

Review

USE OF NUTRACEUTICALS FOR PREVENTION AND TREATMENT AGAINST HYPERTENSION

By:

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Abstract

Hypertension is severe, prevalent, and global disease¹. It's famous as a silent killer² because it doesn't have any signs or symptoms. It either leads or causes other dangerous cardiovascular diseases, heart attack, cerebral hemorrhage, pulmonary hypertension, heart failure, or even death³. In this review, we will discuss the promising use of nutraceuticals as prophylaxis and treatment against hypertension. This review will clarify our present knowledge of nutraceuticals, and their effect on the regulation of blood pressure.

Introduction

The heart pumps the oxygenated blood through arteries and receives deoxygenated blood through veins². The force which the blood exerts on the walls of the blood vessels of the body is called blood pressure⁴. Blood pressure has two types: when the heart contracts or beats, blood pressure is called systolic blood pressure. When the heart doesn't contract between beats, blood pressure is called diastolic blood pressure⁴. The renin-angiotensin-aldosterone system plays the main role in salt and water retention and blood pressure control⁵. Hypertension occurs when there is a persistent elevation in blood pressure above normal levels (120/80 mmHg). Hypertension is divided into primary essential managed and secondary curable types^{12,13}. In this case, systolic blood pressure is ($>$ or $=$ 140 mmHg), and diastolic blood pressure is ($>$ or $=$ 90 mmHg)^{6,2}. Hypertension comprises 80% of cardiovascular diseases in the middle- and low-income countries⁷. There are 1.13 billion hypertensive people around the world⁸. Two-thirds of this percentage live in middle- and low-income countries⁸. Hypertensive people were estimated 1 in 4 men and 1 in 5 females in 2015⁸. 10% of pregnant females suffer from hypertension⁹. Hypertension is a major cause of premature death⁹. The prevalence of hypertension in older patients is highest¹⁰.

Nutraceuticals are a promising treatment for hypertension because recent clinical experiments have appreciated the biological and pharmacological impact of nutraceuticals on hypertension. Recent reports recommend functional food (nutraceuticals) to keep the patient's therapeutic blood pressure. There are many types of nutraceuticals such as sour tea, common spices, vitamin E, vitamin C, cocoa, flavonoids, coenzyme Q10, lycopene, calcium, magnesium, prebiotics, milk's tripeptides, and polyunsaturated fatty acids. Nutraceuticals have other common names such as vitamins, functional foods, nutrients, spices, prebiotics, and dietary supplements¹¹.

Clinical Trials

Recent clinical experiment on humans and animals have clarified the impact of sour tea on hypertension as coming: in a manner that depends on a specific dose (100mg or 3g/day), sour tea was found to lower systolic blood pressure to (-7.58mmHg), and diastolic blood pressure to (-3.53mmHg). This previous study clarified that sour tea was so effective in lowering blood pressure as captopril. The mechanism of how sour tea to lower blood pressure may belong to; 1-Endothelium Derived Nitric Oxide-Cyclic Guanosine Monophosphate (cGMP) which has a vasodilator effect. 2-sour tea contains polyphenols which stimulate nitric oxide synthase enzyme to increase endothelium relaxation. 3-anthocyanin compounds inhibit the activity of the angiotensin-converting enzyme. sour tea has few side effects as mild GIT symptoms, temporary constipation, abdominal distension, and the severe reaction of dysuria. in addition to the benefits of sour tea on hypertension, it is antihyperlipidemic, anti-inflammatory, and antioxidant^{11,13}.

Cocoa also can lower systolic blood pressure (-2.77mmHg) and diastolic blood pressure (-2.20mmHg). The mechanism is because cocoa is rich in flavonoids which increase nitric oxide synthesis leading to lower blood pressure. Cocoa contains also epicatechin and catechin having an antiplatelet effect so it's contraindicated with antiplatelet drugs to prevent internal excessive bleeding¹¹.

Ginger is a medical plant used for the treatment of atherosclerosis, constipation, cholesterol increase, arthritis, and hypertension. This experiment also proved that ginger has an antioxidant, and anti-inflammatory impact. This clinical experiment proved that ginger can

reduce systolic blood pressure (-6.36mmHg) and diastolic blood pressure (-2.12 mmHg). The mechanism of ginger impact on hypertension as the following: -increasing production of nitric oxide. – stoppage of ACE activity. - blockade of voltage-dependent calcium channels. Many clinical types of research have proved that the daily intake of ginger in the rate of (2-4g/day) can prevent chronic hypertension, chronic diabetes, coronary heart disease¹¹.

Vitamin E has antioxidant potency, it can also reduce blood pressure. There some clinical studies that proved that when antihypertensive drugs are taken with vitamin C, the efficacy of antihypertensive drugs is enhanced. Calcium, potassium, and magnesium-containing foods shouldn't be canned or frozen¹⁴ because the normal content of potassium is strongly reduced¹¹.

Polyunsaturated fatty acids have a potent impact on the treatment of inflammatory arthritis, diseases that associate with atherosclerosis, cancers, and hypertension. They can lower blood pressure through the prevention of synthesis of TXA2 which has a strong vasoconstriction effect: - blocking receptors of TXA2and prostaglandin H2. - increasing production of nitric oxide. - inhibition of ACE impact. Prebiotic fibers represent the fuel and food for gut microbiota in the GIT tract which produces vitamins (E, A) that reduce blood pressure¹¹.

Coenzyme Q10 has an antihypertensive effect through increasing nitric oxide production leading to a decrease in peripheral resistance but may promote bleeding in patients who take antiplatelet drugs so it is contraindicated in this case¹⁵.

Garlic was found to reduce blood pressure in rats through increasing plasma levels of nitric oxide, improvement of some species of bacteria at the colon. Several studies have proved that any amounts of garlic use are very safe. The side effects of garlic use are fetid breath, mild alimentary pathway disturbances. These side effects can be reduced by using aged garlic¹⁵.

Conclusion

- Nutraceuticals are a promising way for the treatment of hypertension.

- They have several advantages with minor or with no side effects in recent clinical experiments.
- More clinical experiments should be done to understand the molecular mechanism of functional foods action and to estimate the safety degree of nutraceuticals.
- Nutraceuticals may be future basic regulators of some chronic diseases such as hypertension, chronic diabetes, and chronic heart disease with no toxicity.

References

1. Forouzanfar, M. H. *et al.* Global burden of hypertension and systolic blood pressure of at least 110 to 115mmHg, 1990-2015. *JAMA - J. Am. Med. Assoc.* **317**, 165–182 (2017).
2. William L. Winters - Professor of Medicine, Baylor College of Medicine, Houston, T. hypertension. *Encyclopædia Britannica*.
3. Doroszko, A., Janus, A., Szahidewicz-Krupska, E., Mazur, G. & Derkacz, A. Resistant hypertension. *Adv. Clin. Exp. Med.* **25**, 173–183 (2016).
4. Felman, A. Hypertension : Causes, Symptoms, and Treatments. 1–6 (2019).
5. Publications, O. M. *Oxford Handbook of Nephrology and Hypertension. Oxford Handbook of Nephrology and Hypertension* (2012). DOI:10.1093/med/9780198520696.001.0001.
6. Bakris, G. L. & Sorrentino, M. J. *HYPERTENSION*.
7. Gadallah, M., Megid, S. A., Mohsen, A. & Kandil, S. Hypertension and associated cardiovascular risk factors among urban slum dwellers in Egypt: A population-based survey. *East. Mediterr. Heal. J.* **24**, 435–442 (2018).
8. Hypertension - Copy.
9. Lu, Y., Chen, R., Cai, J., Huang, Z. & Yuan, H. The management of hypertension in women planning for pregnancy. *British Medical Bulletin* vol. 128 75–84 (2018).
10. Buford, T. W. Hypertension and aging. *Ageing Res. Rev.* **26**, 96–111 (2016).
11. Ghaffari, S. & Roshanravan, N. The role of nutraceuticals in the prevention and treatment of hypertension: An updated review of the literature. *Food Res. Int.* **128**, (2020).

12. Stollery, N. *Inherited disorders. Practitioner* vol. 260 (2016).
13. Coleman, E. R. *Blood Pressure: Blood Pressure Solution: The Step-By-Step Guide to Lowering High Blood Pressure the Natural Way in 30 Days! Natural Remedies to Reduce Hypertension Without Medication.* 110 (2016).
14. Samadian, F., Dalili, N. & Jamalian, A. Lifestyle modifications to prevent and control hypertension. *Iran. J. Kidney Dis.* **10**, 237–263 (2016).
15. Matsutomo, T. Potential benefits of garlic and other dietary supplements for the management of hypertension (Review). *Experimental and Therapeutic Medicine* (2019) DOI:10.3892/etm.2019.8375.