Phytochemicals and hypertension

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Abstract: Hypertension is above the systolic blood pressure above 140 mmHg or diastolic blood pressure greater than 90mmHg or both. It is that can be controlled by diet containing an adequate supply of phytochemicals. The article is based on non-systematic literature searches in PubMed, Ovid and Sciencedirect and ISC. Hypertension is one of the major chronic diseases that can affect people around the world. Today's DASH diet (dietary approach to stop hypertension) is used to reduce and control blood pressure. The diet containing plenty of fruits, vegetables, nuts and whole grains that also contain nutrients such as vitamins and minerals and non- nutrient elements are called phytochemical. Phytochemicals are materials at very low concentrations, effect on the expression of many genes, including transcription factors AP-1, NF-Kappa B, SREBPs, PPARs and their cellular metabolism and gene regulation and they have antioxidant properties and anti-hypertensive effects. Moreover, increased intake of phytochemicals is associated to reduction of death from disease cardiovascular diseases, stroke and damage secondary to hypertension. Possible mechanisms of action of phytochemicals in reducing blood pressure are including of inhibition of angiotensin-converting enzyme and inactivation bradikinin and regulation of bioavailability of nitrous oxide. In conclusions based on the results, increased intake of phytochemicals in daily diet is associated with the opposite of death from heart disease - coronary, stroke and damage secondary to hypertension.
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Key words: hypertension, phytochemicals, plant foods, poly phenols, flavonoids, carotenoids

Introduction:

Hypertension or high blood pressure defined as systolic blood pressure of greater than 140 mmHg or diastolic blood pressure greater than 90mmHg or both, affected 11% people in the Iran(1). Hypertension is the third risk factor for death from cardiovascular disease, with LDL-C and smoking has been called the silent killer(2,3).

Also, hypertension is the major risk factor for stroke and renal dysfunction. Lowering the blood pressure, through dietary may decrease damage of hypertension.

Epidemiological studies suggest that consumption of fruit, vegetables (4,5,6,7,8) and mineral water, water (9,10) and tea may protect against high blood pressure (11,12,13,14).Vegetables and fruits and tea may decrease blood pressure due to phytochemicals(15,16).

Functional non- nutrient food factors (phtochemicals) are in vegetable and fruits that considered to be effective for health promotion and disease prevention (15,17)

Methods:

The article is based on non-systematic literature searches in PubMed, Ovid and Science direct and ISC.

Phytochemical:

Flavonoids, polyphenols and carotenoids are included in phytochemical database (15).

This review summarizes current evidence on the effect of phytochemical on blood pressure.

High intake of fresh fruit and vegetable was associated with a low stroke mortality, an effect that was attributed to preventing hypertension(18).

Flavonoids and hypertension:

Flavonoid compounds included flavonols (quercetin, kaempferol, myricetin), flavones (apigenin, lutein) and isoflavones (coumestrol, daidzein, genistein, equol) (18).

Therefore, vegetarians had approximately 40% higher intake of flavonoids that non – vegetarians. Flavonoids are scavengers of free radicals such as superoxide anions and lipid proxy radicals and by preventing oxidation of LDL-c, because oxidized LDL is believed to be atherogenic. Therefore, flavonoids may decrease the formation of atherosclerotic plaques and reduce arterial stiffness, Leaving arteries more responsive to the endogenous stimuli of vasodilation (18,5).

The major dietary of flavonoid intake is black tea studies have shown that consumption of fruit, vegetable and tea (black and green) containing high amount of flavonoid may lead to lower blood pressure

and may provide protection against coronary heart disease and stroke. It is possible that their antioxidant effect are responsible.

Poly phenols and hypertension:

The Mediterranean diet has been associated with greater longevity and quality of life in epidemiological studies. Because of the abundance of fruits and vegetable are provided high amounts of polyphenols. Several polyphenol- rich sources such as grape-derived products, cocao, tea, soy, pomegranate and tomatoes have been shown to decrease blood pressure in hypertensive patients (6,19,20,21,22,23,24).

Polyphenol compounds included chlorogenic acid, caffeic acid, coumaric acid, gallic acid, quercetin, isorhammetin, kaempferol, hesperetin, narigenin, phloretin, enterolacton and enterodiol (25).

Recent studies suggest that chlorogenic acids which are the main components of the polyphenol class in coffee, decrease blood pressure (26). The hypotensive effects of chlorogenic acids was associated with nitric oxide, the suppression of mRNA expression of NADOH oxidase, and the improvement in endothelium-dependent vasodilation in the aorta (27,28).

Grassi and etal suggest that consumption of dark chocolate for 15 day reduce systolic blood pressure in healthy subjects as well as young and elderly hypertensive patients (29).

Polyphenols decrease blood pressure by increasing in endothelial nitric oxide bioavailability via their antioxidant action and their capacity to activate vascular endothelial nitric oxide synthase.

Carotenoids and hypertension:

In the last years, It is known the excess of reactive oxygen species(ROS), is associated to inflammation, growth and vasoconstriction contributing to vascular injury in many cardiovascular disease such as hypertension, hyperlipidemia and diabetes (30,31). ROS play an important pathophysiological role in hypertension.

Antioxidant such as caroteniods inhibit NAD(P)H oxides- driven generation of ROS reduces, improvement of endothelial function, enhance nitric oxide (NO) generation and reduce blood pressure in hypertensive patients (30). Astaxanthin, an oxi-carotenoid has antihypertensive effect by normalization of sensitivity of adreno-receptor sympathetic pathway, decrease in oxidative stress and improvement in NO bioavailability (30).

Lycopen, a carotenoid without pro-vitamin A, is red pigment in tomatoes and watermelon. High lycopen consumption has been associated with a decrease blood pressure (32,33). Meta analysis of the effect of lycopen on systolic blood pressure of all trails is suggested a significant blood pressure reducing effect (-5. 60 + 5.26 mmHg) but no significant effect on diastolic blood pressure (34).

Blood pressure lowering properties of lycopen have been attributed to the stimulation of nitric oxide production in the endothelium(34).

In conclusions based on the results, increased intake of phytochemical in daily diet is associated with the opposite of death from heart disease - coronary, stroke and damage secondary to hypertension. Therefore, it is emphasized to consume foods rich in phytochemical such as vegetables, fruits, nuts, tea and coffee, etc, in the diet order to control and prevention of hypertension.

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