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HIV Infection and Cardiovascular Diseases: The Obnoxious Duos

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ABSTRACT

Cardiovascular diseases are the leading cause of death worldwide. HIV is still ravaging developing countries despite concerted efforts towards its eradication. HIV infection, and its treatment with antiretroviral increases the risk of cardiovascular diseases. These duos of cardiovascular diseases and HIV are more prevalent in developing countries, especially the sub-Saharan regions of Africa. Thus, they are considered inimical to the development of the sub-Saharan African region. Effacing these duos can scale down the health and economic burden orchestrated by them thereby accelerating the development of the sub-Saharan African region. In this paper, we shall illuminate the alliance between HIV infection, antiretroviral drug use, and cardiovascular risk, as well as proffer deflect measures to this imbroglio. A systematic search of already published studies shall be utilized.

Keywords: Cardiovascular diseases, antiretroviral therapy, HIV infection, HIV-positive, Sub-Saharan Africa

INTRODUCTION

Human immunodeficiency syndrome (HIV) was discovered in the early 1980s and has gained entry in virtually all corners of the globe with 84.3 million people infected and 40.1 million deaths from AIDS-related illnesses since the outset of the epidemic. About 38.4 million individuals are estimated to be living with HIV globally as of 2021 with 1.5 million newly infected cases and 650, 000 deaths from AIDS-related illnesses in 2021. This figure represents a 54% reduction in the HIV rate compared to the massive prevalence in 1996 [1, 2]. The decline in HIV infection and AIDS-related deaths can be attributed to an increase in HIV/AIDS awareness and easy access to antiretroviral medications [3]. Sub-Saharan Africa has peaked in the prevalence of HIV/AIDS with women and girls being the most affected [4, 5]. HIV/AIDS has severe economic strain as US $29 billion is budgeted for its eradication in 2025 in low- and middle-income countries [2]. Acquired immunodeficiency syndrome (AIDS) is the resultant disease of HIV infection. The hallmark of AIDS is a compromised immune system triggering opportunistic infections and several other diseases culminating in death. The easiest means of transmission is sexual contact and mother to child during pregnancy or delivery [6]. Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood

vessels. They comprise coronary heart, cerebrovascular, peripheral arterial, rheumatic heart, congenital heart, deep vein thrombosis, and pulmonary embolism diseases. CVDs are the major cause of premature death globally with greater prevalence in low- and middle-income countries. About 17.9 million deaths due to CVDs were recorded in 2019, constituting 32% of the global death rate [7]. HIV-positive individuals are at a bifold risk of developing CVDs. More so, the use of antiretroviral therapy despite its beneficial effects in surviving HIV predisposes HIV-positive patients to other health challenges including CVDs culminating in higher morbidity and mortality outcomes [8]. Thus, antiretroviral can be perceived as a two-edged sword in that they have proven effective in the management of HIV and also cause metabolic changes that enhance the emergence of CVDs. Therefore, we shall x-ray the relationship between antiretroviral and CVDs in HIV-positive patients, bringing a delightful balance between them and thus enhancing the treatment outcomes of these obnoxious duo (HIV and CVDs).

HIV INFECTION AND METABOLIC CHANGES

HIV infection causes an elevation in blood triacylglycerol and free fatty acids and a substantial decline in total cholesterol (TC), low-density lipoprotein (LDL-C), and high-density lipoprotein (HDL-C) [9]. Some antiretroviral drugs especially protease inhibitors and non-nucleoside reverse transcriptase inhibitors increase the concentration of LDL-C with minimal change in HDL-C levels. LDL-C is associated with a greater risk of CVDs [10-13]. HDL-C enhances the removal of lipids from the arterial walls and is thus called good cholesterols [14-17]. HIV infection and protease inhibitors elevate the risk of arterial hypertension in patients. Prolonged antiretroviral use increases the risk of hypertension [18]. HIV infection alone can directly affect blood pressure through immune activation and inflammation triggering endothelial and vascular smooth muscle cell impairments culminating in hypertension [8]. Pulmonary hypertension is one of the severe complications of HIV infection [19]. Glucose metabolism is also hampered during HIV infection. According to Dube [20], there is an increase in insulin clearance and insulin sensitivity in peripheral tissues in HIV-infected individuals than the non-infected individuals. More so, the use of antiretrovirals like protease inhibitors up-regulates insulin resistance. Insulin resistance and impaired glucose metabolism culminate in hyperglycemia [20-23]. Hyperglycemia and dyslipidemia are like co-joined twins and thus increase cardiovascular morbidity and mortality [24, 25].

Pancreatic β-cell capacity is also altered by HIV and antiretroviral medications. Pancreatic β-cells secret insulin and thus a decline in their insulin secretory ability is affiliated with hyperglycemia [26-28]. Further, the proinsulin/insulin ratio, a marker of β-cell secretory function is impaired in HIV-infected patients treated with protease inhibitors, pointing to the deleterious effect of antiretroviral on insulin secretion [29].

MANAGING HIV INFECTION WITH MINIMAL CARDIOVASCULAR RISKS: THE CRUX

Vascular-related complications are the commonest cause of death recorded among HIV-positive patients [30]. This perhaps explains the reason for the inclusion of cardiovascular checks in routine HIV management protocols. Some protocols to reduce CVD risk among HIV-positive individuals include early initiation of selected antiretroviral with minimal metabolic consequences, co-administering antiretroviral medications with antiatherogenic agents, and behavioral changes like quitting smoking and illicit drug use [31]. Worthy of note is the importance of proper maintenance of blood glucose levels in HIV-positive individuals as hyperglycemia triggers the emergence of CVDs and other comorbidities. Most importantly, antiretroviral drugs must be prescribed based on the individual need of each patient putting into consideration the patient's health history like cardiovascular risk predictors, adherence to antiretroviral use, lifestyle, and other comorbidities [8]. The adequate synergy between cardiologists and HIV/AIDS experts enhances HIV management outcomes considering the pivotal effect of the vascular burden on HIV-positive individuals [32]. Dietary intervention could also be pivotal in managing HIV infection and its accompanying cardiovascular risks. Natural food especially those of plant origin are good sources of nutrients [33, 34]. Plant food products possess some nutrients with therapeutic effects. The phytoconstituents inherent in these plants are responsible for the various documented therapeutic efficacies [35, 36]. Some of these constituents are phytochemicals, minerals, vitamins, and others. These constituents especially the phytochemicals have numerous pharmacological potentials such as anti-inflammatory, antioxidant, hypoglycemic, cardioprotective, hypolipidemic, and immune protective [38-40]. Thus, the intake of adequate diets from plant sources could be of palliative effect.

CONCLUSION

HIV infection increases the incidence of cardiovascular diseases. Some antiretroviral drugs aggravate this risk making HIV management a dilemma. Recent HIV therapies are designed to strike a balance between HIV infection, a patient's cardiovascular risk, and antiretroviral therapy. Maintaining this balance will minimize the incidence of vascular diseases among HIV-positive patients, enhance the use of antiretroviral and amplify the strive towards reducing the HIV pandemic. The crucial role of good diet, lifestyle changes, and regular routine checks in the fight against these duos cannot be over-emphasized.

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