

THE INFLUENCE OF THE HUMIDITY OF THE AIR ON THE CARDIOVASCULAR SYSTEM

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Abstract

This article will investigate the effects of different levels of humidity on the circulatory system, including blood pressure, heart rate and general cardiovascular health. As well as analyzing the relationship between air humidity and health indicators related to circulatory system function in order to develop recommendations for the prevention of cardiovascular diseases depending on climatic conditions.

Keywords: Humidity, absolute, relative, cardiovascular system, circulation, blood viscosity, coronary heart disease, hypertension, blood pressure.

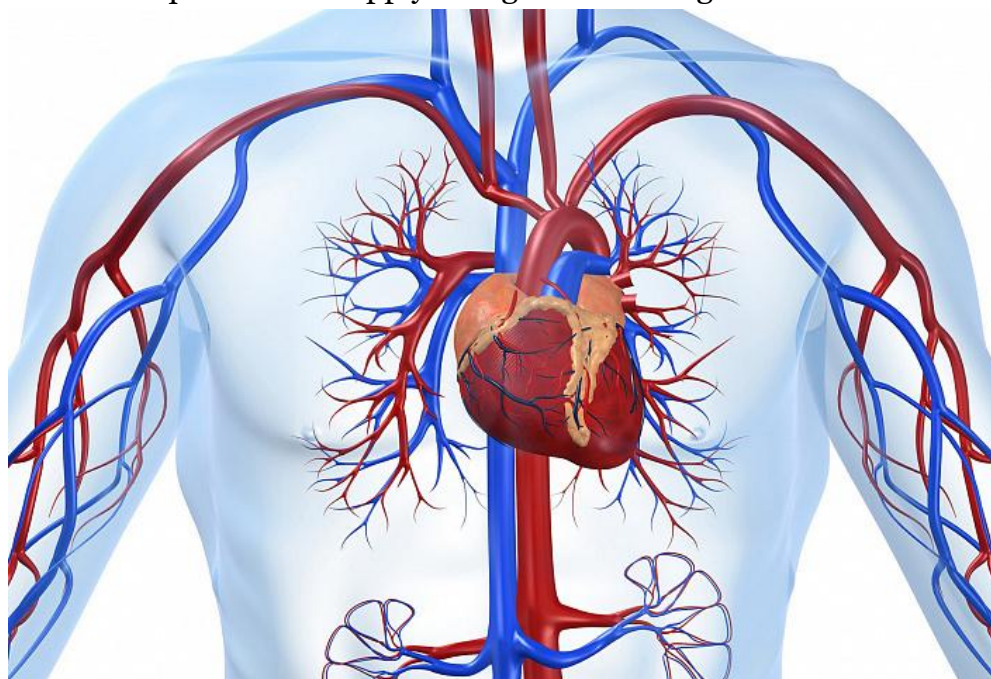
Introduction

Humidity is one of the most important climate factors because of its influence on the thermal balance of the human body. It may affect the symptoms of many diseases and the efficacy of medical therapy. In contrast, there is relatively little information available about the relationship between either air humidity or humidity differences and cardiovascular functions. An effect of air humidity on neurovegetative functions was described by suggesting an influence on thermoregulation. This was more closely investigated in some studies on humans. However, this research was not sufficient to confirm the connection. Some experiments could show that manipulation of body temperature can change morbidity and survival rates of patients with cardiac diseases. They are open to a relationship with air humidity according to the physiological changes provoked by environment.

There are many studies devoted to various aspects of air humidity. The works of such authors as N.M.Liventsov (2012), consider the basic properties and emphasize the functional characteristics of this topic. Other researchers, for example, A.N. Remizov (2003), reveal the effect of increasing or decreasing air humidity on the organism and biophysical processes in it.

Thus, despite the presence of a significant amount of research in this area, the need for a more in-depth analysis of the impact remains relevant, which is the reason for this study. The cardiovascular system (CVS) is a complex and highly organized network of organs and vessels that transports blood, oxygen and nutrients throughout the body. The main organ

of the CVS is the heart, which consists of four chambers: two atria and two ventricles. The heart functions as a pump, ensuring the continuous movement of blood. Arteries, veins, and capillaries make up the vascular part of the system. Arteries carry blood from the heart to organs and tissues, having elastic walls that can withstand high pressure. Veins return blood to the heart, having thinner walls and valves that prevent backflow of blood. Capillaries are the smallest vessels where metabolism between blood and cells takes place. The main functions of the cardiovascular system are to transport oxygen and nutrients to the cells and to remove carbon dioxide and metabolic waste products. In addition, the CVS is involved in regulating body temperature and provides immune defense by transporting immune system cells and antibodies to fight infections. Therefore, the CVS plays a crucial role in maintaining homeostasis, a state of stability of the body's internal conditions. It regulates blood pressure through mechanisms such as baroreceptors, which respond to changes in pressure and trigger appropriate adjustments. The CVS also maintains acid-base balance by transporting carbon dioxide, which is involved in the regulation of blood pH, and ensures adequate blood supply to organs according to their needs.



There is always water vapor in the air. It is formed as a result of evaporation of water from the surfaces of oceans, seas, lakes, reservoirs, rivers, etc. On the amount of water vapor contained in the air depends on the weather, human well-being, the functioning of many of its organs, plant life, as well as the safety of technical objects, architectural structures, works of art. Therefore, it is very important to monitor air humidity and to be able to measure it.

Humidity is a measure of the water vapor content in the air. Absolute humidity is determined by the mass of vapor contained in a unit volume of atmospheric air. It is expressed in grams per cubic meter. Relative humidity is the ratio of the amount of water contained in the air at a given temperature to the maximum amount of water that can be

contained in the air at a given temperature in the form of vapor. Relative humidity indicates how much more moisture is missing before condensation, i.e., the conversion of vapor into liquid, begins under given conditions.

Air with a humidity:

- up to 55% is considered dry,
- 56%-70% moderately dry,
- 71%-85% moderately humid,
- above 85% is very humid.

When the environment has a temperature higher than the human body temperature, heavy sweating occurs. Heavy sweating leads to cooling of the body, but is a strain on the body. A person feels comfortable if the relative humidity of the surrounding air is in the optimal range of 40-60%. Both low and high air humidity negatively affects human health and the condition of blood vessels.

When the air we breathe is too dry, dehydration, or dehydration, is more likely to occur. A significant loss of water in the body leads to a reduction in circulating blood volume, blood clotting, stagnation of lymph and tissue fluid throughout the body. Too high a concentration of moisture in the air is also unfavorable. It interferes with normal sweating, which can provoke overheating of the body and, as a consequence, increase blood viscosity. Changes in the cardiovascular system due to suboptimal humidity in the form of increased blood viscosity slows down the speed of blood flow, impedes the functioning of blood vessels and becomes a heavy load on the heart. This situation in the body is fraught with deterioration of tissue nutrition, oxygen starvation of the brain, vomiting, loss of consciousness; threatens the formation of life-threatening blood clots - thrombi, which can clog small and large veins and disrupt the work of vital organs. When the air humidity increases, even quite healthy people can have health problems: increased heart rate, shortness of breath, feeling of shortness of breath, dizziness, tightness in the chest, etc. All this is the result of increased strain on the heart. People with diseases of the cardiovascular system during this period are particularly vulnerable. When humidity increases, hypertensive people feel worse, and patients with coronary heart disease (CHD) are more likely to have angina pectoris attacks. Therefore, those who suffer from diseases of the cardiovascular system, and in principle, even healthy people, should follow some rules that will keep the heart healthy for as long as possible.

Air humidity is one of the factors that can significantly affect blood pressure and overall cardiovascular health. Let's take a closer look at exactly how humidity affects hypertension and hypotension.

Hypertension, or high blood pressure, is a common problem that can be exacerbated by high levels of humidity. When humidity is high, the body has difficulty thermoregulating. In high heat and humidity, sweating becomes less efficient, making it harder for the body to cool itself. This puts more strain on the cardiovascular system, as the heart must work harder to provide the necessary blood flow and maintain a normal body temperature. High humidity can contribute to increased vascular tone, which also leads to an increase in blood

pressure. This is because the body is trying to compensate for the lack of oxygen that can occur due to breathing difficulties in high heat and humidity. In people with a predisposition to hypertension, high humidity can exacerbate symptoms such as headaches, dizziness and general weakness. This may be due to both physical exertion and psychological stress from the heat.

People suffering from hypertension often note the dependence of their condition on weather conditions. High humidity can be a trigger for elevated blood pressure, requiring additional monitoring and treatment adjustments.

Hypotension, or low blood pressure, can also be affected by changes in humidity. In low humidity, especially in hot weather, dehydration of the body can occur, leading to a decrease in blood volume and a resulting drop in blood pressure. This condition can cause symptoms such as dizziness, weakness and even fainting. With low humidity and high temperatures, physical activity can exacerbate hypotension. Fluid loss through sweating leads to an even greater decrease in blood volume and poor circulation. In some people, the body can adapt to changes in humidity, but this takes time. It is important to monitor your condition and take steps to maintain normal hydration levels if necessary.

Thus, the impact of high humidity on blood pressure and general health of people with hypertension is significant and multifaceted. Conditions of high temperature and humidity place additional stress on the cardiovascular system, which can exacerbate symptoms and lead to worsening of the condition. Understanding these interrelationships is important to effectively control hypertension and hypotension to prevent potential complications. People with a predisposition to high blood pressure should closely monitor changes in the weather, maintain adequate hydration, and adjust their treatment measures as needed. Being aware of the impact of climate conditions on health will help you better manage your condition and improve your quality of life. Continuous monitoring of blood pressure allows people with hypertension to detect changes in their condition in a timely manner. Using a home tonometer and keeping a diary of blood pressure readings will not only help to monitor your current condition, but also to identify possible triggers such as stressful situations or dietary changes. Regular visits to the doctor are also important for adjusting treatment and evaluating the effectiveness of prescribed medications.

Air humidity can have a significant effect on the development and exacerbation of angina pectoris, as well as on the condition of the coronary arteries. High humidity leads to increased water vapor content in the air, which makes breathing difficult and impairs gas exchange in the lungs. This puts additional strain on the heart, especially in people with pre-existing cardiovascular disease. At high humidity levels, it is more difficult for the body to regulate temperature, which can lead to overheating and increased heart rate. This, in turn, increases the heart's need for oxygen, which can cause an exacerbation of angina symptoms.

On the other hand, low humidity can also have a negative impact on health. Dry air conditions can irritate the respiratory tract, making it difficult to breathe and causing

discomfort. Low humidity can also contribute to increased stress and anxiety levels in patients, which can trigger angina attacks.

In addition, changes in humidity can affect coronary artery health. For example, sudden fluctuations in temperature and humidity can contribute to vasospasm, leading to narrowing of the coronary arteries and impaired blood supply to the heart muscle. This can worsen the course of angina and increase the risk of cardiovascular events.

Thus, both high and low humidity can affect the course of angina pectoris and coronary artery disease. It is important that patients with these conditions closely monitor climate conditions and take steps to maintain a comfortable environment, which can help reduce the risk of exacerbations and improve quality of life. Studies show that changes in weather conditions, including humidity levels, may be associated with an increased risk of stroke. Humid air can promote blood clots and impair blood microcirculation, which increases the likelihood of stroke.

High humidity can exacerbate other stroke risk factors such as high blood pressure and diabetes. Combined with other unfavorable conditions (such as heat), this creates a dangerous situation for people with a predisposition to stroke.

A comprehensive approach to managing heart disease involves many aspects, each of which plays an important role in improving patients' quality of life. Regular health monitoring, maintaining adequate hydration, being aware of one's condition and adopting a healthy lifestyle all help people with CHD feel more confident and in control of their health. As a result, this can lead to a more active and fulfilling lifestyle, reducing the risk of exacerbations and improving overall health.

To minimize the negative impact, it is recommended to maintain an optimal level of humidity in living and working rooms with the help of air conditioners and dehumidifiers, regularly ventilate the rooms. It is necessary to increase fluid intake, especially water, to maintain normal circulating blood volume and prevent dehydration, which can aggravate the strain on the heart. It is important to avoid strenuous physical activity in hot and humid conditions, preferring to rest in a cool and well-ventilated room. Taking a cool shower can help lower body temperature and reduce the strain on the cardiovascular system. In case of symptoms such as shortness of breath, dizziness, chest pain, you should consult a doctor immediately. Regular consultations with a cardiologist and adherence to cardiovascular treatment recommendations are especially important in humid environments. Preventive measures aimed at maintaining optimal levels of humidity and temperature help to reduce the risk of complications and improve the quality of life of people with cardiovascular disease.

In conclusion, the effect of air humidity on the cardiovascular system cannot be underestimated. Increased humidity, especially in combination with high temperature, creates a significant load on the cardiovascular system, aggravating the course of existing diseases and provoking discomfort in healthy people. Effective microclimate management, adherence to a drinking regimen, limiting physical activity in humid conditions, and timely referral to a physician when symptoms appear are key aspects of preventing and reducing

the negative effects of humid air on heart health. Further research should be aimed at a deeper study of the mechanisms of this effect and the development of personalized recommendations for different population groups, taking into account individual risk factors.

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