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THERAPEUTIC USES OF NIGELLA SATIVA: A COMPREHENSIVE REVIEW

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ABSTRACT

Nigella sativa, commonly known as black seed or Shoneez in Unani medicine, is a medicinal plant with a rich historical and therapeutic legacy across various traditional systems, including Unani, Ayurveda, and Tibb-e-Nabwi (Prophetic Medicine). Revered for centuries as a panacea, its seeds and oil have been used to treat a wide array of ailments. This review synthesises classical Unani literature, such as texts by Ibn Sina and Al-Razi, with recent evidence-based studies to elucidate the pharmacological properties, phytochemistry, and clinical applications of Nigella sativa. The bioactive compound thymoquinone is highlighted as a key contributor to its therapeutic effects, including antioxidant, anti-inflammatory, antimicrobial, antidiabetic, anticancer, and cardioprotective activities.[1] While classical Unani texts emphasise its holistic benefits, modern research validates many traditional claims, though gaps in clinical standardisation and large-scale trials remain. This paper aims to bridge traditional wisdom with contemporary science, providing a comprehensive resource for researchers and clinicians.

KEYWORD: - Nigella Sativa, Black Seed, Thymoquinone, Unani Medicine

1. INTRODUCTION

Nigella sativa (Family: Ranunculaceae), known as Kalonji, black cumin, or Shoneez, is an annual herb native to Southern Europe, North Africa, and Southwest Asia, widely cultivated in regions like the Mediterranean, Middle East, and South Asia.[2,3] Its seeds and oil have been integral to traditional medical systems, particularly Unani, where it is celebrated for its versatile therapeutic properties.[4,5] In Islamic tradition, it is referenced in Tibb-e-Nabwi, with the Prophet Muhammad (PBUH) reportedly stating that black seed is a remedy for all diseases except death. Classical Unani scholars, including Ibn Sina (Avicenna) and Al-Razi, documented its use for digestive, respiratory, and inflammatory conditions. Recent scientific studies have explored its pharmacological potential, attributing many effects to thymoquinone, a major bioactive component. This review examines Nigella sativa's therapeutic applications through the lens of Unani literature and modern evidence, highlighting its relevance in contemporary medicine.

Taxonomical classification

Kingdom: Plantae
Subkingdom: Tracheobionta
Super division: Spermatophyta
Division: Magnoliophyta
Class: Magnoliopsida
Order: Ranunculales
Family: Ranunculaceae
Genus: Nigella L.
Species: N. sativa

2. Nigella Sativa in Classical Unani Literature

Nigella sativa is a potent herb with a broad spectrum of pharmacological actions. Classical texts provide detailed accounts of its therapeutic uses, often aligning with its humoral theory-based applications.

***Ibn Sina's Al-Qanun fi al-Tibb (The Canon of Medicine)*:** Ibn Sina describes Shoneez as a warming, drying herb that balances the body's humours, particularly black bile and phlegm. He recommends it for digestive disorders (e.g., flatulence, dyspepsia), respiratory ailments (e.g., asthma, cough), and as a diuretic and emmenagogue to promote menstrual flow.

Its carminative and expectorant properties are emphasised for relieving gastric discomfort and expelling phlegm.[6] ***Al-Razi's Kitab al-Hawi****:* Al-Razi notes Nigella sativa's efficacy in treating skin disorders, such as eczema and psoriasis, due to its anti-inflammatory and blood-purifying qualities. He also prescribes it for liver tonification and as an analgesic for headaches and joint pain.[7] ***Ibn al-Baitar's Jame ul-Mufradat al-Adwiya***: This text highlights Shoneez's galactagogue properties, promoting lactation, and its use in strengthening immunity and vitality. It is also recommended for fever, bronchitis, and as an anthelmintic.[8]

Unani literature attributes the following properties to Nigella sativa**: *Mufattih Sudad (Deobstruent)***: Clears obstructions in organs, aiding liver and kidney function. ***Muhallil-e-Warm (Anti-inflammatory)****:* Reduces swelling and inflammation. ***Mudirr-e-Bawl and Mudirr-e-Haiz (Diuretic and Emmenagogue)***: Promotes urination and menstrual flow. ***Musakkin-e-Alam (Analgesic)****:* Alleviates pain in conditions like rheumatism. ***Muqawwi-e-Meda (Digestive Tonic)***: Enhances digestion and appetite. ***Muqawwi-e-Jigar (Liver Tonic):*** Enhances liver function.[1,8,9,10,11,12,13,14]

Traditional Preparations

In Unani practice, Nigella sativa is administered as seeds, oil, decoctions, or powders, often combined with honey, vinegar, or other herbs to enhance efficacy. For example, a paste of roasted seeds with honey is used for respiratory issues, while oil is applied topically for skin conditions.

3. Phytochemistry of Nigella sativa

The therapeutic potential of Nigella sativa is largely attributed to its rich phytochemical profile, with *thymoquinone (TQ*) being the most studied bioactive compound.

Key constituents include ***Volatile Oils***: Thymoquinone (30–48%), p-cymene, carvacrol, α-pinene, β-pinene, and longifolene. ***Fixed Oils***: Linoleic acid, oleic acid, palmitic acid, and arachidic acid. ***Alkaloids***: Nigellidine, nigellimine, and nigellicine. ***Saponins and Flavonoids***: Alpha-hederin, kaempferol glucoside. ***Amino Acids and Minerals***: Cystine, aspartic acid, glutamic acid, and trace elements like iron and zinc. ***Thymoquinone*** is the primary contributor to Nigella sativa's antioxidant, anti-inflammatory, and anticancer effects, though synergistic interactions among constituents enhance its overall activity.[15,16,17,18,19]

4. Therapeutic Applications: Evidence from Modern Studies

Recent research validates many traditional uses of Nigella sativa, with preclinical and clinical studies demonstrating its efficacy across various conditions. Below is a detailed analysis of its pharmacological actions.

Antioxidant Activity: Nigella sativa's antioxidant properties stem from thymoquinone's ability to scavenge reactive oxygen species (ROS) and enhance antioxidant enzyme activity (e.g., glutathione peroxidase, catalase). A 2017 study demonstrated that Nigella sativa oil reduced oxidative stress in lipopolysaccharide-induced inflammation models in rats, improving liver fibrosis. Clinical trials indicate improved oxidative stress markers in patients with metabolic syndrome supplemented with Nigella sativa.[20]

Anti-Inflammatory Effects: Thymoquinone inhibits pro-inflammatory cytokines (e.g., TNF-α, IL-6) and suppresses prostaglandin and leukotriene synthesis. Key findings include:

A 2024 review highlighted Nigella sativa's superior anti-inflammatory effects compared to turmeric and ginger, attributed to thymoquinone's modulation of inflammatory pathways.

In a rat model, Nigella sativa oil reduced inflammation in stress-induced gastritis, comparable to omeprazole.[21]

Antimicrobial Properties Nigella sativa exhibits broad-spectrum antimicrobial activity against bacteria, fungi, and viruses: In vitro studies show its ethyl acetate fraction inhibits *Fusarium oxysporum* and *Macrophomina phaseolina at 50 mg/mL*. A 2020 review suggested Nigella sativa's potential against SARS-Cov-2, with thymoquinone and nigellidine showing high affinity for viral proteases in silico.[22]

Antidiabetic Effects

Nigella sativa improves glycemic control and insulin sensitivity: A clinical trial in patients with metabolic syndrome showed significant reductions in HbA1c, fasting blood glucose, and postprandial glucose with Nigella sativa supplementation. Animal studies indicate thymoquinone enhances glucose metabolism and protects pancreatic β-cells.[23]

Anticancer Activity

Nigella sativa's anticancer effects involve apoptosis induction, cell cycle arrest, and anti-angiogenesis. A 2017 review reported thymoquinone's efficacy against breast, lung, and colon cancers via modulation of p53, PTEN, and caspase pathways. In vivo studies showed that Nigella sativa oil inhibited colon carcinogenesis in rats without adverse effects.[24]

Cardioprotective Effects

Nigella sativa supports cardiovascular health through hypolipidemic, antihypertensive, and antiatherosclerosis actions: A 2013 study noted its ability to reduce ventricular conduction and inflammation in cardiovascular stress models. Meta-analyses confirm reductions in serum lipids and blood pressure with Nigella sativa supplementation.[25]

Dermatological Applications

Nigella sativa is effective for skin conditions like acne, eczema, and psoriasis: A randomized controlled trial found Nigella sativa ointment as effective as betamethasone for hand eczema, with no adverse effects. Its antimicrobial and anti-inflammatory properties support its use in acne vulgaris and wound healing.

Other Therapeutic Uses: ***Neuroprotective***: Improves learning and memory; potential in neurodegenerative diseases.[26] ***Gastroprotective***: Prevents gastric ulcers by inhibiting proton pumps and enhancing mucin secretion. ***Reproductive Health***: Enhances male fertility and alleviates dysmenorrhea.[27]

5. Safety and Toxicological Profile

Nigella sativa is generally safe at therapeutic doses. Acute and chronic toxicity studies confirm the safety of its oil and thymoquinone, particularly when administered orally. Clinical trials report minor adverse effects, such as digestive symptoms (e.g., nausea, diarrhoea), with no serious events. However, high doses may cause mild toxicity, and long-term use requires further investigation. Unani texts advise moderation and combination with carriers like honey to minimise side effects.[28]

6. Challenges and Future Directions

Despite its promising therapeutic profile, Nigella sativa faces challenges in clinical application:

Standardisation: Variability in phytochemical composition across studies complicates dosing and efficacy. ***Methodological Quality***: Many meta-analyses report low to critically low quality due to bias, inconsistency, and small sample sizes. **Clinical Trials**: Large-scale, high-quality randomised controlled trials are needed to confirm efficacy and establish standardised protocols. ***Alkaloid Research:*** Compounds like nigellidine and nigellicine remain underexplored. Future research should focus on: Developing standardised extracts with consistent thymoquinone content. Conducting phase 1 and 2 clinical trials for specific indications (e.g., diabetes, cancer). Exploring synergistic effects with conventional drugs to reduce therapeutic doses and overcome resistance.

7. CONCLUSION

Nigella sativa's therapeutic potential, rooted in centuries-old Unani wisdom, is substantiated by modern scientific evidence. Its diverse pharmacological actions—antioxidant, anti-inflammatory, antimicrobial, antidiabetic, anticancer, and cardioprotective—position it as a valuable complementary therapy. Thymoquinone's role as a primary bioactive compound underscores its efficacy, though other constituents contribute synergistically. While classical Unani texts provide a holistic framework for their use, recent studies validate many traditional claims, particularly for chronic diseases. However, limitations in clinical trial quality and standardisation necessitate further research to fully integrate Nigella sativa into evidence-based medicine. By bridging traditional and contemporary perspectives, this review highlights Nigella sativa's promise as a "miracle herb" and a cornerstone of integrative healthcare.

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