A Critical Assessment of Global and Regional Trends in Cardiovascular Disease (CVD) Burden and its Factors

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ABSTRACT

Cardiovascular diseases (CVD) mainly include coronary heart disease (CHD), stroke, rheumatic heart disease (RHD) and cardiomyopathy; it is the leading cause of death not only in industrialized and developed countries but also in developing societies and has placed a significant economic burden on low- and middle-income countries accounting for around 18 million deaths each year. Modifiable risk factors for cardiovascular disease include high blood pressure, unhealthy diets, tobacco use etc. Non modifiable risk factors include heredity or family history and ethnicity or race etc. Therefore, it was recommended that government and health policy makers should conduct seminars on the menace of cardiovascular disease, addressing gaps in knowledge with targeted information, education and communication measures to the public

KEYWORDS: Cardiovascular diseases, Risk Factor, Types of CVD and Global/Regional Trends of (CVD)

Introduction

Cardiovascular diseases (CVD) which mainly include coronary heart disease (CHD), stroke, rheumatic heart disease (RHD) and cardiomyopathy represent the leading cause of death worldwide (Celermajer, Chow, Marijon, Anstey & Woo, 2012). Changes in lifestyle of the population living in developing countries, which is due to the socioeconomic and cultural transition, are important reasons for increasing the rate of CVD. In the early 20th century, CVD was responsible for less than 10% of all deaths worldwide, but it increased to 30% by 2001. Countries like low and middle-income have 80% deaths due to CVD. Although CVD already places a significant economic burden on low- and middle-income countries (Leeder, 2004), the resources available for its management in these countries are limited because of competing health priorities. It is, nevertheless, essential to recognize that the transition to lower levels of infectious diseases and higher levels of noncommunicable diseases is already under way; failure to act now will result in large increases in avoidable CVD, placing serious pressures on the national economies (WHO, 2001; 2005 & 2002).

Environmental exposures may also play a role in CVD morbidity and mortality independent of other risk factors. However, susceptible populations such as the elderly and other high-risk populations may be most impacted. For example, studies have shown exposure to ambient airborne particulate matter to be associated with increased hospitalizations and mortality

among older individuals, largely due to cardiopulmonary and cardiovascular disease (American Lung Association, 2016; Brook, Rajagopalan, Pope, Brook, Bhatnagar & Diez-Roux, 2010; U.S. EPA, 2009). Environmental tobacco smoke (ETS) may also contribute to CVD. Although the smoke to which a nonsmoker is exposed is less concentrated than that inhaled by smokers, research has demonstrated increased cardiovascular-related health risks associated with ETS (HHS, 2006; State of California, 2005).

Concept of Cardiovascular Disease (CVD)

Cardiovascular disease (CVD) is the leading cause of death not only in industrialized and developed countries but also in developing societies (WHO, 2008a). Cardiovascular disease (CVD) is an abnormal functioning of the heart or blood vessels. Heart disease (HD) is a general term for a variety of heart conditions. The most common form of HD is coronary heart disease (CHD), also called coronary artery disease (CAD) because it involves the coronary arteries. Other types of CVD include hypertension, congestive heart failure, stroke, congenital cardiovascular defects, hardening or narrowing (atherosclerosis) of the blood vessels, including the coronary arties, and other diseases of the circulatory system (Roger, Lloyd-Jones & Berry, 2011). Diabetes, hypertension, high cholesterol, obesity, lack of exercise, smoking, increased age, and family history are risk factors for cardiovascular (or heart) disease.

Globally, cardiovascular diseases according to WHO (2016) are the number one cause of death and they are projected to remain so. An estimated 17 million people died from cardiovascular disease in 2005, representing 30% of all global deaths. Of these deaths, 7.2 million were due to heart attacks and 5.7 million due to stroke. About 80% of these deaths occurred in low- and middle income countries. If current trends are allowed to continue, by 2030 an estimated 23.6 million people will die from cardiovascular disease (mainly from heart attacks and strokes). However, more women than men die each year from CVD (Xu, Kochanek, Murphy & Tejada-Vera, 2007).

Risk Factor of Cardiovascular Disease

Major Modifiable Risk Factors

High blood pressure: High blood pressure (hypertension) is one of the most important risk factors for CVD. A major risk for heart attack and the most important risk factor for stroke.

Abnormal blood lipids: High total cholesterol, LDL-cholesterol and triglyceride levels, and low levels of HDL cholesterol increase risk of coronary heart disease and ischaemic stroke.

Unhealthy diets: Low fruit and vegetable intake is estimated to cause about 31% of coronary heart disease and 11% of stroke worldwide; high saturated fat intake increases the risk of heart disease and stroke through its effect on blood lipids and thrombosis.

Tobacco use: Increases risks of cardiovascular disease, especially in people who started young, and heavy smokers. Passive smoking an additional risk.

Other Modifiable Risk Factors

Alcohol use: One to two drinks per day may lead to a 30% reduction in heart disease, but heavy drinking damages the heart muscle.

Mental ill-health: Depression is associated with an increased risk of coronary heart disease.

Low socioeconomic status (SES): Consistent inverse relationship with risk of heart disease and stroke.

Psychosocial stress: Chronic life stress, social isolation and anxiety increase the risk of heart disease and stroke.

Non-modifiable Risk Factors

Gender: Men are more likely to develop CVD at an earlier age than women.

Advancing age: Most powerful independent risk factor for cardiovascular disease; risk of stroke doubles every decade after age 55.

Heredity or family history: Increased risk if a first-degree blood relative has had coronary heart disease or stroke before the age of 55 years (for a male relative) or 65 years (for a female relative).

Ethnicity or race: Increased stroke noted for Blacks, some Hispanic Americans, Chinese, and Japanese populations. Increased cardiovascular disease deaths noted for South Asians and American Blacks in comparison with Whites.

Types of CVD

According to Amani & Sharifi (2012), there are many different types of CVD. Six types of CVD are described below:

Rheumatic heart disease: Is a problem in many poor countries. It is caused by damage to the heart valves and heart muscle from the inflammation and scarring caused by rheumatic fever. Rheumatic fever is caused by an abnormal response of the body to infection with streptococcal bacteria, which usually begins as a sore throat or tonsillitis in children (WHO, 2017). Its symptoms may include: shortness of breath, fatigue, irregular heartbeats, chest pain and fainting. Also rheumatic fever symptoms include: fever, pain and swelling of the joints, nausea, stomach cramps and vomiting (WHO, 2017).

Coronary heart disease (heart attacks): Coronary heart disease (CHD) is a condition in which the walls of arteries supplying blood to the heart muscle (coronary arteries) become thickened. This thickening, caused by development of lesions in the arterial wall, is called *atherosclerosis*; the lesions are called *plaques*. It can restrict the supply of blood to the heart muscle (the myocardium) and may manifest to the patient as chest pain on exertion (angina) or breathlessness on exertion (Frayn 2005).

Cerebrovascular disease: involves interruption of the blood supply to part of the brain and may result in a stroke or a transient ischemic attack. The loss of blood supply to part of the brain may

lead to irreversible damage to brain tissue. The blockage most commonly arises from the process of thromboembolism, in which a blood clot formed somewhere else (e.g. in the heart or in the carotid artery) becomes dislodged and then occludes an artery within the brain (cerebral arteries). Narrowing of the intracerebral arteries with atherosclerotic plaque may increase the risk, and may also lead to local formation of a blood clot (Frayn 2005).

Congenital heart disease: Is a problem with the structure of the heart arising because of a birth defect. These anatomical defects can be as simple as a small hole in one of the inside walls of the heart or they can be very complex, affecting the way blood flows through the heart and lungs. Some congenital heart problems result in death unless immediately corrected by surgical intervention. Other cause disability to varying degrees and are treated by surgical later in life with correction of the problem sometimes requiring more than a single operation.

Peripheral vascular disease: Peripheral vascular disease (PVD) involves atherosclerotic plaques narrowing the arteries supplying other regions apart from the myocardium and brain. A common form involves narrowing of the arteries supplying blood to the legs. The result may be pain on exercise. In more severe cases, impaired blood supply leads to death of leg tissues, which requires amputation (Frayn 2005).

Ischaemic heart disease: This is the most common type of cardiovascular disease in industrialized countries of the world. It refers to problems with circulation of blood to the heart muscles. A partial blockage of one or more of the coronary arteries can result in lack of enough oxygenated blood (Ischaemic) thus causing symptoms such as angina chest pain and dyspnoea (shortness of breath) complete blockage of an artery causes necrosis (damage to the tissues) or a myocardial infarction commonly known as “heart attack”

The Global and Regional Trends in CVD Burden

In recent years, the dominance of chronic diseases as major contributors to total global mortality has emerged (WHO, 2008a). By 2005, the total number of cardiovascular disease (CVD) deaths (mainly coronary heart disease, stroke, and rheumatic heart disease) had increased globally to 17.5 million from 14.4 million in 1990 (WHO, 2009a). The World Health Organization (WHO) estimates there will be about 20 million CVD deaths in 2015, accounting for 30 percent of all deaths worldwide (WHO, 2005). Thus, CVD is today the largest single contributor to global mortality and will continue to dominate mortality trends in the future (WHO, 2009a).

Globally, there is an uneven distribution of age-adjusted CVD mortality. This is a well-known fact due to its prevalence. The lowest age-adjusted mortality rates are in the advanced industrialized countries and parts of Latin America, whereas the highest rates today are found in Eastern Europe and a number of low and middle income countries (WHO, 2008a). The broad causes for the rise and, in some countries, the decline in CVD over time are well described. The key contributors to the rise across countries at all stages of development include tobacco use and abnormal blood lipid levels, along with unhealthy dietary changes (especially related to fats and oils, salt, and increased calories) and reduced physical activity (Hu, 2008). Key contributors to the decline in some countries include declines in tobacco use and exposure, healthful dietary shifts, population-wide prevention efforts, and treatment interventions (Shafey et al, 2009; Davies et al, 2007).

Pathophysiology

Cardiovascular diseases, whether affecting the coronary, cerebral or peripheral arteries, share a common pathophysiology involving atherosclerosis and thrombosis (or clotting).

Atherosclerosis

Atherosclerosis is the most common cause of CVD and related mortality. The first observable event in the process of atherosclerosis is the accumulation of plaque (cholesterol from low-density lipoproteins [LDLs], calcium, and fibrin) in large and medium arteries. This plaque can grow and produce ischemia either by insufficient blood flow if there is a high oxygen demand or by rupturing, forming a thrombus and occluding the lumen (Rudd, 2005). Only high-risk or vulnerable plaque forms thrombi. Characteristics of vulnerable plaque are lesions with a thin fibrous cap, few smooth muscle cells, many macrophages (inflammatory cells), and a large lipid core (Rudd, 2005). The site of plaque formation or atherogenesis is the endothelium in the artery wall. Normally the endothelium promotes dilation of the blood vessel, less smooth muscle cell growth, and prevention of an anti-inflammatory response (Davignon & Ganz, 2004).

In atherosclerosis the endothelium becomes dysfunctional before an atheroma or plaque, a more serious lesion, develops. This endothelial dysfunction results in the production of less nitric oxide, a key vasodilator, and the blood vessel becomes more constricted (Amani, & Sharifi, 2012). It also becomes more permeable and allows LDL cholesterol to be taken up by macrophages, which then accumulate and form foam cells and eventually an early lesion known as a fatty streak.

Conclusion

Cardiovascular diseases (CVD) which mainly include coronary heart disease (CHD), stroke, rheumatic heart disease (RHD) and cardiomyopathy represent the leading cause of death worldwide accounting for around 18 million deaths each year. The modifiable risk factors for cardiovascular disease include high blood pressure, unhealthy diets, tobacco use etc. Non modifiable risk factors include heredity or family history and ethnicity or race etc. CVD has places a significant economic burden on low- and middle-income countries, the resources available for its management in these countries are limited because of competing health priorities.

Recommendation

Based on the study, the following recommendations are made:

1. Government and health policy makers should conduct seminars on the menace of cardiovascular disease, addressing gaps in knowledge with targeted information, education and communication measures to the public.

2. Health care practitioners should step up their task of health education (personal and public) to help create awareness and also knowledge of the risk factors for cardiovascular disease jeopardy

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