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NIGELLA SATIVA PLEIOTROPISM: A MOMENTARY GAWK

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ABSTRACT

Nigella sativa (N. sativa) (Family Ranunculaceae) have been used for thousands of years as a curative remedy for various disorders. N. sativa seed reveal a broad spectrum of pharmacological activities including immuno-stimulants, anti-histaminic, anti-diabetic, anti-hypertensive, anti-inflammatory, and anti-microbial activities. It is known as a source of thymoquinone, thymohydroquinone, dithymoquinone, p-cymene, carvacrol, 4-terpineol, t-anethol, sesquiterpene longifolene, nigellicimine and nigellicimine-N-oxide, α-pinene and thymol etc. The incalculable medicinal properties and therapeutic uses of N. sativa prove its importance as a valuable medicinal plant. The aim of this review is to summarize important pharmacological potentials and phytochemical investigations on N. sativa and isolated principles, which can be investigated further to get novel molecules in the search of novel herbal drugs.

KEYWORDS: Nigella sativa, Medicinal plant, Phyto-constituent, Pharmacological activity.

INTRODUCTION

Nigella sativa (N. sativa) (Family Ranunculaceae) commonly known as black seed, have been used for thousands of years as a spice and food preservative, as well as a protective and curative remedy for several disorders. Traditionally, there is a common Islamic belief that blackseed is a universal remedy for all ailments, but cannot prevent aging or death. Blackseed is also known as the curative black cumin in the Holy Bible and is described as Melanthion by Hippocrates and Dioscorides and as Gith by Pliny. During the last two decades, many studies have been conducted, by using N. sativa seed extracts on various body systems in vitro or in vivo. It has been revealed that seed extracts of the plant exhibits various pharmacological activities including immuno-potentiation and anti-histaminic, anti-diabetic, anti-hypertensive, anti-inflammatory, and anti-microbial activities. Many of these activities have been due to the presence of quinone constituents in the seed.[1] Taxonomic classification: Kingdom- Plantae; Sub-kingdom- Tracheobionta; Superdivision- Spermatophyta; Phylum- Magnoliophyta; Class- Magnoliopsida; Order- Ranunculales; Family- Ranunculaceae; Genus- Nigella Species N. sativa. The major common names of the plant are Black cumin, Fennel flower, Nutmeg flower, Black seed, Black caraway, Roman coriander, Damascena, Devil in-the-bush and Wild onion seed. The other medicinal uses of the seeds of N. sativa are in the treatment of various diseases like bronchitis, diarrhoea, rheumatism, asthma and skin disorders. Further, it acts as a liver tonic, appetite stimulant and emmenagogue. Moreover, number of studies reported the usefulness of seeds of plant in digestive disorders, increase milk production in nursing mothers to fight parasitic infections and to strengthen immune system.[2] Furthermore, seeds are also useful in food industry as flavoring additive in the breads and pickles.[3] At last, seeds are useful in the treatment of worms, skin eruptions. Antiseptic, antiemetic and local anesthetic.[4] Therefore,

in this review, the diverse pharmacological activities of N. sativa along with the explored signalling mechanisms are discussed in detail.

Pharmacological activities

N. sativa has been extensively studied for its biological activities and shown to possess wide spectrum of activities such as diuretic, antihypertensive, bronchodilator, gastroprotective, hepatoprotective, antidiabetic, anticancer and immunomodulatory, analgesic, antimicrobial, analgesics and anti-inflammatory, spasmolytic, renal protective and antioxidant properties.

N. sativa and anti-bacterial

Different crude extracts of N. sativa exhibited antimicrobial efficacy against different bacterial strains which comprised either gram negative or gram positive bacteria. Crude extracts of N. sativa showed a potential

effect against some of the test organisms. The most effective extracts of N. sativa were the crude alkaloid and water extracts. Gram negative isolates were more susceptible than the gram positive ones.[5] Hannan et al. investigated in 2008 the antibacterial activity of N. sativa against clinical isolates of methicillin resistant Staphylococcus aureus. All tested strains of methicillin resistant Staphylococcus aureus in his study were sensitive to ethanolic extract of N. sativa at a concentration of 4 mg/disc with an MIC range of 0.2-0.5 mg/Ml.[6] In another study antibacterial activity of N. sativa against and triple therapy in suppression of Helicobacter Pylori in patients with non-ulcer dyspepsia was determined. N. sativa seeds exhibited clinically useful anti H. pylori activity, comparable to triple therapy[7]

The aqueous extract of N. sativa seeds exhibits inhibitory effect against candidiasis in mice.[8] Antidermatophyte activity of ether extract of N. sativa and thymoquinone was tested against eight species of dermatophytes: four species of Trichophyton rubrum and one each of Trichophyton interdigitale, Trichophyton mentagrophytes, Epidermophyton floccosum and Microsporum canis using Agar diffusion method. The ether extract of N. sativa and thymoquinone show inhibitory activity against fungal strains. The results show the potentiality of N. sativa as a source for antidermatophyte drugs.[9] In another study anti yeast activity of the black cumin seed quinines, dithymoquinone, thymohydroquinone, and thymoquinone were evaluated in vitro against six dairy spoilage yeast species. Thymohydroquinone and thymoquinone possessed significant anti yeast activity.[10]

N. sativa and antioxidant; antiarthritic

The antioxidant and antiarthritic activity of thymoquinone in Wistar rat by collagen induced arthritis was evaluated. Oral administration of thymoquinone significantly reduced the levels of pro-inflammatory mediators [IL-1β, IL-6, TNF-α, IFN-γ and PGE (2)] and increased level of IL-10.[11]

N. sativa and cardioprotection

The acute effects of diesel exhaust particles on cardiopulmonary parameters in mice and the protective effect of thymoquinone were studied. Diesel exhaust particles were given to mice, intratracheally. Diesel exhaust particles caused systemic inflammation characterized by leucocytosis, increased IL-6 concentrations and reduced systolic blood pressure. Diesel exhaust particles reduced platelet numbers and aggravated in vivo thrombosis in pial arterioles. In vitro, addition of diesel exhausts particles to untreated blood-induced platelet aggregation. Pretreatment of mice with Thymoquinone prevented diesel exhaust particles induced decrease of systolic blood pressure and leucocytosis, increased IL-6 concentration. Thymoquinone also averted the decrease in platelet numbers and the prothrombotic events but not platelet ggregation in vitro.[12]

N. sativa and gastroprotection

Ischaemia/reperfusion (I/R) induced gastric lesion, model was used to assess the antioxidant effects of N. sativa oil and thymoquinone on gastric mucosal redox state and gastric lesions, 1 and 24 h after reperfusion. I/R raised the levels of lipid peroxide and lactate dehydrogenase, while diminished glutathione and superoxide dismutase. These biochemical changes were accompanied by an increase in the formation of gastric lesions, which was reduced by both treatments. N. sativa oil normalizes the level of lactate dehydrogenase, reduced glutathione and superoxide dismutase. These results indicate that both N. sativa oil and thymoquinone possess gastroprotective effect against gastric lesions which may be related to the conservation of the gastric mucosal redox state.[13]

N. sativa and hepatoprotection

Aqueous extract of the seeds of N. sativa were evaluated for hepatoprotective activity in male Wistar rats against carbon tetrachloride induced hepatotoxicity. Various biochemical parameters were studied to determine the hepatoprotective potential. Aqueous extract showed significant hepatoprotective effect against carbon tetrachloride-induced toxicity on the liver indicating the hepatoprotective activity.[14]

N. sativa and contraceptive and anti-fertility agent

Hexane extract of N. sativa seeds when orally administered prevented pregnancy in experimental rats at a dose of 2 g/kg daily on day's 1-10 postcoitum..[15] In another study the ethanolic extract of N. sativa seeds was found to possess an anti-fertility activity in male rats which might be due to inherent estrogenic activity of N. sativa.[16]

N. sativa and anti-oxytocic action

N. sativa seeds oil inhibit the uterine smooth muscle contraction induced by oxytocin stimulation in rat and guinea pig uterine smooth muscles suggest the anti-oxytocic potential of N. sativa seeds oil.[17]

N. sativa and anti-diabetic

The study was conducted to determine the effects of N. sativa seed ethanol extract on insulin secretion in INS832/13 and β TC-tet lines of pancreatic β-cells and on glucose disposal by C2C12 skeletal muscle cells and 3T3-L1 adipocytes. Treatment with N. sativa amplified glucose-stimulated insulin secretion by more than 35% without affecting sensitivity to glucose. N. sativa treatment also accelerated β-cell proliferation. N. sativa increased basal glucose uptake by 55% in muscle cells and approximately 400% in adipocytes. Finally, N. sativa administration of pre-adipocytes undergoing differentiation accelerated triglyceride accumulation comparably with treatment with 10μ M rosiglitazone. It is concluded that in vivo. Antihyperglycemic effects of

N. sativa seed extract are attributable to a combination of therapeutically relevant insulinotropic and insulin-like properties.[18]

N. sativa and anti-cancer

In vitro and in vivo anti-cancer effects of Nigella sativa L. seed extracts was evaluated in one of the study. In the study the essential oil and ethyl acetate extracts were showed more cytotoxic effects against the P815 cell line than the butanol extract. Extracts showed a comparable cytotoxic effect against the ICO1 cellline, with IC50 values ranging from 0.2 to 0.26% (v/v), but tests on the BSR cell line revealed a high cytotoxic effect of the ethyl acetate extract (IC50 = 0.2%) compared to the essential oil (IC50 = 1.2%).[19]

CONCLUSION

Medicinal plants are used for therapeutic purpose since the beginning of human civilization. They consists phytoconstituents that exhibits therapeutic potential. According to one of the report about 80% of the world population of the developing and under developed countries relies mainly on medicinal plants. It is quite obvious that the N. sativa is widely used in traditional medicinal system and has been reported to possess number of pharmacological activities such as hepatoprotective, anti-inflammatory, antitussive, antifungal and also used to check wounds healing and antibacterial properties. The present review summarizes some important pharmacological studies on N. sativa and phytochemical investigations and isolated principles which can be investigated further to get novel molecules in the search of novel herbal drugs.

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