

Role of Sodium and Potassium level in the different stages of hypertension

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ABSTRACT – High blood pressure which is also known as Hypertension is the disorder which generally affects the arteries. High blood pressure constantly exerts high pressure on the walls of the arteries due to high force of the flowing blood. In this situation heart also has to work harder to pump the blood into the arteries. Sometimes people with hypertension may not experience any symptoms but it actually causes a greater harm inside the body. Hypertension is a multifactorial disease but one of the main pathological factor that is related to is impaired functioning due to electrolytic imbalance. The levels of Sodium and Potassium play a significant role These are in turn associated with the kind of food and diet that is consumed by an individual. Although genetics also plays a very crucial role, the interplay of it with food molecules is in primary focus now as a cause of heart diseases as well as other lifestyle diseases. This paper deals with the relation of different levels of sodium and potassium in relation to the different stages of hypertension and also the role of oral nutrition on their levels and in turn heart conditions in the human body.

Keywords – hypertension, sodium, potassium, blood pressure

INTRODUCTION

Currently Hypertension is defined as the condition when the value of systolic blood pressure (SBP) ranges from 130mmHg and more and/or diastolic blood pressure (DBP) is more than 80 mmHg. Hypertension ranks among the most common chronic medical condition characterized by a persistent elevation in the arterial pressure and this disease is becoming a concerning factor due to modern lifestyle and food habit.

According to The American College of Cardiology blood pressure can be classified into four categories. They are as follows :-

- Normal blood pressure – when the blood pressure is 120/80 mm Hg or lower
- Elevated blood pressure – when the systolic blood pressure ranges from 120-129 mm Hg and diastolic blood pressure is not above 80 mm Hg

- Stage 1 hypertension – when the systolic blood pressure range is between 130-139 mm Hg and diastolic is between 80-89 mm Hg.

- Stage 2 hypertension - this occurs when the diastolic pressure is 140 mm Hg or higher and systolic pressure is 90 mm Hg or higher. [2]

Thus we can say that it is the condition of elevated blood pressure. If we consider about the epidemiology of hypertension then we can see that it's a very common disease but if it's remain untreated then it may possess serious threats like stroke and damage to heart, kidney, brain etc. [4] Over one billion of people around the globe has been found to suffering from hypertension with upto 45% of the affected population is adult. And this high prevalence is independent of socio-economic status and income strata.

If we take a look at the pathophysiology then we will find that there are numerous mechanisms of hypertension development but they generally include includes increased salt absorption resulting in volume expansion, an impaired response of the renin-angiotensin-aldosterone system (RAAS), increased activation of the sympathetic nervous system. These changes lead to the development of increased total peripheral resistance and increased afterload which in turn leads to the development of hypertension.

The overview of the risk factors of hypertension is

- Age – it generally occurs at old age after 40-50 years
- Genetics – this disease can get inherited
- Weight – obesity is also an important factor in developing hypertension
- Physical activity – physical inactivity can also lead to hypertension
- High salt diet, diet high in saturated fat and trans fats, low intake of fruits and vegetables
- Alcohol consumption
- Others- smoking, salt sensitivity

People with stage 2 hypertension may experience some of the symptoms like dizziness, severe headaches, chest pain, nausea, vomiting, abnormal heart beat, blurred vision etc.[2]

REVIEW

The amount of Na consumption is a major determining factor of the level of hypertension. Increased intake of sodium in diet leads to elevated intravascular volume and thus in turn increases cardiac output by elevating blood pressure. At the cellular

level it has been found that there is an increase in intracellular increase in sodium exchange with the increase in intracellular calcium with its potent effects of augmented vascular tone and vascular hypertrophy which results in persistent hypertension. People with hypertension has shown to have low ability of Na excretion by their kidneys. [3]

On the other hand, dietary supplementation with potassium can lower BP in normal and hypertensive patients. Potassium channels, along with $\text{Na}^+\text{-K}^+\text{-ATPase}$ (also known as $\text{Na}^+\text{-K}^+$ pump), are central in determining the resting membrane potential and cell volume. Because the concentration of potassium is much higher in intracellular than extracellular medium, activation, and consecutive opening of potassium channels, results in hyperpolarization of the plasma membrane, thereby changing an electrogenic driving force for Na^+ reabsorption in the distal nephron.[5]

It was recommended by the American Heart Association to intake 2g of salt (Sodium) for mild hypertension and 1g for moderate levels. And the potassium requirement is 3500 mg per day which can be liberally taken through fruits and vegetables.[4]

One study found that individuals with STEMI were undernourished when measured using a nutritionally appropriate scale. A person's health, including their energy levels, protein metabolism, and immune system, can be measured by looking at their diet. According to prospective studies and trial results, cardiovascular mortality decreases with increasing potassium intake. Although serum potassium levels were not affected

by diet or eplerenone, cardiac injury was avoided in this study. We used to eat a lot of potassium-rich foods, but that has changed recently.

In many industrialized countries, the average daily intake of potassium is now about 70 mmol day⁻¹, which is only about a third of what our ancestors ate, because more potassium is excreted from the diet and the potassium level drops by eating fruits and vegetables. There's a lot of information out there about the health benefits of increasing your potassium intake. Several epidemiological and clinical studies have shown that a potassium-rich diet is effective in lowering blood pressure in hypertensive patients and the general population. One study found that indicators of malnutrition in STEMI patients were measured by appropriate methods.

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