

A Study on Heart Management Using Healthy Heartbeat Frequency

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Abstract - As an auxiliary role in maintaining heart health, in this paper, we studied the heart health management method using sound heartbeat sound by borrowing the sound's resonance phenomenon. In a specific way, it is a method to manage the heart healthily by grafting a heartbeat sound to a smartphone or smartwatch so that a healthy heartbeat sound is transmitted through vibration indirectly from the pocket through the skin or blood vessels of the wrist. This is because smartphones and smartwatches are personal portable items that are always attached or carried on the body, directly affecting the human body. The healthy heartbeat cycle transmitted to the body in this way causes a resonance phenomenon to be transmitted to the body, which will pull the irregular and weak heartbeat into a healthy and normal heartbeat.

Keywords — Heart rate, resonance phenomenon, blood, peripheral blood vessels, smartphone, smartwatch

I. INTRODUCTION

Heart disease can also be caused by irregular diet, cholesterol and fat-rich food, and obesity and stress. When the heart movement is weakened, blood circulation is weakened, so the force to push the waste in the blood vessels is weakened, and the blood vessels can be blocked as the waste accumulates in the blood vessels. This paper is a study to prepare for heart disease that can be found by anyone. By controlling the heartbeat sound using the acoustic resonance phenomenon, we studied a method to prevent heart disease before the onset. For the study, first, the most active and healthy heartbeat sound wave was selected. An experiment was conducted to induce the resonance phenomenon of the heartbeat sound wave by listening to the symptoms of arrhythmia that occurred because the heart rate was slower than that of the normal person, and to the person with arrhythmia that occurred because the heart rate was faster than that of the normal person. . A healthy heartbeat sample will take care of the heart of someone with an abnormal heartbeat. As a research method, the existing heart disease treatment methods were analyzed. The abnormal heartbeat frequency and normal heart frequency were compared and analyzed. The change was measured by checking the pulse and blood pressure while listening to normal heart frequency. An experiment maintains a normal heart rate by extracting a

healthy heartbeat frequency and giving it to a person with weak or irregular heart disease to correct the patient's heart frequency.

II. Heart

The heart is an important organ directly connected to life as it is said to be the human body's power plant. It does in the heart play a role in maintaining health by smoothly circulating blood throughout the body from head to toe to secure immunity, increase healing power, and facilitate cell division. Suppose the heart is weak and the blood cannot be supplied to the whole body smoothly. In that case, the peripheral nerves are paralyzed, and blood flow in the blood vessels is weakened, resulting in an increased risk of myocardial infarction and arteriosclerosis. In particular, if the blood vessels in the heart or brain are blocked and cannot function properly, you may face an emergency that immediately endangers your life, so you should always do your best to manage your heart. The heart is located in the human body's left chest area, and it sends blood to the whole body and the lungs. A typical adult's heart weighs between 250 and 350 grams and is an adult fist's size. The surface of the heart is surrounded by muscles and has a heart-shaped shape.[1][2][3]

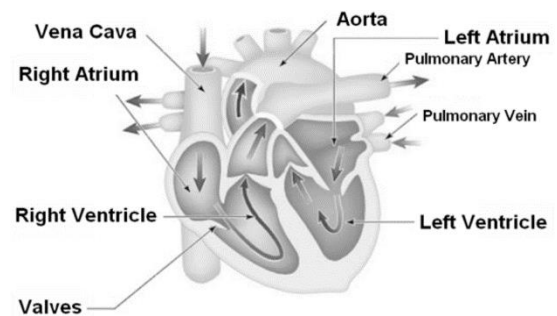


Fig. 1 Part names of the human heart

The heart's structure consists of four chambers, and the blood circulates throughout the body by constant and continuous movement by the heart muscle. The four chambers inside the heart are called the left atrium, left ventricle, right atrium, and right ventricle. Each room has a task of regularly contracting and expanding by muscles and tendons, receiving and pumping blood, and reaching anywhere in the body. Blood that enters the right atrium



through the vena cava passes through the right ventricle to the left and right pulmonary arteries and moves to the lungs. The heart keeps your heart healthy while pumping out the blood it needs.[4][5]

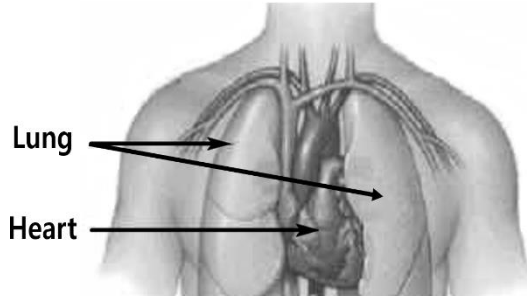


Fig. 2 The location of the heart in the human body

The heart's movement is called the heart rate, and the heart rate is measured in 1-minute increments. In general, adults' normal heart rate is 60 to 100 beats per minute, 120 to 140 beats per minute for newborns, 90 to 140 beats for infants and children, and 70 to 80 beats for the elderly, with slight differences depending on the situation. The reason infants' heart rate is high is that they have a weaker heart and a smaller body than adults, so they must work quickly and circulate blood. In the elderly, the heart rate is low because the heart muscle is aging, and the activity amount is low. However, young people, especially physically healthy athletes, have a strong heart, so that a low heart rate may be normal. The heart rate can also change with stimulation, such as exercise or stress. If the heart rate is irregular, it can cause various heart diseases, leading to serious diseases, so it is necessary to manage the heart thoroughly.[6][7]

III. Resonance Phenomena

Resonance is a phenomenon in which the external force's frequency in the forced vibration coincides with the natural frequency, and the amplitude increases as the input are continuously applied. When a resonance phenomenon occurs, the external force and the response speed have the same phase, and energy is supplied to the external force's vibration system. It refers to the phenomenon that the vibration is amplified by the influence of an object that causes vibration and another object causes vibration, causing a large vibration with a slight force. Objects have natural frequencies, so they resonate when they meet a common frequency with the corresponding frequency. The phenomenon of resonating with each other is also called a resonance phenomenon.[8]

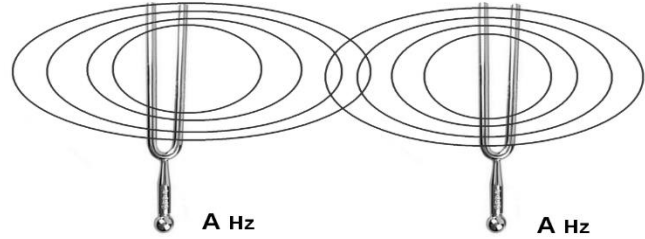


Fig. 3 Resonance phenomena experiment using the soundbar

In the soundbar resonance experiment in Fig. 2, when xylophone 1 and xylophone 2 are placed nearby and the A sound of Soundbar No. 1 is hit, the sound A of Soundbar No. 2 resonates and vibrates. In this way, the principle that sound waves of the same frequency resonate with each other is applied to the heartbeat frequency and used to recover arrhythmia symptoms. Under the premise that heartbeat frequencies resonate with each other, healthy and normal heartbeat frequencies resonate with abnormal heartbeat sounds as an acoustic resonance phenomenon so that they operate normally.[9][10][11]

IV. Heart disease

Heart disease is a disease with high incidence, high treatment costs, and high recurrence rates for modern people. Moreover, the mortality rate is very high if not treated in time. Heart disease is the second-largest disease in Korea after cancer, and the cause of death is also the second-highest after cancer. In addition, most of the two major diseases require surgery, but the cost of surgery and treatment is high, and the treatment period is long. For cerebrovascular disease, serious postoperative disorders often occur after surgical treatment, so rehabilitation treatment requires considerable time and cost. The causes of heart disease are mainly blood vessels that supply blood to the heart, blood vessels that supply blood to the brain, blood vessels that supply blood to the kidneys, and peripheral blood vessels, causing ischemic heart disease, stroke, kidney failure, and limb ischemic artery disease. . According to the statistics on the causes of death published by the National Statistical Office in 2018, circulatory system diseases, including hypertensive disease, ischemic heart disease, and cerebrovascular disease, are the second-largest cause of death in Korea, ranking next to malignant tumors. Men over 55 years of age and women over 65 years of age significantly increase circulatory disease's mortality rate. Among cardiovascular diseases, risk factors associated with atherosclerosis, in particular, are high blood pressure, hyperlipidemia, diabetes, smoking, lack of exercise, and obesity.

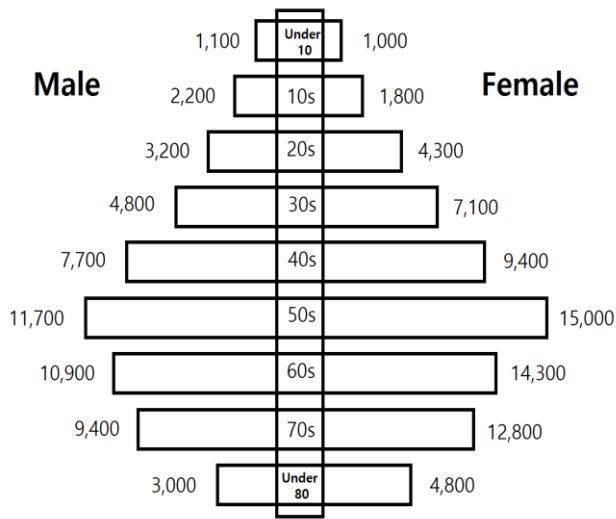


Fig. 4 Heart disease death rankings by men and women in 2018

Cardiovascular disease refers to diseases that occur in the heart and major arteries. Heart disease includes congenital heart disease from birth and acquired heart disease from life. The heart structure can be divided into heart muscle, cardiovascular system, valve, and conduction system responsible for electrical signals of the heart. Heart disease can also be classified into diseases that occur in each part of the heart. The cardiovascular system refers to the blood vessels involved in the movement of the heart. When a disease occurs in the cardiovascular system, abnormalities in the normal heartbeat occur. When the heart beats irregularly, an abnormality occurs in the heart, and when the heart is abnormal, blood cannot circulate smoothly throughout the body. An irregular heartbeat is called arrhythmia, and various cardiovascular diseases can be the cause. The cardiovascular system's major diseases include high blood pressure, ischemic heart disease, coronary artery disease, angina, myocardial infarction, atherosclerosis (arteriosclerosis), cerebrovascular disease, stroke, and arrhythmia.[12][13][14] The force that blood exerts on the walls of blood vessels is called blood pressure, and if the systolic blood pressure is more than 140 mmHg or the diastolic blood pressure is more than 90 mmHg, it is diagnosed as hypertension.

Cardiovascular disease types and symptoms

Cardiovascular disease types	Contents
High blood pressure	When measuring blood pressure multiple times, systolic blood pressure is over 140mmHg, or diastolic blood pressure is over 90mmHg
Ischemic heart disease	A disease in which the heart muscle is unable to function because the amount of oxygen required for the heart muscle is not supplied to the heart muscle
Coronary artery disease	angina pectoris A disease in which the internal diameter of the coronary artery is narrowed due to arteriosclerosis, so that blood is not supplied to the heart muscle
	Myocardial infarction Heart disease necrosis due to blockage of the coronary arteries (cardiac arteries) that supply blood to the heart
Atherosclerosis (atherosclerosis)	Diseases in which blood vessels become oily, the walls of blood vessels become stiff, and the inside diameter of blood flows becomes narrow, resulting in

	impaired blood circulation.	
Cerebrovascular disease (stroke)	Ischemic stroke	Cerebral blood vessels that supply blood to the brain are clogged with arteriosclerosis or blood clots, causing blood flow disorders
	Hemorrhagic stroke	Bleeding occurs in cerebrovascular vessels due to high blood pressure, etc., and the bleeding blocks the blood supply
Arrhythmia	An abnormal condition of the pulse that is caused by repeated contractions and relaxations of the heart muscle	

Ischemic heart disease refers to a disease in which the heart muscle cannot function properly because oxygen is not supplied to the heart muscle as necessary for the heart muscle for various causes. The most common cause is the narrowing or clogging of the heart arteries (coronary arteries) that supply blood to the heart. Coronary artery disease refers to a disease that occurs when an abnormality occurs in the coronary artery (cardiac artery). This blood vessel supplies oxygen and nutrients to the heart muscle. Angina and myocardial infarction are typical examples. Angina pectoris is a disease in which the coronary artery's internal diameter is narrowed by arteriosclerosis, and blood is not supplied to the heart muscle. When the heart needs a lot of nutrients and oxygen, such as when exercising, the narrowed blood vessels do not supply enough blood to the heart muscle, resulting in cardiac dysfunction. Myocardial infarction is a disease in which myocardial necrosis is caused by a blockage of the coronary arteries (cardiac arteries) that supply blood to the heart. Chest pain occurs as the heart muscle rots because the waste products accumulated on the artery walls narrowed by atherosclerosis completely block the flow of blood. Arteriosclerosis is a disease in which blood vessels become oily, and blood vessel walls become hard. Cholesterol deposits on the innermost membrane, the innermost membrane of blood vessels, and cell proliferation occur, resulting in a thick, deadly atheroma. As the inner surface of these blood vessels becomes thick, and the walls become thicker, the blood flowing's inner diameter becomes narrow, which causes blood circulation disorder. When the fibrous membrane surrounding atherosclerosis (called a sclerosis plaque) bursts, blood clots form in the blood vessels. In addition, bleeding occurs inside the atheroma, which causes the inner diameter of blood vessels to narrow or block rapidly. Cerebrovascular disease or stroke can be classified into ischemic stroke and hemorrhagic stroke. It is an

ischemic stroke that the blood vessels that supply blood to the brain are blocked by arteriosclerosis or blood clots, causing an ischemic stroke. A bleeding stroke is caused by bleeding in the cerebral vessels due to high blood pressure and bleeding.[7] Arrhythmia is an abnormal condition of the pulse that appears as the contraction and relaxation of the heart muscle repeats. Mainly, the rhythm is irregular, or the speed is too fast or slow. A cardiac conduction system that spontaneously generates regular electrical signals in the heart for the regular contraction of cardiac muscles and transmits it to the entire heart. If the cardiac conduction system is abnormal, an arrhythmia occurs.[15][16]

V. Heart health management using resonance frequency of healthy heartbeat sound wave

Heartbeat is an exercise in which the sinus node's electrical stimulation in the heart's right atrium is transmitted to the heart muscle to contract and relax regularly. In this way, the heart must behave regularly and at an appropriate speed and frequency to maintain health. It is advantageous for a healthy life to have a habit of preventing heart-related diseases in advance by always checking one's heart rate. The core of this study is a study to restore the normal heart rate by resonating the normal heart rate frequency with the abnormal heart rate that threatens health due to the slow or fast heart rate. For this study, first, the heartbeat frequency of the arrhythmia symptom is checked, and the sampled normal heart frequency is resonated with the abnormal heartbeat to restore the normal heartbeat. The first resonance phenomena were investigated, and the second abnormal heartbeat and normal heartbeat were compared. Third, a resonance phenomenon was generated using normal heart frequency, and the result was confirmed.

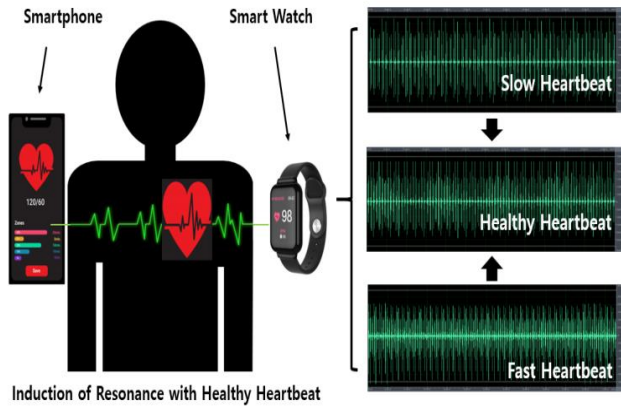


Fig. 5 Heart rate management using healthy heartbeat sound waves

It's a good idea to check your heart rate regularly. A good place to check the heart rate in the human body is in the wrist and neck. While looking at the digital watch, place your hand on your wrist or neck to check how many times your heart beats per minute. When resting, the heart rate of a normal

person is about 60 to 100, and the state of slow beating less than 60 times is called bradycardia, and if it beats more than 100 times, it is called tachycardia. In infants' case, the normal heart rate is 100-140 beats, and in the case of infants less than 1-year-old, the heart rate of 160 beats is considered normal. In the case of elementary school students, 70~110 times are considered normal. During exercise, the normal heart rate of adults is 115-145 in their 20s, 110-140 in their 30s, 105-130 in their 40s, 100-125 in their 50s, and 95-115 beats in their 60s and older. An experiment was conducted to restore a weak heartbeat to normal by using the heartbeat frequency's resonance phenomenon. In this way, while listening to the normal heart frequency, the pulse was checked, and the change was measured. For the experiment, the normal heartbeat frequency (diastolic:80-systolic:120) was listened to by a total of 10 patients with heart disease among 5 men and women in their 50s to see how much improvement. The normal heartbeat was recorded, the smartphone or smartwatch was heard frequently for about a week, and the pulse rate was checked 10 times each to record the improved pulse rate. the results are as follows.[17][18]

Table of results of heartbeat frequency resonance

Gender	Whether to listen to heart rate frequency	Subject 1	Subject 2	Subject 3	Subject 4	Subject 5
Woman	before listening	59-85	88-94	55-84	49-83	52-90
	after listening	75-112	72-118	80-121	77-115	79-124
Man	before listening	64-95	59-95	69-100	54-105	62-99
	after listening	77-118	84-121	79-119	78-124	75-115

unit: bpm

As a result of checking the healthy normal heart rate frequency for a week and checking it about 10 times, it was shown that the heart rate of men and women who were weakly resonated with the healthy heart rate frequency and gradually recovered rapidly. It has been shown that if listening to such a healthy normal heartbeat frequency becomes a daily routine, the unstable heartbeat cycle can be maintained at a normal and stable heartbeat frequency.[19][20]

VI. CONCLUSIONS

The irregular heartbeat that was healthy is a red sign that there is something wrong with your health. Since the heart is an important organ directly connected to life maintenance, it is very important to recover health. In this paper, as one of the methods of restoring heart health, it is proposed to help healing by incorporating the resonance principle of frequency. A method of returning the abnormal heart frequency to the normal heart frequency by resonating the heart's normal heart frequency slower or faster than the normal heart rate was proposed. A healthy heartbeat was

inserted into a smartphone or a smartwatch, operated from time to time, and transmitted through the skin and blood vessels, synchronizing the weak and irregular heartbeat healthily. As a result of the experiment, the symptoms of slow or weak heart disease showed the possibility of gradually recovering by resonating with a healthy heart frequency and being controlled by a heart rate close to the normal heart rate. Normalization of the heartbeat due to the heartbeat acoustic resonance phenomenon prevents the heartbeat from slowing down or excessively fast and induces an appropriate heartbeat. The heartbeat acoustic resonance phenomenon will play an important auxiliary role in preventing the risk of complications and outbreaks that occur as the heartbeat becomes slower or faster than the standard. If the heartbeat sound wave's resonance phenomenon is successfully performed, it will help anyone maintain basic heartbeat movement. It was concluded that a more effective help would be obtained if a healthy heartbeat sound frequency resonance therapy was used in combination with steady exercise and a diet free of fat and waste products.

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