

Research Progress of Dietary Habits and the Hypertension

Xinni Wei

Sierra Canyon School, Los Angeles, USA

xinni.wei@scsstudent.org

Abstract. Chronic disease (include hypertension) is a kind of lifelong disease with serious bodily function damage, which can only be controlled, but cannot be cured. The morbidity of complications is high, and with high disability rate and mortality rate, the health management of chronic disease has become an important public health problem in China. At present, there are abundant drugs for the treatment of hypertension on the market, but they may only regulate a certain aspect, so that the blood pressure control effect is not ideal, and increasing the dose can hardly reduce the extra blood pressure but will increase the risk of adverse reactions. There are many factors that cause the high blood pressure, and they are closely related to dietary habits. In order to ensure that people can have a reasonable diet and good health, the article makes a detailed study on the dietary habits (such as the high salt and low potassium, high fat, excessive diet) and hypertension.

Keywords: Hypertension, diet, salt, obesity.

1. Introduction

Hypertension is a systemic disease characterized by elevated blood pressure (BP), which is one of the main causes of disability and death in the world and is also a major treatable risk factor for cardiovascular and cerebrovascular diseases. According to the estimation of 2022 China Cardiovascular Health and Disease Report, there are about 245 million hypertension patients in China, and the number of hypertension patients continues to increase with the intensification of the aging population [1]. Although China has achieved good results in the prevention and control of hypertension, the hypertension control rate in China is only 16.8% [2]. How to strengthen the health management of such a large number of hypertension patients is still a major public health challenge facing our country.

Hypertension is a chronic disease with controllable and preventable characteristics, patients must follow the doctor's advice rational use of drugs, and then effectively control the condition. However, the management of high blood pressure can not only rely on drugs, and drugs may have certain side effects, or drug resistance, so should find new intervention breakthroughs, such as dietary intervention. Modern studies have shown that poor eating habits will increase the risk of hypertension, and overweight and obesity closely related to diet are also important risk factors for hypertension, especially central obesity, which is more closely related to hypertension [3, 4]. Therefore, from the perspective of eating habits, this paper explores the correlation between bad eating habits and hypertension, and how to carry out healthy diet collocation for hypertensive patients.

2. Dietary Habits and Hypertension

2.1. High Sodium and Low Potassium Diet

Sodium ion is one of the essential components to maintain the normal physiological function and homeostasis of the body. The World Health Organization (WHO) recommended that the daily sodium intake for adults be less than 2000 mg per day, which is around 5 grams of salt. It is mainly ingested through diet, and most of it is excreted through the kidney. In the 1960s, Dahl first confirmed the relationship between salt and high blood pressure through animal experiments. Excessive intake of sodium ions will increase the retention of water and sodium in the body, increase blood volume, and thus increase blood pressure. The increase of sodium ion level in vascular smooth muscle can lead to the increase of intracellular calcium ion concentration and enhance the vasoconstriction response. As

a result, peripheral vascular resistance increases, and hypertension is formed [5]. A large cross-sectional study of 10,074 participants from 32 countries found that high sodium was positively associated with hypertension, with an increase in daily salt intake of 5-6g and an increase in systolic/diastolic blood pressure of 3 to 6/0.1 to 2.5 mmHg (1 mm Hg = 0.1333 kPa). If the daily salt intake is increased by 6g compared with the current salt intake for 30 years, the systolic blood pressure level of the overall population will increase by 9 mmHg [6]. Also, people across the globe are consuming far more sodium than is healthy, according to a new study led by researchers at Harvard School of Public Health and the University of Cambridge. As shown in figure 1.

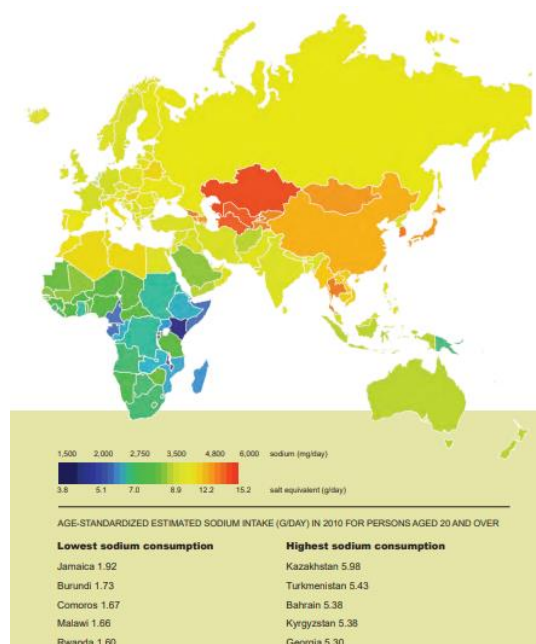


Figure 1. Age-standardized estimated sodium intake (g/day) in 2010 for persons aged 20 and over (https://www.hsph.harvard.edu/magazine/magazine_article/wheres-the-salt/)

Another environmental factor is potassium deficiency, the causative role of which is often ignored or even considered insignificant. Potassium actually acts as an intracellular fluid to help the body get rid of excess sodium, reducing the impact on blood pressure. A meta-analysis showed that in hypertensive patients with potassium intake of 1.2-4.8g/d, there was a non-linear relationship between the potassium intake and systolic and the diastolic BP, and their 24-hour urinary potassium excretion ranged from 0.67g to 5.1g [7]. And the interaction between high sodium and low potassium is not the effect of any one of these factors alone.

In addition, a total of 984 residents aged 18 and above in Zhongshan City were investigated. The prevalence was 8.2% (81/984). Multivariate logistic regression analysis showed that the risk increased by 0.341 times (OR=1.341) for every 1 unit increase in the dietary sodium to potassium ratio [8].

2.2. High-fat Diet

Fats are insoluble in aqueous solutions. Fat is mostly found in meat, bone marrow, seed, palm and olive oil from domesticated crops. Increased intake of saturated fat can lead to an increase in cholesterol and resistance for the heart to pump. Unsaturated fat tends to be solid at room temperature and found in plants, vegetable oils. It can help to decrease the level of cholesterol and lower the rate of cardiovascular disease and blood pressure. Trans fat is usually found in deep fried food, hydrogenated oils and processed foods. Trans fat also increases cholesterol level and the rate of high blood pressure. High fat diets usually are higher in cholesterol, which would increase the risk of cardiovascular disease. This would harden the arteries and make heart to strain more to pump blood. The World Health Organization (WHO) recommended 30% of total calories consumed by adults to be fat and less than 25 to 30g saturated fat daily. Most countries consume around 60 to 80g fat daily,

and the US consumes 160g of fat daily. Also, in most countries in Asia, many people consume around 100 to 120g of fat daily. So, most people have exceeded their daily recommended fat intake.

At the same time, people who eat high-fat food for a long time are prone to obesity, and the subcutaneous fat of obese people will thicken, so that the capillaries will expand, and the blood circulation will increase relatively. In the case of normal heart rate, the stroke volume will increase greatly, and long-term overburden will induce left heart hypertrophy, resulting in increased blood pressure. An animal experiment found that long-term administration of a high-fat diet can significantly stimulate changes in the arterial wall of spontaneously hypertensive rats, resulting in reduced vascular elastic function and increased arterial stiffness [9].

2.3. Obesity

Unhealthy diet is an important risk factor for chronic diseases, especially obesity, such as irregular ration, too much meat, preference for snacks or high-calorie foods or fried foods or sweets.

One of the important mechanisms of obesity-related hypertension is the activation of sympathetic nerve. A variety of factors may activate the sympathetic nerve, such as increased leptin levels, insulin resistance, obstructive apnea and so on. Leptin (leptin), as the expression product of obesity gene, is a polypeptide hormone secreted by white fat cells, which is mainly involved in the central regulation of food consumption and energy consumption. Animal experiments have shown that increased leptin levels can lead to increased insulin secretion in the central system, activation of kidney sympathetic nerves, and then lead to increased blood pressure [10, 11].

The renin-angiotensin-aldosterone system (RAAS) is a major regulatory mechanism for the regulation of BP and water and salt metabolism. There is also a link with obesity. A growing body of evidence suggests. RAAS and adipose tissue play an important role in BP regulation. In overweight state, due to inflammation and oxidative stress, angiotensinogen secretion increases, RAAS activation causes renal vasoconstriction, renal blood flow and glomerular filtration rate decrease, and blood pressure increases accordingly. Obesity would also affect hormone levels, cause insulin resistance, which would all lead to high blood pressure [12].

2.4. Excessive Alcohol

A large number of epidemiological studies support a positive relationship between regular heavy alcohol consumption and hypertension. A cohort study of 371,463 participants found that excessive alcohol consumption increased the risk of high blood pressure by 1.3 times. A study was conducted to investigate the drinking behavior characteristics and related factors of 18–79-year-old hypertensive population in Beijing. Among those with hypertension and drank alcohol, the frequency of drinking was mainly weekly (34.7%) and daily (29.3%). The majority of men drank weekly (37.1%) and daily (34.4%), while the majority of women drank annually (43.8%) ($P < 0.001$). There were statistically significant differences in the distribution of drinking frequency among age, education and occupation groups ($P < 0.001$). Before 50 years old, drinking frequency was mainly weekly. After the age of 50, alcohol consumption was mainly daily [13, 14].

In particular, teenage drinking is very common at present and should be paid more attention to. Exposure to alcohol during adolescence continues to activate microglia. Adolescents are in an important stage of rapid growth and development, and the activation of microglia has an important impact on the development of brain structure and function, as well as the pathogenesis of alcohol use disorders, and eventually alcohol addiction, leading to early onset of hypertension. Or through the activation of nicotinic acetylcholine receptors, the specific mechanism is not fully understood [15].

3. Strengthen Health Management and Develop Good Eating Habits

Reasonable eating habits and diet structure may effectively improve the reasonable intake of beneficial substances.

As dietary patterns have changed, processed foods have become an important source of sodium intake. All people with high blood pressure should take steps to limit sodium intake from various foods. At the same time, it can increase the intake of the potassium-rich foods [3].

In addition to rice and flour, China's common staple foods also include cereals, beans, potatoes and other starch-rich foods (pumpkin, lotus root, etc.), which contain more dietary fiber and trace elements. A diet rich in food fiber has a certain effect on blood pressure, and soluble dietary fiber may be more closely related to blood pressure reduction.

Maintaining a healthy weight range is recommended, including controlling energy intake and increasing physical activity. A randomized controlled study conducted 12 weeks of aerobic exercise training in patients with refractory hypertension to observe the effects of aerobic exercise on blood pressure. The results showed that the ambulate systolic blood pressure and ambulate diastolic blood pressure in the experimental group decreased by 7.1mmHg and 5.1mmHg, respectively, compared with the control group. Daytime blood pressure and office systolic blood pressure were also significantly lower compared with the control group [16].

People with high BP are advised not to drink alcohol, and drinkers should try to abstain from alcohol. Reduce mental stress and maintain mental balance [17].

4. Conclusion

With the age of hypertension and the aging of the population, hypertension is increasing year by year. At present, although hypertension cannot be completely cured, it is expected that long-term control can be obtained through follow-up effective health management and standardized treatment, supplemented by long-term management of diet, so as to reduce the impact of hypertension on normal life. Good dietary behaviors and alcohol abstinence are conducive to blood pressure control in hypertensive patients, and extensive health education is needed clinically due to the lack of hypertension-related cognition and inadequate health guidance are important factors affecting the healthy eating behavior of patients. Disease cognition not only directly affects dietary compliance, but also indirectly affects dietary compliance through doctor-patient trust and learning willingness and is regulated by self-efficacy. Therefore, in the process of improving dietary strategies for elderly patients with hypertension, it is necessary to improve patients' disease cognition and self-efficacy through various ways and pay attention to issues such as doctor-patient trust relationship building and health education popularization, so as to improve patients' self-management awareness and ability. It is believed that through these means make hypertensive patients fully realize the importance and necessity of lifestyle for the prevention and treatment of this disease, through cultivating good diet and living habits, with reasonable drug treatment, play a certain role in improving symptoms and reducing complications.

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