PREDICTING HEART FAILURE

INVASIVE, NON-INVASIVE, MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE BASED METHODS

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Types of Biosensors and their Importance in Cardiovascular Applications

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3.1 Introduction

Cardiovascular disease (CVD) is a general nomenclature given to the group that includes diseases of the heart or blood vessels and describes any disease that affects the circulatory system. CVDs include heart attacks, congenital heart disease, rheumatic heart disease, hypertension, cerebrovascular disease, peripheral artery disease, and heart failure. Although there are several causes of CVD, the most common causes are atherosclerosis and/or hypertension which are the leading cause of death worldwide. Hypertension can be very dangerous because in most cases there can be no apparent symptoms at the early stages that will prompt patients to seek medical care. Although it is a disease with a fairly silent course, a few symptoms including headache, ringing in the ears, nosebleeds, and visual impairment can be warning signs [1]. In the last two decades, mortality rates from CVDs have decreased in high-income countries. Still, morbidity and mortality rates have increased surprisingly rapidly in low- and middle-income countries. More than 17 million people die from CVDs each year, which is around 31% of all deaths worldwide. 75% of CVD deaths occur in low- and middle-income countries and occur almost equally in men and women. If the current situation is allowed to persist, it is estimated that, by 2030, an estimated 23.6 million people will die from CVD [2–5].

Although these diseases are generally seen in older adults, primary prevention efforts should begin early in life, especially since atherosclerosis dates back to childhood. Therefore, there is increasing emphasis on eliminating risk factors through, for example, healthy eating, exercise, and smoking avoidance in atherosclerosis prevention. There are many causes of CVDs, and the main reasons are tobacco use, physical inactivity, unhealthy diet, and the harmful use of alcohol. Many studies have proven that dietary habits are directly related to CVDs. Inadequate intake of whole grains, high consumption of salt, saturated fatty acid, and fried food in the diet of individuals are important parameters that increase the risk of CVDs. Changes that can be made in lifestyle habits, such as increasing fruit and vegetable consumption, adopting a diet that includes regular consumption of olive oil, fish, whole grains, and milk and dairy products, and walking for about 40 minutes daily to support this, as well as exercises to be determined according

Predicting Heart Failure: Invasive, Non-Invasive, Machine Learning, and Artificial Intelligence Based Methods, First Edition. Edited by Kishor Kumar Sadasivuni, Hassen M. Ouakad, Somaya Al-Maadeed, Huseyin Cagaty Yalcin, and Issam Bait Bahadur.
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