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Saudi Journal of Biological Sciences

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ORIGINAL ARTICLE

Panacea seed “Nigella”: A review focusing on regenerative effects for gastric ailments



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Received 26 August 2014; revised 1 October 2014; accepted 2 October 2014
Available online 13 October 2014

KEYWORDS

Gastric ulcer;
Gastropathies;
Gastro-protective;
Nigella sativa;
Medicinal plant

Abstract *Nigella sativa* (NS) or black cumin is a dark, thin, and crescent-shaped, seeded shrub belonging to the Ranunculaceae family commonly growing on Mediterranean coasts in Saudi Arabia, northern Africa and Asia. They have amazing curative and therapeutic features that make them one of the most popular, safe, non-detrimental, and cytoprotective medicinal plant that can be used for prevention and treatment of many complicated diseases. Originally, *N. sativa* was used to treat migraines and allergy, and researches have shown its effectiveness in destroying cancer cells as well. The gastro protective effect of NS oil and its constituents has also been reported earlier; however, the complete perception on etiology and pathogenesis of gastric ulcer is not yet clear. Herein, we attempt to unveil some of the potential mechanisms exhibited by NS in preventing problems related to gastric ulcers. Gastric ailments like ulcers and tumors are the most common disorders of the gastro-intestinal tract in the present day life of the industrialized world. Gastric

Abbreviations: NS, *Nigella sativa*; TQ, thymoquinone; PGs, prostaglandins; NSAIDs, non-steroidal anti-inflammatory drugs; PUFAs, polyunsaturated fatty acids; ROS, reactive oxygen species; GI, gastrointestinal; NF-κB, nuclear transcription factor kappa B; GSH, glutathione; LOX, lipoxygenase; COX, cyclooxygenase; 5-FU, 5-flourouracil.

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Peer review under responsibility of King Saud University.



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<http://dx.doi.org/10.1016/j.sjbs.2014.10.001>

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ulcer being a multifaceted problem exhibits complex etiology and is the fourth most common cause of cancer mortality. Drug interactions and toxicity are the main hindrances in chemotherapy. The existing merits and demerits of modern-day drugs make us turn toward the plant kingdom which may provide a valuable resource of novel potent natural compounds for pharmaceuticals or alternately, as dietary supplements. In this context, the revered phytotherapeutic *N. sativa* comes as a promising savior in today's times. This review aims to summarize, both the functional and disease-related effects in the area of gastroenterology.

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1. Introduction

Nigella sativa (NS), a medicinal and nutritional plant, became the focus of interest among modern day researchers from Chemistry, Biology, Agriculture, Pharmacology and Medical Sciences since 1970s. However, the Ayurvedic, Unani and Herbal Medicine practitioners were extensively using NS since hundreds of years for ailments ranging from a simple headache to disorders like diabetes, hypertension, gastrointestinal problems, menstruation and lactation (Al-Rowais, 2002; Salem, 2005).

NS, a member of Ranunculaceae family growing on the Mediterranean coasts, is a short 8–12 inch high annual herb, with pinnate segmented leaves. The blue and white flowers are solitary, self pollinating and form a fruit capsule consisting of trigonal seeds. Presently, these seeds due to its pepper oregano like taste are generally used as a seasoning in cuisines world over. Additionally they have significant medicinal benefits, making it one of the most cherished medicinal spices (Fallah Huseini et al., 2011). Arabs considered it as 'Habbatul Barakah' or the blessed seed (Al-Rowais, 2002). Metabolites of *N. sativa* seeds possess myriad of potent therapeutic features for the immune, cardiovascular, respiratory, gastric and endocrinal health (Ahmad et al., 2013; Gilani et al., 2001). The black cumin seeds contain more than 100 chemical compounds, a number of them are yet to be characterized. The phyto-components of NS seeds include nigellone, thymoquinone, phytosterols, fatty acids, vitamins, and minerals (Boseila and Messalam, 2011). The composition and yield of its essential oils differ depending upon geographical conditions as well as the varied hydrodistillation methods employed for oil extraction. Primary components of the essential oil are monoterpenes (87.7%) like *p*-cymene, carvacrol, α -thujene, γ -terpinene, α -pinene and β -pinene and its oxygenated derivatives (9.9%), rest being sesquiterpenes and derivatives (Wajs et al., 2008).

Gastric ulcer, one of the most prevalent ailments, is due to an imbalance between the aggressive and defensive mechanisms (Alkofahi and Atta, 1999). The gastric mucosa is constantly exposed to harmful agents such as drugs, pepsin, gastric acid, bile acids, microbial antigens like *Helicobacter pylori* (*H. pylori*), Epstein Barr virus and food ingredients (Peskar and Maricic, 1998). These causative factors have been associated with the pathogenesis of gastric ulcerations by means of pronounced gastric acidity, increased inflammatory markers and cell proliferation along with reduced gastric motility and gastric blood flow (Toma et al., 2005). Gastric irritants like ethanol are also known to induce contraction of the fundic strip circular muscles in rats, causing musculo-compression. Such a stress at the mucosal fold crests progresses toward ulceration and necrotic effects (Abdulla et al., 2010).

Treatment of peptic ulcers either counteracts aggressive factors like pepsin, acid, active oxidants, leukotrienes, platelet aggravating factor, endothelins, bile and exogenous factors including non-steroidal anti-inflammatory drugs (NSAIDs) or stimulates the mucosal defenses like normal blood circulation and production of mucus, prostaglandins (PGs), nitric oxide and bicarbonate (Borrelli and Izzo, 2000). An imbalance of harmful and protective factors leads to gastric ulcers. Stress is a prime factor in the pathogenesis of gastric ulcers, wherein neutrophil infiltration (Abdallah et al., 2009), pepsin (Kotani et al., 2007), secretion of gastric acid (Tanaka et al., 2002) and formation of lipid peroxidation products, nitric oxide and redox imbalance (El-Abhar et al., 2003) are the main parameters implicated. The gastric lesions produced are healed by antioxidants (Yoshikawa et al., 1991, 1989), proton pump inhibitors and drugs lowering gastric secretion (Kitano et al., 2006). Treating peptic ulcer involves relief from pain and acidity, ulcer healing and recurrence prevention. Currently, no economically feasible treatment meeting all these goals exists. Many over the counter drugs, claiming to give relief are introduced overnight and then also hurriedly withdrawn on findings of serious side effects. Under these circumstances a tried and tested remedy over centuries can be far more safely relied upon. Hence, majority of the people around the globe rely on natural remedies. Spices such as NS, oregano, black pepper, fennel, clove, cinnamon, fenugreek, turmeric, and ginger contain potential anti-oxidative phytoconstituents (Adhikari et al., 2007). Herbs like galanga, pepper, cloves, turmeric, and cardamom have been favorably researched for their anti-ulcer effects (Al-Mofleh et al., 2006; Al-Moflehi et al., 2005; Al-Yahya et al., 1990; Al Mofleh et al., 2008; Alhaider et al., 2005a,b; Rafatullah et al., 1995, 1990).

Due to limitation of scientific investigation and resource dependency, socio-economic factors, religious faith, and ancestral experience, locally available spices and herbal medicine were considered as a central part of traditional complementary medicine. However, effective practice and result oriented usage over a long period of time have established the efficacy of many cheap and easily available specific flora for the treatment of various ailments. Spices contain anticancer potential in addition to their anti-ulcerogenic activity which is likely due to the anti oxidative action of their different phytoconstituents (Mothana et al., 2009; Shan et al., 2005). The antioxidant and scavenging ability of reactive oxygen species (ROS) intercedes gastro-protection.

This review aims to elaborate our present pharmacological and toxicological knowledge of the actions of this plant in specific context to gastric ulcers. We hope to produce a clinical appraisal and evaluation of its efficacy in the treatment of gastric ailments, due to the different properties exhibited by

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