

REVIEW ARTICLE

**THERAPEUTIC POTENTIAL OF BLACK CUMIN
SEEDS (KALAJIRI): A MIRACULOUS HERB**

**Sarita Sharma^{1*}, Priya Hargunani², Aruna Pai³,
Bhagyashree Patil⁴, Dr. Ashish Jain³**

1. Dept. of P'ology, Shri DD Vispute College Of Pharmacy & Research Center, Maharashtra, India
2. Dept. of P'ceutical Chemistry, Shri DD Vispute College Of Pharmacy & Research Center, Maharashtra, India
3. Dept. of P'cognosy, Shri DD Vispute College of Pharmacy & Research Center, Maharashtra, India
4. Dept. of P'ceutics, Shri DD Vispute College Of Pharmacy & Research Center, Maharashtra, India.

Correspondence

Sarita Sharma
Shri DD Vispute College Of
Pharmacy & Research Center,
Maharashtra, India.
Sharmasarita.4416@gmail.com

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ABSTRACT

Black cumin seeds commonly known as 'Bitter cumin'(kalajiri) & also named as *Centratherum anthelminticum* , a traditional Ayurvedic herb which has been used since centuries for curing common ailments such as fever, cough, and diarrhea and it is also used as a general tonic. *C. anthelminticum* has wide range of secondary metabolites such as: aliphatic fatty acids, flavones, saponins, steroids and glycosides. The extract of this herb possess a wide range of pharmacological activities such as: analgesic, antibacterial, antifungal, antidiuretic, anti-filarial, anti-helminthic, anti-diabetic, antimicrobial, antimalarial and antipyretic properties. This review is an effort to summarize the different therapeutic effects of black cumin with responsible bioactive constituents in detail.

INTRODUCTION

C. anthelminticum commonly known as kalajiri, somraj, black cumin or bitter cumin, is a robust leafy plant belongs to the family Asteraceae (Compositae). It is an erect, branched, leafy annual herb which can grow up to 50 to 90 cm in height. The seeds are brown-black in color, with a hot sharp taste and astringent properties. Commonly grown in India and south East Asia.

The experimental investigations on the extract or pure components isolated from the plant shows an extensive range of pharmacological effects, including anti-diabetic, antioxidant, anti-diuretic, and anti-obesity, analgesic-antipyretic, applied in inflammatory swelling & good wound healing, anthelmintic activity^[1,2].

Chemical constitutes of black cumin:

More than 120 bioactive components were identified in black cumin. It contains 18% fixed oil and 0.02% volatile oil. Apart from this different classes of chemical constituents are further reported in seeds like flavonoids (Butein, flavone, dihydroflavone), polyphenolic derivatives, sterols (methylvernosterol, vernosterol and avernosterol), steroidal saponins, sesquiterpene lactones, tannins, proteins, carbohydrate^[1,2]. These identified chemical constituents were isolated using

chromatographic techniques and spectroscopic techniques used for structural elucidation.



Figure 1. Black cumin plant

Figure 2. Black cumin seeds

The mechanism of action to produce different biological activities by the black cumin and chemical constitute has been discussed below.

Anti-Diabetic Activity

Now a day's number of diabetic patients is increasing at alarming rate due to changes in life style, stress, obesity and aging in general population worldwide.

Glycosidase and amylase are the important enzymes involved in the digestion of carbohydrates. They serve as the major digestive enzymes which help in intestinal absorption of the carbohydrates.

Many studies reported, the polyphenolic extract of black cumin seeds containing a mixture of phenolic-flavonoid compounds like gallic acid, proto-catechuic acid, caffeic acid, ellagic acid, ferulic acid, quercetin and kaempferol showed significant inhibition of intestinal glucosidase (maltase and sucrose) activity, human salivary amylase and also reduced postprandial hyperglycemia thus indicating a possible mechanism in ant hyperglycemic effect of black cumin seeds. However modulating the carbohydrate hydrolyzing enzymes amylase and glucosidase it is useful for management of type-2 diabetes^[3].

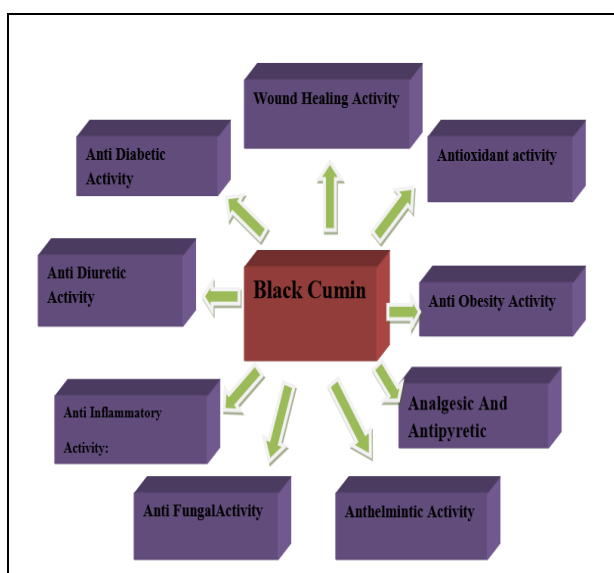


Figure 3. Different Effects of Black Cumin

Antioxidant Potential:

Oxidative stress is the result of an increased ROS (Reactive oxygen species) production and a decrease in their elimination. Based on the fact that ROS are dangerous for cells, tissues and organs it has been inferred that oxidative stress is the cause for number of disorders, including atherosclerosis, neural degenerative disease, inflammation, cancer and ageing^[4-6].

The main physiological role of antioxidants is to prevent damage to cellular constituents arising as a consequence of chemical reactions involving free radicals^[7, 8].

The phenol extract of bitter cumin contain phenolic compounds. Hydroxyl groups of phenolic compounds function as hydrogen donor that reduces ROS by donating hydrogen atom so it may be responsible for its antioxidant & free radical scavenging activity^[9, 10].

Anti-Diuretics Activity

Diuretics are responsible for increase the rate of urine flow, sodium excretion and to maintain the volume and composition of body fluids in a various clinical disorders. Diuresis is very much beneficial in some of life-threatening disorders like CHF, hypertension, renal failure, Liver cirrhosis and often pregnancy toxemia^[11].

The seed extract of black cumin contains tannins, proteins, carbohydrate [12] and Presence of phenolic compounds, organic acids and polar compounds such as flavonoids and steroidal saponins which act by inhibiting Na^{++} reabsorption and secretion of ADH to produce diuretic activity^[13-15].

Anti-Obesity Activity

The world health organization recognized the obesity as one of the top 10 global health problems in developed countries. It is estimate that 5% of total health costs are related to obesity^[16, 17].

Epidemiological studies from India suggest a risk in morbid obesity close to 5%. Obesity is the excess accumulation of fat in the body and an imbalance in energy intake and energy expenditure. Various reasons such as sedentary life style, increased intake of high calorie (energy and fat) food, genetic determinants and psychologic and behavioral determinants also contributes to it^[18]. It is the most common nutritional disorder in the developed world and is considered of the major human diseases.

Extract of the black cumin is containing bioactive constituents such as saponins, Anthocyanins, flavonoids, diterpenes, triterpenes, and other phytochemicals shows appetite suppressant activity,

hypocholesterolinic and excess body weight reducing properties^[19, 20].

Anti-Inflammatory Activity

Inflammation is a localized physical condition in which part of the body becomes reddened, swollen, hot, and often painful, especially as a reaction to injury or infection. Black cumin seeds containing chemical constituent like sterol, flavonoids, resins and alkaloids have been reported to have anti-inflammatory action^[21, 22].

Analgesic and Antipyretic

Black cumin seeds were reported to contain flavonoids which act by Inhibition of prostaglandin synthesis, studies shows that it could be the possible mechanism of antipyretic actions as paracetamol and concludes the analgesic and antipyretic activities^[23, 24].

Anti-Fungal Activity

Black cumin contains naphthalene derivatives and as Methanolic extract of the seeds exhibits antifungal activity against *Aspergillus flavus*, *Candida albicans* and *Penicillium citrinium* in increment of the concentration. Many studies reported the highest activity against *C. albicans* at 200 mg/mL and this activity is equivalent to that of fluconazole at 30 mg/mL^[25].

Wound Healing Activity

Wound healing is a process of skin (or any organ tissue) self-repairing by restoring cellular structure & tissue layers^[26]. A vital component in wound healing is angiogenesis, which is the formation of new blood vessels from the pre-existing vessels. Various medicinal plants have been used in treating wounds & promoting angiogenesis. 5% w/w & 10% w/w aqueous methanolic extract of black cumin shows wound healing properties on excision and incision wounds. However, the chemical components of black cumin which contribute to this wound healing mechanism are yet to be investigated^[27-29].

Anthelmintic Activity

Traditional therapists in India used black cumin as a medication effective in the evacuation of parasitic intestinal worms and exhibited successful results in deworming small children and adults.

The anthelmintic property, as displayed by the name of the plant itself *C. anthelminticum*, shows its great potential in expelling different types of worms. This activity is also evident *in vitro* and *in vivo* through many scientific validations by previous researchers against *Fasciolopsis buski*, *Ascaris lumbricoides*, *Hymenolepis*

nana worms and gastrointestinal nematodes^[30-31].

CONCLUSION

Several scientific investigations have indicated high medicinal potential of black cumin & its wide therapeutic activity against numerous illnesses. These evidential properties indicate the importance of this plant for further studies directed towards plant-based drug development. Leads to the production of safer and economical alternative medicine from black cumin in the future.

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