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Invited Review-pharmacology across disciplines

Prevalence and prevention of cardiovascular disease and diabetes mellitus

Pitchai Balakumar[a], Khin Maung-U[b,1], Gowraganahalli Jagadeesh[b,*,1]

[a] Pharmacology Unit, Faculty of Pharmacy, AIMST University, 08100 Bedong, Kedah Darul Aman, Malaysia
[b] Division of Cardiovascular and Renal Products, Center for Drug Evaluation and Research, US Food and Drug Administration (FDA), Silver Spring, MD 20993, USA

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ABSTRACT

Noncommunicable diseases (NCDs) have become important causes of mortality on a global scale. According to the report of World Health Organization (WHO), NCDs killed 38 million people (out of 56 million deaths that occurred worldwide) during 2012. Cardiovascular diseases accounted for most NCD deaths (17.5 million NCD deaths), followed by cancers (8.2 million NCD deaths), respiratory diseases (4.0 million NCD deaths) and diabetes mellitus (1.5 million NCD deaths). Globally, the leading cause of death is cardiovascular diseases; their prevalence is incessantly progressing in both developed and developing nations. Diabetic patients with insulin resistance are even at a greater risk of cardiovascular disease. Obesity, high cholesterol, hypertriglyceridemia and elevated blood pressure are mainly considered as major risk factors for diabetic patients afflicted with cardiovascular disease. The present review sheds light on the global incidence of cardiovascular disease and diabetes mellitus. Additionally, measures to be taken to reduce the global encumbrance of cardiovascular disease and diabetes mellitus are highlighted.

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* Corresponding author at: Division of Cardiovascular and Renal Products, Office of Drug Evaluation I, Office of New Drugs, Center for Drug Evaluation and Research, US Food and Drug Administration (FDA), 10903 New Hampshire Avenue, Building 22, Room 4128, Silver Spring, MD 20993-0002, USA.
E-mail addresses: pbala2006@gmail.com (P. Balakumar), Khin.U@fda.hhs.gov (K. Maung-U), gowra.jagadeesh@fda.hhs.gov (G. Jagadeesh).
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1. Introduction

According to the World Health Organization (WHO) report, non-communicable disease (NCD) deaths have been on the rise from 6.7 million in 2000 to 8.5 million in 2012 in the South-East Asia area, and from 8.6 million to 10.9 million in the Western Pacific area [1]. Since 2000, the number of deaths due to NCDs has augmented globally and in every region. While NCDs-associated deaths are higher than all other causes combined, NCD deaths are projected to further increase from 38 million in 2012 to 52 million by 2030 [1].

Cardiovascular diseases (CVDs) constitute the number one cause of mortality at the global level; each year, more people die from CVDs than from any other cause [2]. According to a WHO report, an estimated 17.3 million people died from CVDs in 2008, representing 30% of all global deaths; it was projected that about 23.6 million people will die from CVDs, mainly from heart disease and stroke by 2030 [2].

According to the WHO report, globally in 2012, of 56 million deceases, NCDs killed 38 million people. More than 70% (28 million) deaths happened in low- and middle-income countries [3]. Of note, 16 million deaths due to NCDs occurred before the age of 70, with 82% occurring in low- and middle-income countries [3].

The concept that CVD is a disease of affluence and only rampant in the western society is no longer correct because, the prevalence of CVD is rising fast in the developing countries as well. Among the NCDs, CVDs account for the highest number of NCD deaths (17.5 million people annually); cancers are the second cause of NCD deaths (8.2 million), followed by respiratory diseases (4 million), and diabetes mellitus (1.5 million). These 4 disease groups over all account for 82% of all NCD deaths [3].

In a recently published Medscape Medical News, heart disease (23.4% of all deaths), cancer (22.5%), chronic lower respiratory disease (5.6%), accidents (unintentional injuries; 5.2%), cerebrovascular diseases (5.1%), Alzheimer's disease (3.6%), diabetes mellitus (2.9%), influenza and pneumonia (2.1%), nephritis, nephrotic syndrome, and nephrosis (1.8%), and intentional self-harm (1.6%) were the top 10 areas of death in 2014 in the United States. [57]. Together, these 10 causes of death accounted for 74% of all deaths in the United States [57].

In this article, we review various key cardiovascular risk issues, and the prevalence of CVDs and diabetes mellitus. Additionally, we highlight potential ways to reduce the global burden on CVDs and diabetes mellitus.

2. Cardiovascular risk factors

As per the World Heart Federation, cardiovascular risk factors are divided into 2 major classes, *viz.* non-modifiable and modifiable risk factors [4].

2.1. Non-modifiable risk factors

The non-modifiable risk factors include age, gender and family history. Old people are prone to have CVDs because of aging-associated structural and functional anomalies in heart and vessels. Men are at higher risk for cardiac disease than pre-menopausal women, whereas post-menopausal women may have a similar risk just like men [4]. Sudden cardiac death (SCD) often occurs without previous cardiac symptoms. Of note, the high risk of premature death attributed to SCD among men and women is almost 1 in 9 and 1 in 30, respectively. This should serve as a motivator of public health efforts in preventing SCD [58]. Family history of incidence of stroke or coronary heart disease (CHD) is also a vital non-modifiable risk factor for CVD incidence in subsequent generation [4]. Regular check-up is highly recommended for people with non-modifiable risk factors for CVDs.

2.1.1. CVD risk factors unique to the elderly population

The prevalence of CHD and morbidity from it increase with the age of population. When evaluating the elderly population, age-specific CHD risk factors such as arterial stiffness, frailty, lipid profiles and depressive symptoms should be considered [31]. As an individual is aging, structural and functional changes in the vascular wall follow, including thickening of the arterial wall and subsequent greater arterial stiffness. The arterial changes could lead to the development of systolic hypertension, which increases left ventricular afterload causing left ventricular hypertrophy [31]. Frailty, which is frequently seen in very old people, is also a risk factor for the development of CHD. The lipid profiles levels affect the CVD risk of the elderly in a different manner from that in a younger population. Neither high total serum cholesterol nor high LDL levels predict cardiovascular mortality in very elderly population (>85 years); however, low HDL level remains a risk factor for CHD death. Lastly, the elderly may suffer from depression for various reasons, which might act as an independent risk factor for CHD in the elderly population [31].

2.1.2. CVD risk factors unique to women

The prevalence of CHD in women is relatively less than men prior to the age of 50. However, their prevalence of CHD rises significantly with age up to almost the prevalence rate in men by the time they are in their seventh decade of life [31]. Almost 50% of women are unaware that heart disease is the leading cause of death in women [31]. It is likely that for women, the traditional methods to evaluate the risk of future coronary events may be inadequate. While considering the cardiovascular risk for a woman, nontraditional factors that could increase the CHD risk of a woman including cardiovascular conditions associated with pregnancy such as preeclampsia, gestational hypertension, gestational diabetes mellitus, menopause-related hormonal changes and autoimmune diseases that are common in women should also be evaluated [31]. Apart from traditional risk factors for CVD (smoking, obesity and metabolic syndrome, hypertension, physical inactivity, high lipids, and diabetes mellitus), the aforementioned nontraditional risk factors for CVD are unique to women. At menopause, the levels of endogenous estrogen fall to about one-tenth of the pre-menopausal levels, while hormonal changes at menopause could independently produce a negative effect on HDL levels and body fat