Minireview Article

The Most Common Heart Diseases and Their Influence on Human Life: A Minireview

ABSTRACT

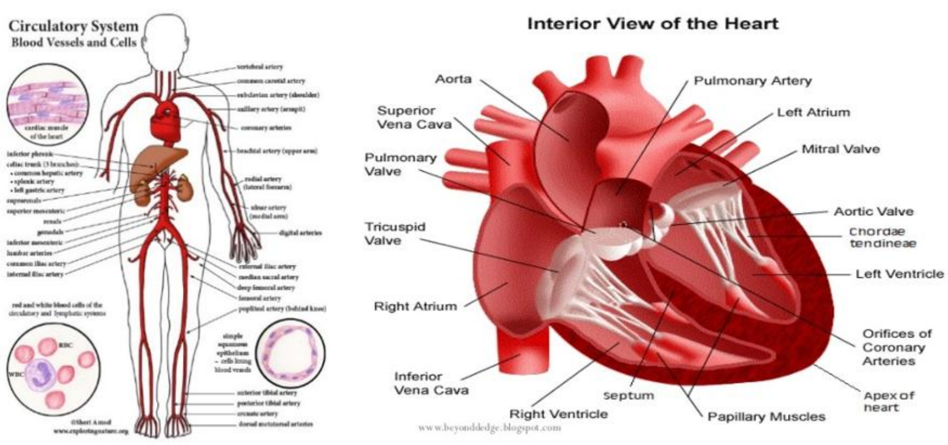
According to the World Health Organization, many people suffer from heart disease and blockage of blood vessels, which are the most common diseases of death worldwide. The heart is one of the human body organs located between the lungs in the middle of the chest behind the sternum muscle. In this article, the authors decided to highlight the types of heart disease that affect humans and the signs and causes. This article outlined that these diseases are dangerous, and care should be taken to review the specialists early and take the appropriate treatment in order not to cause sudden death.

Keywords: Heart, Diseases, Blood, Human, Arrhythmia, Organs, Death.

1. INTRODUCTION

Today, the world suffers from the spread of diseases very seriously [1]. The disease is an abnormal condition that affects human effort, often associated with signs and symptoms and resulting from external causes such as infectious diseases such as COVID-19 or internal disorders such as heart failure [2-4]. A healthy heart is a powerful pump that circulates blood throughout our bodies [5][6]. It consists of four chambers: two atrium (left and right) and two ventricles (left and right) [7-9]. Both atria contract simultaneously at first and help fill the chambers. The two chambers then contract simultaneously to send blood to the organs. A good heart muscle should be able to pump blood well and also be able to fill correctly. The heart pumps 5 litres of blood during rest per minute. This can be more than that and then double during the exercise [10][11]. Oxygen-poor blood from the body comes through the vena cava to the right heart. The right heart pumps blood through the lungs, where the blood absorbs, among other things, oxygen. Oxygenated blood is transported to the left heart through the pulmonary veins [12]. Through the left ventricle, the oxygen-rich blood is pumped to various organs of the body through the sizeable circulatory system. Many healthcare workers and physicians are forced to use artificial intelligence techniques to diagnose and analyse their patients' data due to the ability of these techniques to speed up decision-making and with high accuracy [13-20].

To understand heart diseases, it is essential to understand the structure of the heart first. The heart (the motor organ) [21][22], which is the most critical organ in the human body [23], weighs between 230 and 350 grams [24]. It is the principal organ in the circulatory system (see Figure 1.a). It is a vital organ [25], and its main task is to pump oxygen-carrying clean blood from the lungs to the body and to send the dirty blood from the body, whose oxygen has been used by the cells, to the lungs [26] [27]. In addition, it is a muscular pump the size of a fist that pumps blood around the body through the blood vessels [28], where it pumps from 5 to 7 litres per minute, which is approximately 7500 litres per day [29]. In general, the heart is a muscular organ [30], like all muscles, that constantly requires nutrients and oxygen to operate in its activities [31], which it gets from the blood. Besides, it is characterized by working without stopping and regulating the rhythm and beats in the human body. Actually, our body is made up of millions of cells that require oxygen and implications that provide energy, such as sugar and proteins, for their operation [32-34]. These implications are in the blood [35], and the cardiocirculatory system is in charge of distributing them throughout the body [36][37]. Moreover, the heart is a pump that has a primary role with its action movement that provides the vital force of blood and the materials it carries to circulate healthily through the arteries and veins. In each beat, the heart removes a quantity of blood towards the thickest artery (aorta) [38][39], and through subsequent branches that leave this artery, the blood will reach all parts of the body. When the heart delivers oxygen and nutrients (sugar and proteins), the body's cells are composed in the veins back to the heart again [40]. Figure 1.b illustrates an interior view of the heart. The human heart includes four chambers: two atria and two ventricles [41]. Furthermore, the blood that returns to the heart through the veins enters through the right atrium [42]. The coronary arteries run all the way around the outer surface of the heart — forming a kind of crown and from it there are branches that carry blood to the entire heart muscle [43][44]. When the heart is functioning normally and healthily, all its four chambers work together in a continuous and coordinated manner to keep blood circulating throughout the body. There are two coronary arteries: left and right. In addition, the left coronary diverges into two primary branches: the anterior descending and the circumflex [45]. Thus, three large arteries will be created: right coronary, anterior descending and circumflex [46]. The oxygen necessities of the heart muscle are not always exact; however, when the body demands more energy, the heart reacts to this demand by increasing its work. This increase grows the oxygen necessities of the heart muscle itself, demands that are met by a more remarkable supply of blood through the coronary arteries. In fact, the human body requires oxygen continuously [47], mainly when performing physical exercises, work, or cases of stress. Thus, this is the role of the heart in supplying oxygen on a continuous basis to the body.



(a) (b)

Fig. 1. (a) The circulatory system, (b) Interior view of the heart [downloaded from Google].

The foremost contribution of this article is to provide an overview of heart disease and its types and what are the signs, symptoms and causes that lead to the emergence of this disease and what is its influence on human life. All information in this article is collected from articles published between 2016-2022.

2. HEART DISEASES

There are many types of heart diseases that influence human life and may lead to sudden death [48], where investigations and medical reports indicate that the most common causes of heart disease are narrowing or blockage of the coronary arteries, as well as blockage of the blood vessels that give the heart itself with blood [49]. In the United States of America [50-52], one person dies every 36 seconds from heart disease and blockage of blood vessels. About 659,000 people die each year, and heart disease costs the United States of America about $363 billion annually from 2016-2017. The diseases are coronary artery disease, arrhythmia, heart valve disease, and heart failure. In the following, the details of these diseases are shortly addressed.

2.1 Coronary Artery Disease

Diseases caused by concerns that block the coronary (feeding the heart) vessels are named 'coronary vessel disease' [53][54]. Some plaques, popularly called 'atherosclerosis' [55], can stop blood flow in these vessels. Chest pain is noticed with the obstruction of blood flow, which happens with fatigue quickly [56]. Complete occlusion of the vein yields a 'heart attack' [57], which is life-threatening and can result in demise. For this reason, when feeling pain in the whole chest, this pain must be checked, and the person may have coronary artery disease, especially when going up and downstairs. Moreover, anyone who suffers from chest pain should go to the physician! Because if patients with chest pain or a heart attack present to a health institution without wasting time, it is likely to detect and open these vessels directly. Also, heart muscle damage due to vascular obstruction can be stopped by intervention within the first six hours of patients who have had a heart attack [58]. Therefore, early diagnosis of coronary artery disease is critical [59]. If the patient has a heart attack because of neglected findings [60], severe damage to the heart muscle may happen even if he does not die. The main underlying cause of the disease is “atherosclerosis”, which is commonly known as arteriosclerosis [61]. The signs and symptoms of the disease are generally seen after the age of 40 [62]. However, it can also be seen at an earlier age in people with a family history of coronary artery disease. Men have a more significant risk than women. Smoking is one of the most important risk factors for coronary artery disease.

2.2 Arrhythmia Disease

There are different types of disorders [63], and most of them are not harmful to human life. However, some cases may be life-threatening and require immediate healthcare intervention. These disturbances are often caused by damage or problems in the nerve transmission network within the heart that regulates the heartbeat [64]. The electrical activity in the heart causes the heart muscle to contract from 60 →100 times per minute [65][66]. In this case, the heart ensures the continuity of critical actions by pumping the oxygenated clean blood in the lungs to the body. Sometimes there is a deterioration of the electrical impulses in the heart. The heart may beat faster or slow down, any irregular in its activity. This condition is known as arrhythmia [67][68]. This disease does not cause serious health problems [69]; it can be noticed at almost any age. While the incidence of arrhythmia, which is more common in advanced age, is 2% in the general population, its incidence is about 10% in those 80 years and older [70-72]. The most significant signs of a severe heartbeat disorder are dizziness, loss of consciousness, shortness of breath, or chest pain [73][74]. There are many explanations for the occurrence of this disease, and the most important reasons are smoking, alcohol or coffee. Some people are born with an irregular heart rate [75]. Moreover, common causes of arrhythmias are heart attacks and enlarged heart caused by high blood pressure [76]. Arrhythmia is organised separately according to the arrhythmia site and the heart rate it causes. Types of arrhythmias are tachycardia, bradycardia, supraventricular tachycardia (SVT) [77][78]. There are 4 main types of type 3 heart arrhythmias that cause slowing blood flow to the body. There are four main types of type three arrhythmias that cause slowing blood flow to the body: atrial fibrillation, atrial flutter, and paroxysmal supraventricular tachycardia. The diagnosis is made through a clinical examination and other tests such as electrocardiograms (ECG) [79]. Supraventricular arrhythmia is a type of tachyarrhythmias not a separate type. Wolf Parkinson White syndrome is a disease that can cause arrhythmia and not a type of arrhythmia while ventricular tachycardia happens as a result of the lower chamber of the heart beating so unexpectedly and rapidly that it is unable to pump blood well, and the body does not obtain enough oxygenated blood.

2.3 Heart Valve Disease

The primary pursuit of the valves is to separate the parts of the heart, as there is a valve at the exit of each part of the heart [80][81]. These valves keep blood flowing in one direction and prevent blood from leaking in the opposite direction [82]. In other words, when the valve is unlocked, the blood passes through it, and when locked, the flow of blood will stop. Both valvular stenosis (narrowing) and valve insufficiency cause an upsurge in the workload of the heart. In case of stenosis, the valve blocks blood flow to the body [83]; Flow by overcoming this obstacle can only be provided by increasing the heart's pumping force. In insufficiency, extra energy is needed to pump the increased blood volume while adding back-flowing blood. Besides this advanced burden on the heart, the blood behind the dramatic valve is high pressure. This increases pressure in the veins returning from the lungs or lower parts of the body, depending on which valve is affected. This result in fluid pooling in the tissues [84]. The symptoms of heart valve diseases differ depending on which valve is suffering [85]. Patients with mild valve stenosis or insufficiency may have no criticisms for years. But as the disease advances, more and more extra work is put on the heart. There are other causes of blockage in the heart valves, such as rheumatic fever, congenital, degeneration, endocarditis, mitral valve prolapses, and high blood pressure (hypertension) [86]. The significant symptoms that occur on the patient are shortness of breath, fatigue and exhaustion, orthopnea, paroxysmal nocturnal dyspnea, Edema, Heart palpitations, hemoptysis, recurrent pulmonary emboli, and Pneumonitis. These symptoms are caused by the accumulation of blood in the pulmonary veins.

2.4 Heart Failure

This disease happens when the heart muscle does not pump blood when it should [87]. It is categorised into chronic heart failure and acute heart failure [88]. Certain conditions, such as clogged arteries or high blood pressure, gradually weaken the heart to fill and pump efficiently. In this disease, the heart's main pumping chambers (the ventricles) can become stiff and not fill appropriately between beats. In some cases, the heart muscle can become destroyed and powerless, and the ventricles tighten to the point that the heart cannot sufficiently pump blood to the body. Heart failure can concern the left ventricle, the right ventricle, or both [89]. Naturally, heart failure begins on the left side, particularly the left ventricle (the main pump of blood). Any of the following situations can damage or weaken the heart and cause heart failure as heart attack and coronary artery disease, high blood pressure (hypertension), heart valves with problems, damage to the heart muscle, inflammation of the heart muscle, congenital disabilities, abnormal heart rhythms, and hypertrophic or restrictive cardiomyopathies [90][91]. Types of this disease are diastolic heart failure, left heart failure, right heart failure, and systolic heart dysfunction.

3. CONCLUSION

The heart is a blessing that must be preserved by following daily practices to stay healthy, including quitting smoking, which is the main factor in heart disease and acute pneumonia. In addition, exercising on a daily basis for thirty minutes and eating useful foods such as fruits and vegetables and water is essential and staying away from obesity. Moreover, avoid stress and agitation because it reduces the lifespan of the heart. In the future, more studies of heart disease will be conducted by using machine learning techniques in predicting and diagnosing patient data.

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