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File: ■ Nigella (Black Cumin; *Nigella sativa*)
■ Hypertension
■ Oxidative Stress

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RE: Potential Role of Nigella in Prevention and Control of Hypertension

Leong X-F, Mustafa MR, Jaarin K. *Nigella sativa* and its protective role in oxidative stress and hypertension. *Evid Based Complement Altern Med.* 2013;2013:120732. doi: 10.1155/2013/120732.

Nigella (black cumin; *Nigella sativa*), also known by its Arabic name *habat-ul sauda* or *habbatussauda*, has been used for centuries medicinally and as a food spice throughout the Middle East, India, and Northern Africa. It is an annual flowering plant with pale blue flowers and has fruit with black, angular seeds. The seeds are used for treating diabetes, hypertension, hypercholesterolemia, inflammation, and gastrointestinal disorders. The purpose of this article was to review the literature evaluating the antihypertensive effect of nigella.

The seed oil is rich in polyphenols and tocopherols. The seeds contain 36-38% fixed oils (mainly fatty acids: linoleic [C18:2], oleic [C18:1], palmitic [C16:0], and stearic [C18:0] acids), 0.4-2.5% essential (volatile) oil, proteins, alkaloids, saponins, and 30-48% thymoquinone along with its derivatives dithymoquinone, thymohydroquinone, and thymol. Thymoquinone is the most pharmacologically active ingredient in abundance in the seeds.

The seed oil has strong antioxidant properties. In particular, thymoquinone is a potent superoxide radical scavenger which is as effective as superoxide dismutase (SOD) against superoxides generated either photochemically, biochemically, or derived from calcium ionophore. Thymoquinone has a strong protective effect by decreasing oxidative stress through preserving glutathione and increasing the levels and activities of antioxidant enzymes like SOD and glutathione peroxidase.

Oxidative stress may play an important role in hypertension pathogenesis by enhancing sequestration of nitric oxide (NO) by reactive oxygen species (ROS), forming lipid peroxidation products, and depleting nitric oxide synthase (NOS) cofactor tetrahydrobiopterin. NO causes vasodilation that reduces peripheral resistance, thus decreasing blood pressure, so its lower bioavailability may result in endothelial dysfunction. Also, oxidative stress may cause functional and structural damage in the

molecules and cells of the vascular wall and blood vessels. Therefore, nigella may protect against hypertension via its antioxidant abilities. However, more research is needed to test this hypothesis.

Hypertension may be reduced by a cardiac depressant effect, calcium channel blockage, and a diuretic effect. Studies show that nigella volatile oil and thymoquinone decreased arterial blood pressure and heart rate in rats, which was mainly mediated centrally, either directly or indirectly, via serotonergic and muscarinic receptors. Also in rats, the cardiac depressant effects of nigella may be mediated by nicotinic receptors. Overall, the cardiac depressant and hypotensive effects of nigella may be centrally mediated, involving the vasomotor center of the medulla and sympathetic outflow to the periphery. Thymol has been shown to dose-dependently reduce blood pressure by inhibiting calcium ion channels. When calcium channels are blocked, vasorelaxation increases. Kidney function is important for the control and pathogenesis of hypertension. Nigella may decrease blood pressure via a diuretic action; it increased urinary excretion of sodium, potassium, chloride, and urea. It also increased glomerular filtration rate and urinary and electrolyte output, independent of the renin-angiotensin-aldosterone system.

One study in patients with mild hypertension revealed that oral nigella seed extract of 100 mg/day or 200 mg/day for eight weeks significantly and dose-dependently reduced diastolic and systolic blood pressure compared with placebo and baseline ($P < 0.01$ for all; except systolic blood pressure with 100 mg/day, $P = 0.03$). There were also significant decreases in total cholesterol and low-density lipoprotein (LDL) cholesterol ($P < 0.01$ for both), and no adverse effects.¹

The authors conclude that nigella may have cardiovascular protective effects via a multitude of actions. They state that nigella has been used in traditional medicine with no reported adverse events. The authors only include one clinical study assessing the effect of nigella seed extract in patients with hypertension. A quick search of PubMed revealed that there are only two clinical trials available for this indication. More studies in humans are needed to confirm efficacy.

—Heather S. Oliff, PhD

Reference

¹Oppel M. Study finds nigella seed extract may help lower mild high blood pressure as well as total and LDL cholesterol levels. *HerbClip*. May 15, 2009 (No. 120682-376). Austin, TX: American Botanical Council. Review of Antihypertensive effect of *Nigella sativa* seed extract in patients with mild hypertension by Dehkordi FR, Kamkhah AF. *Fundam Clin Pharmacol*. August 2008;22(4):447-452.

Referenced article can be found at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3606739/pdf/ECAM2013-120732.pdf>.

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