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A critical appraisal of cardiovascular disease picture in the United Kingdom; an experience tool for low resource settings

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ABSTRACT:
Background: Cardiovascular disease (CVD) is one of the most prevalent non-communicable conditions that is a major public health problem worldwide. **Objective**: To critically appraise the cardiovascular disease picture in the United Kingdom with a view to providing an experience tool for low resource settings. **Materials and Methods**: Through PubMed, Cochrane Libraries, Google Search, and Semantic Scholar, an electronic search of articles on maternal mortality and related current issues published between 1976 and 2023 was carried out. In order to narrow the search, this was combined with advanced search utilizing Boolean operators. The search was nevertheless limited to English-language articles only. **Conclusion**: Despite the appreciable degree of medical technology and the high calibre of medical treatment, CVD continues to be a major burden in the UK with the burden, as well as its attendant morbidities and mortalities, more in the developing nations. The inclusion of cardiovascular disease management strategies in universal health coverage programs is key to reducing the prevalence of cardiovascular disease globally.

Keywords: Cardiovascular disease, United Kingdom, Experience, Low resource settings.

INTRODUCTION:

Cardiovascular disease (CVD) is one of the most prevalent non-communicable conditions that is a major public health problem worldwide(1). According to Stewart, Manmathan, and Wilkinson, the illness is a broad term that includes rheumatic and congenital heart disorders as well as coronary heart disease (CHD), cerebrovascular disease (CVD)/stroke, peripheral arterial disease, venous thromboembolism, and other disease entities(2). Cerebrovascular disease and coronary heart disease are the most prevalent variations of these diseases (3). Approximately 34% of fatalities worldwide are attributable to CVD, with 80% of these deaths taking place in poorer nations(3). According to the World Health Organization (WHO), 17.9 million people died from cardiovascular disease in 2019—roughly 32% of all fatalities that were reported(3). Despite improvements in aetiopathogenesis, risk factor identification, treatment, and prevention, CVD continues to be a significant cause of death in the United Kingdom (UK), one of the developed nations in the forefront(4) . According to Bhatnagar et al., CVD poses a significant financial and health burden on the UK, having an impact on all facets of society including people, families, communities, hospitals and the entire nation(4). This has a noticeable negative impact on Gross Domestic Product (GDP). An analysis of cardiovascular disease found that 28% of fatalities in the UK occurred as a consequence of CVD in 2012(4), with CHD accounting for 46% of these deaths (among the highest rates in the world), and other CVD variations accounting for 26%. The research also revealed that among men and women, CVD was responsible for 25% of premature deaths (deaths occurring before the age of 75). The highest age-standardized CVD rates in the UK were found to be 347/100,000 and 320/100,000 in Scotland and the North of England respectively (4).

CVD management is extremely expensive in the UK; the report also revealed that the National Health Service of England spent about 6.8 billion pounds on CVD in the years 2012–2013(4).

Risk factors for cardiovascular diseases:

In the UK, it has been shown that there are high levels of common risk factors for CVD; most of these risk factors may be changed(4); the strength of their link and the consistency of the results as demonstrated by multiple levels of investigations are the major determinants of the dependability of their cause-effect relationship. According to Poulter, these risk factors include central obesity, dyslipidaemia, glucose intolerance, hypertension, and smoking(5). Atherosclerosis, a major pathology in CVD, is produced by this range of illnesses. This is linked to oxidative and inflammatory alterations in the arterial wall, which, over time, result in fatty-fibrous lesions that rupture (when subjected to trauma) and give rise to a wide range of clinical symptoms found in the condition(6). Therefore, a thorough understanding of not only these risk factors and their etiopathogenesis but also pertinent measurements of connection between the risk factors and the illness is necessary for CVD prevention. One of the leading causes of CVD is dyslipidaemia. Increased blood levels of triglycerides (TG), low density lipoprotein (LDL-C) and total cholesterol (TC) or decreased serum levels of high-density lipoprotein cholesterol (HDL-C) are all examples of dyslipidaemia. Moreover, 50% of the adult population has dyslipidaemia, according to studies(7–9). Endothelial damage and the subsequent cascade of dysfunctions are the causes of dyslipidaemia, which can be brought on by either a high-fat or high-calorie diet. Among other CVD risk factors, systemic hypertension has the greatest causal evidence(10) ; studies have revealed attributable risks of 25% and 50% for CHD and CVD respectively(11). Heart failure, stroke, coronary artery disease and cardiovascular mortality are among the short-term and long-term complications of high blood pressure; including hypertensive cardiomyopathy, heart failure with maintained ejection fraction and atrial fibrillation(10). According to McEniery et al, central blood pressure has also been found to be a reliable indicator of cardiovascular risk(12)

According to research by W. Lee et al.(13), smoking is a significant risk factor for cardiovascular disease. Numerous hazardous compounds have been found in tobacco, but polycyclic aromatic hydrocarbons and oxidizing gases are particularly harmful to the heart and are known to cause ischemia and coronary heart disease (11,14). The first preventable cardiac danger recognized globally is smoking(15). Single nucleotide polymorphisms (SNPs), a genetic method for evaluating the cardiovascular consequences of smoking, have contributed to the development of a tenuous link between smoking and cardiovascular disorders (15). The risk of acquiring several cardiac illnesses and associated consequences was found to be raised by smoking-related SNPs using this method(16,17). According to Katanoda and Yako-Suketomo , smoking is linked to 10% of all cardiovascular disorders and accounts for around 6 million deaths worldwide each year (18). The link between smoking cigarettes and acute coronary thrombosis, which causes sudden cardiac mortality, has been found for both active and passive smokers(19). Studies have also shown statistically significant negative effects of smoking on serum lipids, including potentiation of increases in nearly all classes of atherogenic serum lipoproteins (TC, LDL, VLDL, and TG) and decreases in HDL, all of which favor endothelial deterioration and the onset of atherosclerosis(20,21). Despite controlling for age, body mass index and other unrelated factors, British Cardiac Research (BCR) found that smokers had an elevated chance of developing type II diabetes. Other research(22,23) have shown that smoking alters insulin sensitivity, which leads to type II DM. Although the effects of smoking on lipid levels and insulin sensitivity have been well studied, there is conflicting evidence about the impact of smoking on blood pressure. However, research(24) found that smokers had greater central systolic blood pressure and pulse pressure than non-smokers did.

Cardiovascular illnesses have been linked to varying degrees of glucose intolerance(25). Considering its link to the emergence of CVD, type II DM is a global problem and important for public health. According to Lamacchia and Sorrentino(26), a patient with DM may develop CVD because of the hyperglycaemic environment's varied effects on the micro and macro circulations, which lead to varying degrees of arterial stiffness. In established and developing countries alike, the prevalence of obesity, a risk factor for CVD, has been steadily rising(27). In contrast, the prevalence of other risk factors, such as hypertension and plasma cholesterol, has been dropping in affluent nations. Hypertension, type II diabetes and dyslipidaemia have all been associated with excess adipose tissue (6,28). A strong correlation between dyslipidaemia and CVD (myocardial infarction) was found in a large prospective cohort research (HR (Hazard Ratio):2.71; 95% CI: 1.12-6.57; P.value: 0.05) (29). Age, smoking, diabetes mellitus, total cholesterol and systolic hypertension were all identified as significant risk factors for CVD in a large prospective cohort study by Hamer et al. in England (30); however, ischaemic heart disease was predicted by a relatively different set of risk factors such as HDL, body mass index and blood pressure (HR per SD = 1.22; 1.08-1.38). Case-control research on stroke and hypertension management, however, revealed that 21% of CVD cases were attributable to insufficient control with medication; the

ratios for the groups with reasonably well controlled blood pressure (140-149mmHg) and the untreated group, respectively, were 1.6 and 3.5(31). Another population-based study looking at risk factors for every stroke in older people revealed atrial fibrillation (HR = 2.03; 95% CI, 1.31-3.16), prior transient ischaemic attack (1.87 [95% CI, 1.27 to 2.76]), smoking (1.72 [95% CI, 1.28 to 2.32], and cardiovascular disease (1.55 [95% CI, 1.19 to 2.03]) as risk factors for CVD; while HR (Hazard Ratio) according to a 10mmHg rise in systolic blood pressure was1.15(95%CI,1.19 to 2.03)(32). The aforementioned study came to the conclusion that stroke is not an inevitable problem of aging and that early diagnosis and management of risk factors will significantly lessen the development and burden of CVD. Obesity was significantly associated with an increased risk of type 2 diabetes (OR, 1.67; 95% CI, 1.30 to 2.14; P 0.001; 12 = 93%) and coronary heart disease (OR, 1.20; 95% CI, 1.02-1.41; P = 0.03; 12 = 87%); there was no significant association between obesity and CVD in this review(33).

An increased risk of ischaemic stroke (RR, 2.01, 95% CI, 1.84-2.20) and a slightly higher risk of intracerebral haemorrhage (RR, 0.43, 95% CI, 0.26-0.69) were found in women with diabetes in a UK prospective and meta-analysis study; additionally, the incidence of CVD was higher in women with poor/fair health ratings compared to women with excellent/good health ratings (RR, 1.36, 95% CL, 1.30-1.42), and the risk of haemorrhagic stroke was less (heterogeneity P<0.001)(34). According to a meta-analysis looking at the correlation between smoking and CVD, smokers suffered from a higher risk of stroke compared with non-smokers, with a pooled odds ratio (OR) of 1.61 (95% CI, 1.34 to 1.93, P0.001); the study additionally discovered that passive smoking increased the incidence of CVD by 45% (OR 1.45, 95% CI, 1.0-2.11, P0.05)(35).

Implication to public health action:

With an understanding of the implicated risk factors and the causal relationship with CVD, risk reduction strategies, programs and policies will go a long way to reduce morbidity and mortality associated with the burden of the disease. This approach should be at the three levels of preventive care: primary, secondary and tertiary. However, the greatest emphasis should be placed on primary care. In order to lessen the burden of CVD across the entire nation, particularly in the area of bridging health inequality among the various social classes, the National Health Service (NHS), Department of Health (DH), and other related stakeholders in the UK have developed a number of health-promoting policies and programs. The Quality and Outcome Framework (QOF) idea is noteworthy among these policies(36). To enhance the care of CVD and associated consequences in the UK, the QOF is a quality improvement policy and clinical governance. There are specific indications and standards for treating CVD under this clause. These include measures to improve the methods for recognizing people who have CVD, especially in rural regions, ways to increase the number of people who can handle CVD. These include methods for improving the ability to identify people who have CVD, particularly in rural areas, increasing the number of people who can handle CVD, providing more facilities and equipment for efficient and effective treatment, and providing incentives in all forms to healthcare professionals, particularly general practitioners.

Furthermore, in order to improve the current system of treatment and promote more sustainable progress in CVD care, the concept of "Cardiovascular Disease Beyond the QOF" was also developed(36). The major goal of this strategy is to train more primary care cardiovascular leaders and general practitioners, with provisions for ongoing professional development (CPD). The second is the growth of the primary medical care provider (PMCPA) division through the certification of additional training facilities. The Quality Practice Award (QPA), a concept that encourages excellence and e-learning in the management of CVD, has also been introduced. This notion encourages working health team members to adopt a collaborative and interdisciplinary approach.

Another initiative of the NHS and other relevant organizations is the recognition and treatment of more CVD variations that have been overlooked, as well as the implementation of steps to close different management gaps in those disease variants. As an illustration, consider increasing the incidence of atrial fibrillation identification and care. According to Mant et al. (2007), 40% of patients who require warfarin do not have access to it. Further, findings from two significant British cohort studies revealed that barely half of the country's hypertensive population was receiving therapy(37).

The key lifestyle changes for CVD prevention are different types of exercise, food selection, weight management and other associated actions. Exercise has been proven to significantly reduce the risk of CVD. Although exercise is extremely important for CVD prevention, clinicians frequently struggle with deciding the type and intensity of exercise to recommend. This is a reflection of a study's finding that, despite the clear benefits of exercise, community members find it difficult to engage in it (38). It stands for the National Institute for Health and Care Excellence. The National Institute for Health and Care Excellence (NICE) advised either 150 minutes per week of moderate intensity aerobic exercise or 75 minutes per week of vigorous aerobic exercise; muscular strengthening was also recommended(13). The advice given in this regard is consistent with that of a sizable expert panel(39).

In the UK, dietary interventions are still a common way to lower or prevent high blood pressure. With the implementation of dietary measures, B.P. significantly decreased, according to a systematic review and meta-analysis(40). The American Heart Association (AHA) advocated a diet high in plant derivatives, such as vegetables, fruits and whole grains, but low in sugars and saturated fats(41). The NICE guidelines advocate eating more monounsaturated fatty acids in addition to five pieces of fruits and vegetables each day. Evidence linking trans fats produced by the industrial sector to CHD highlights the necessity for their outlawment(42). In a systematic review exploring the relationship between diet and CVD(43), it was revealed that; there was a higher adherence to the western diet than the traditional one, which is worrisome; the western diet carried more risks of metabolic syndrome and its variants; consumption of dairy products was linked to a drop in blood pressure; consumption of fish, vegetable oils, and black tea was linked to a lower risk of CHD; and the western diet was associated with more risks of metabolic syndrome and its variants.

The single most cost-effective strategy for managing and preventing CVD has been identified as quitting or avoiding smoking(41). All current recommendations urge people to stop smoking, and doing so has several short- and long-term advantages. The use of drug (nicotine) replacement treatment has been promoted as a helpful adjuvant to quitting smoking, which, among other things, increases the abstinence rate by 50–70% (44). It is impossible to overstate the importance of lipid-lowering treatment in the primary prevention of CVD. The most researched blood lipid fraction has been LDL-C, therefore, a study has shown that reducing the fraction by 1.0mmol/l could result in 25-25% decrease in the risk of developing CVD along with its mortality (45). A reductase inhibitor, known as statins, has been used to reduce the level of LDL-C; the drug is recommended for primary prevention by the AHA, the use of non-statin therapies in the patients whose lipid profile are not optimized by statin monotherapy is recommended (45). The AHA recommends statins for primary prevention; however, if statin monotherapy does not improve a patient's lipid profile, non-statin medications should be utilized instead (46). Statins are reductase inhibitors that have been used to lower LDL-C levels.

Anti-hypertensive medications have critical roles in the primary prevention of CVD; raising blood pressure lowers the bar for the onset of CVD. It has been suggested that the threshold for treating hypertension in high-risk individuals should be lowered because hypertension continues to be an independent risk factor for CVD(47). Antihypertensive therapy procedures should not be unclear, and there should be clear guidelines for starting them. It has been demonstrated that careful blood glucose management is necessary for diabetics since it lowers the risk of developing CVD and the progression to other DM problems (46). Antiplatelet treatment also plays a significant role in CVD secondary prevention. However, it is advised against using it as a main preventative strategy in individuals without comorbidities since their risk of bleeding is higher (CASP Randomised Controlled Trial Checllist, 2020).

A briefing on CVD in the developing nations; using Nigeria as a case study

The main cause of death globally, accounting for 32% of all mortality, is cardiovascular disease (CVD); low- and middle-income nations account for more than 75% of CVD fatalities(3). Low- and middle-income nations, including Nigeria, have been experiencing an increasing rise in CVD for the past two decades, much like many high-income nations did during the past century (48). According to the World Health Organization (WHO), non-communicable illnesses were predicted to be the cause of 29% of all deaths in Nigeria in 2016 with cardiovascular diseases (CVDs) accounting for 11% of those deaths(49). Due to lack of primary health care programs for the early detection and treatment of people with risk factors for CVDs, the prevalence of CVDs is rising among the population in low- and middle-income countries. Similarly, people with CVDs and other noncommunicable diseases have reduced access to effective, equitable, and needs-based health care services (3). In Nigeria, over the last 50 years, communicable illnesses and malnutrition were the main causes of cardiovascular problem presentations. The two main CVDs that presented at that time were cardiomyopathies and rheumatic heart disease (48). However, over the past 20 years, Nigeria has seen improvements in its public health systems, including cleaner water supplies, better food production, and improved food distribution, which together have decreased the number of people dying from infectious diseases and malnutrition. Dramatic changes in diet, exercise levels and behaviors like smoking were brought on by ongoing improvements in the economic situation, urbanization and fundamental changes in the nature of work-related activities [2]. Hypertension, heart failure, and stroke are three CVDs that have been identified to be on the rise in Nigeria during the past 20 years (48). Several other studies have also noted an increase in the prevalence of hypertension in urban Nigeria (50,51). Over the past 20 years, ischemic heart disease and cardiomyopathies have been shown to have a stable prevalence and have contributed less than 1% of Nigeria's CVD burden; with prevalence of adult congenital heart diseasing steadily possibly due to; increased medical awareness encouraging earlier hospital presentations in younger age groups leading to early intervention and correction before adulthood, an expanded range of cardiovascular expertise in Nigeria that aids in the management and correction of childhood congenital heart diseases and the support of non-profit organizations. Thus, there is

an increase in cardiovascular illness and mortality in Nigeria, and the causes of this trend include rising cardiovascular risk factor prevalence, urbanization and adoption of the Western food and lifestyles, notably with metropolitan residents.

Conclusion and Recommendations:

Despite the noticeable degree of medical technology and the high calibre of medical treatment, CVD continues to be a major burden in the UK. It may be difficult to manage these factors at the primary level since they have dominating causative roles in hypertension, smoking, and diet. Although primary prevention is still the major therapeutic strategy that the UK emphasizes, early identification, treatment, and upgrading the current healthcare system to handle complications are all very desirable. To further understand the causal connection between the risk factors that have been identified and CVD, more study is required. To improve and broaden the current CVD care network and the standard of treatment, the UK has also developed the Quality and Outflow Framework idea. The inclusion of cardiovascular disease management strategies in universal health coverage programs is key to reducing the prevalence of cardiovascular disease.

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