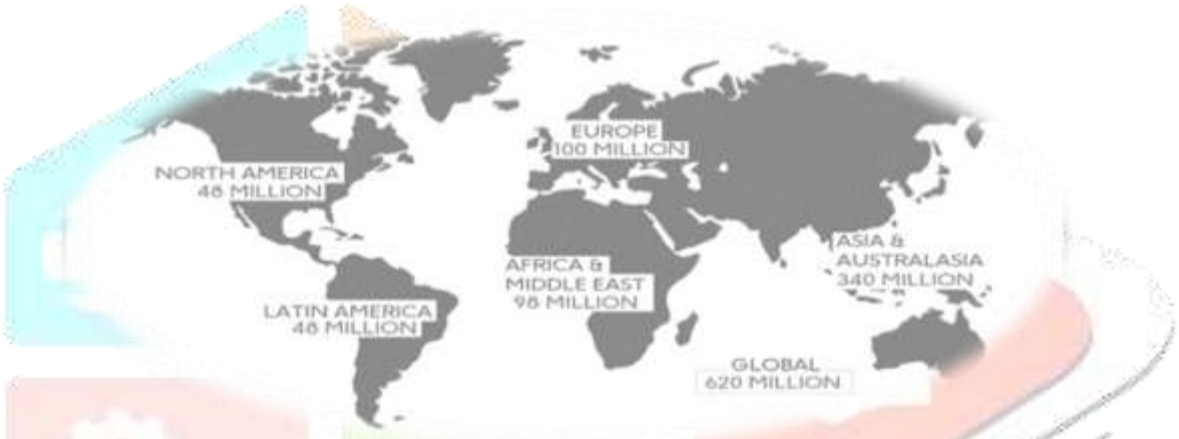
It has been surveyed up to 2011 through various literature sources which is mentioned in a Systematic review paper “Birth Prevalence of Congenital Heart Disease Worldwide: A Systematic Review and Meta-Analysis” published in the “Journal of the American college of Cardiology” which consists of 114 papers that comprised 24,091,867 of the overall population study. Among all 164396 were identified as congenital heart disease. Using the inverse variance method, the birth prevalence of total CHD and its eight most prevalent subtypes was pooled at 5-year intervals starting in 1930 and in income and continent groups starting in 1970. From 0.6 per 1,000 live births (95% confidence interval [CI]: 0.4 to 0.8) in 1930 to 1934 to 9.1 per 1,000 live births (95% CI: 9.0 to 9.2) in 1995, the reported total birth prevalence of CHD grew significantly with time. Stabilisation took place during the past 15 years, meaning that 1.35 million newborns with CHD are diagnosed annually. Geographical differences were found to be significant. With 9.3 per 1,000 live births (95% CI: 8.9 to 9.7) and a comparatively higher number of pulmonary outflow blockages and less left ventricular outflow tract obstructions, Asia was shown to have the highest birth prevalence of congenital heart disease. In comparison to North America, the reported total prevalence of congenital heart disease (CHD) was much higher in Europe (8.2 per 1,000 live births [95% CI: 8.1 to 8.3] vs. 6.9 per 1,000 live births [95% CI: 6.7 to 7.1]; $p < 0.001$). There are still many places in the globe where access to diagnostic facilities and health care is restricted, which likely explains the disparities in reported birth prevalence between high- and low-income nations. It is necessary to conduct additional research in order to customise the care of this worldwide health issue because observed variations may potentially be related to genetic, environmental, socioeconomic, or ethnic origins [14]. The term "cardiovascular disease" (CVD) encompasses several related pathologies, which are usually classified as peripheral artery disease, venous thromboembolism, rheumatic and congenital heart illnesses, peripheral heart disease, and cerebrovascular disease. 31% of deaths worldwide are related to CVD, with the bulk of cases being cardiac disease and cerebrovascular accidents [16]

The leading causes of death worldwide in 2019 were heart and circulatory disorders; for both men and women, coronary heart disease led the global death toll in 2019 followed by stroke. Rheumatic heart disease, atrial fibrillation, and hypertensive heart disease are other common cardiovascular causes of death.

	MEN		WOMEN		TOTAL	
1	Coronary heart disease	5.0 million	Coronary heart disease	4.2 million	Coronary heart disease	9.1 million
2	Stroke	3.3 million	Stroke	3.2 million	Stroke	6.6 million
3	COPD	1.9 million	COPD	1.4 million	COPD	3.3 million
4	Lung cancer	1.4 million	Lower respiratory infections	1.2 million	Lower respiratory infections	2.5 million
5	Lower respiratory infections	1.3 million	Alzheimer's/dementia	1.0 million	Lung cancer	2.0 million

Global Top Killers (GTK 2019 Estimates) (30)

For the past 20 years, heart disease has continued to be the world's top cause of mortality. But more people are dying from it now than ever before. Since 2000, the number of heart disease fatalities has climbed by over 2 million, reaching about 9 million in 2019. Currently, heart disease accounts for 16% of all deaths. The WHO Western Pacific area accounted for more than half of the 2 million extra deaths (32)



Heart and circulatory disease deaths projected in 2021(30)

Methods.

We reviewed the most recent literature and emphasised the areas that these guidelines are meant to address. 'Primary prevention in cardiovascular disease and a combination of 'diet, hypertension, exercise, smoking, and medical treatment' were used to search the literature. The present investigation employs a variety of online resources, including national and international journals, SCOPUS, PsycINFO, Google Scholar, British Heart Foundation, National Institute for Health and Care Excellence (NICE), American Heart Association (AHA) & American College of Cardiologists (ACC), and Sports Discuss. The review covers articles published up to December 2023.

Findings.

In this section, we address the key areas targeted for CVD primary prevention, reviewing the most recent guidelines, the data supporting them and any variations in the recommendations.

We have such a deep affection for children. Take a moment to ensure that their hearts are in the best possible health during American Heart Month. The best defence against cardiovascular disease, which is

one of the main causes of death for adults, is prevention. The lifestyle choices your child makes today could affect their heart health in the future. Fortunately, risk factors can be controlled in various ways early in life [17] such as:

Daily exercise- Youngsters aged three to five should be active all day long. Children aged 6 to 17 should strive for at least one hour of moderate-to-intense physical activity every day. Three days a week should be dedicated to muscle-building exercises like push-ups and climbs, and three days should be devoted to cardiovascular sports that strengthen bones like running or jumping. Make getting your regular work out a family affair.

Maintain a Balanced Diet- Adults with high cholesterol have fatty plaque accumulation that starts in childhood and grows over time. Low-cholesterol foods include fruits, vegetables, and whole grains. It is not recommended to start tracking fat intake before the age of two. For proper growth and development, infants require fat. Making the move to low-fat milk and yoghurt is one of those small adjustments that can have a significant impact. Switch your bread and cereal with whole-grain options as well. Diet modifications can benefit the entire family.

Be aware of your family's past- Kids with high blood pressure (hypertension) frequently have no symptoms, making it difficult to diagnose. Although not apparent at birth, this disease may run in families. Make sure your child's blood pressure is tested annually during their well-child appointments, and if there is a family history, take extra care to monitor it.

Steer clear of smoking- Teens may choose to use some of the increasingly popular smoking ways even though they may be aware of the risks associated with cigarettes. For instance, a single vape can have the same amount of nicotine as a full pack of cigarettes. Smokers who use hookahs inhale much more tobacco and carbon monoxide than those who smoke cigarettes. Furthermore, even though marijuana has recently been legalised in several jurisdictions, it's crucial to understand the potential risks to one's heart associated with smoking. Regardless matter how popular these hobbies are, talk to your teenagers and adolescents about the risks associated with them.

Weight- Body mass index (BMI) greater than 25 is associated with a lower all-cause mortality rate, which is observed at BMI 20–25. However, because BMI < 20 is associated with a higher all-cause mortality rate [18], routine recommendations to reduce BMI below this level are not made. While maintaining a healthy weight is advised to lower the risk of CVD, no specific weight-related interventions are recommended by the guidelines. Visceral adiposity and liver fat are important risk factors at all BMI levels, while BMI is a strong indicator of CVD risk, especially at higher levels [19]. This contributes to the understanding of the heterogeneity in the CVD risk profile observed in overweight individuals, which changes according on the location of adipose deposition. Some indications of decreasing waist circumference, which serves as a stand-in for decreasing visceral fat, should be addressed in addition to lowering BMI to lower the risk of CVD.

Medical Treatment- (Lipid Lowering Therapy): With a high association between LDL-C levels and CVD risk, LDL-C is the most well-understood atherogenic sub-fraction. Reducing LDL-C by 1.0 mmol/L results in a consistent 20–25% risk reduction in CVD mortality and non-fatal MI [20]. Raising high-density lipoprotein cholesterol (HDL-C) levels has been suggested to have cardioprotective effects, although the exact mechanism is yet unknown. This debate is supported by the unfavourable CVD profile of HDL-raising medications like torcetrapib, as well as recent mendelian randomization analysis indicating that naturally occurring elevated HDL levels have no intrinsic benefits. The best-understood atherogenic sub-fraction is LDL-C, which has a strong correlation with CVD risk; a 1.0 mmol/L reduction in LDL-C results in a corresponding 20–25% risk reduction in non-fatal MI and CVD mortality [20]

Anti-hypertensive medications- One independent risk factor for the onset of CVD is hypertension. A continuous and exponential effect occurs when blood pressure is raised over 115/75 mmHg; for every 20 mmHg increase in systolic blood pressure (SBP) or every 10 mmHg increase in diastolic blood pressure (BP), the risk of a cardiovascular event doubles [21]. Previous meta-analyses have demonstrated a decrease in CVD risk throughout a broader range of BPs, indicating that the benefits of BP reduction are not limited and that there is no clear threshold beyond which further reductions are detrimental [22, 23]. According to recent meta-analyses, there may be conflicting or detrimental effects from reducing blood pressure from a baseline of less than 140 [24]. Combining these data would imply that lowering blood pressure in hypertensives lowers mortality; however, there is minimal support for early intervention in normotensive or pre-hypertensive individuals.

Blood Glucose- Although it is not a substantial risk factor for CVD in non-diabetics, glucose management is important in the diabetic population. While people with impaired fasting glucose (IFG) are known to be at considerable risk of both CVD and the progression to diabetes mellitus (DM), people with diabetes mellitus (DM) have an average risk of CVD [25]. With the lowest risk at normal blood sugar levels, DM serum glucose lowering has been demonstrated to lower CVD [26] More drastic glucose reductions were harmful, and dipeptidyl peptidase-4 inhibitors and certain thiazolidinediones in particular increased the risk of CVD [27] Recent studies have demonstrated that, when compared to conventional therapy, oral hypoglycaemics like empagliflozin, which belong to the sodium/glucose transporter 2 inhibitor class, significantly lower all-cause mortality by 32%, CVD death by 28%, and heart failure by 35%.[28] Although it seems that cardio-renal hemodynamic effects rather than a decrease in glucose were the mechanism underlying these outcomes, the significant advantages seen would suggest starting it early in diabetic patients. Further information about these drugs is required to update the current guidelines [15].

Anti-Platelet Medication- Anti-platelet therapy is a major factor in secondary prevention, but it shouldn't be used for primary prevention in those without comorbidities because it increases the risk of bleeding and shows no signs of lowering the risk of CVD. The American College of Chest Physicians advises aspirin medication in patients with DM and a 10-year CVD event risk of ≥10%, but the European Society of Cardiology (ESC) maintains that the bleeding risk outweighs the benefits of aspiring therapy [29]

In the UK, cardiovascular disease is a serious and rapidly expanding issue that causes a large amount of morbidity and accounts for almost one-third of all deaths [15].

Conclusion

In the recent decades, understanding the seriousness, acuteness and danger of the global problem of CVD prevalence in the world, many authors have been highlighting it in their research works. It is crucial to remember that ayurvedic and current medical conceptions of CVD may differ and these distinctions should be taken into account.

Preventing CVD aims to lower the frequency of significant cardiovascular events, which will decrease early morbidity and disability while increasing survival and quality of life. While there is broad agreement regarding smoking and exercise as ways to lower the risk profile for CVD, the specifics of other factors may cause variations in the advice from the United States, Europe and the United Kingdom. Lifestyle advice hasn't changed much, while as pharmaceutical choices have developed over the years. Primary prevention continues to advance and as long-term data becomes more widely available, our knowledge are the best means to lower the risk of CVD improves as well. If we are trying to reduce the burden of a preventable disease, we need to keep up this endeavour.

There should be a rise in interest in global health research due to the current epidemiological shift that is taking place in low- and middle-income countries, as well as the growing epidemiological significance of cardiovascular and other non-communicable diseases to the adverse effects of infectious diseases and nutritional deficiencies.

It is critical that we as parents, educators, carers and other trustworthy adults provide our children direction, support and a healthy environment so that they have a healthier future. It's obvious that our nation's kids need a better solution than what we've been providing and the moment to act is now. It goes without saying that a nutritious diet and regular exercise are essential for children and teenagers to grow and maintain a healthy weight. And since our kids and teenagers spend seven hours a day at school on average, we think that schools have the ability to improve the health of their students, especially if they incorporate exercise and playtime.

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