

ORIGINAL ARTICLE

Phytochemical, chromatographic and spectroscopic investigation of
Carum copticum seeds and their potential as immunomodulatory agentsPankaj K. Sonar¹, Ranjit Singh², and Shailendra K. Saraf³

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Abstract

Context: *Carum copticum* seeds have been prescribed in the traditional system of medicine for the treatment of immune disorders, such as asthma and rheumatism.

Objective: The objective of this study was to determine immunomodulatory effects of the alcoholic extract and isolated compounds in Swiss albino mice.

Materials and methods: Seeds of *C. copticum* were extracted with 95% v/v alcohol. The immunomodulatory activity of the crude extract was evaluated at the doses of 100, 300, and 500 mg/kg body weight of mice, administered in mice once daily (orally) for 25 days. Volatile oil of *C. copticum* was isolated by steam distillation and was characterized by GLC and HPLC. Bioassay-guided fractionation and isolation were carried out and the isolated compounds were characterized and subjected to immunomodulatory activity studies.

Results: The *n*-hexane fraction yielded *p*-cymene, carvacrol, and α -pinene. The LD₅₀ value of the crude extract was found to be 4500 mg/kg and the values reported for *p*-cymene, carvacrol, and α -pinene in the literature were 4750, 810, and 3700 mg/kg, respectively. The oral administration of crude extract, *n*-hexane fraction (HEF), and isolated oils at the dose of 500, 150, and 50 mg/kg body weight, respectively, showed a significant increase in the HA titers, DTH-response, and phagocytosis. The stimulatory effect observed, on humoral and cellular immunity, was compared with the standard (levamisole treated) and control groups.

Discussion and conclusion: The results obtained in the study endorse the traditional use of the seeds of *C. copticum* and the isolated constituents act as immunostimulants.

Keywords

DTH-response, HA-titer, immunomodulation, phagocytosis, thymol, WBC

History

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Introduction

Carum copticum L. (Apiaceae), commonly called Bishop's weed, is widely cultivated for its uses as a spice and in medicine. The plant is indigenous to India, Iran, and Egypt. The fruits are harvested from February to March and are separated when dried. The seeds are grayish-brown in color (Boskabady & Shaikhi, 2000; Chopra, 1982; Devasankaraiah et al., 1974). Its essential oil was in great demand in the past due to its antiseptic properties. The seeds of *C. copticum* consist of proteins, fat, minerals, fibers, and carbohydrates. Calcium, phosphorus, iron, carotene, thiamine, riboflavin, and niacin are among the vitamins and minerals present in the seeds. The volatile oil is rich in cymene, terpene, thymine, and steroptin. The oil is almost colorless to brownish liquid, with a characteristic odor and a sharp hot taste. If the liquid is

allowed to remain undisturbed, a part of thymol may separate in the form of crystals. Thymol is used as a condiment and the oil is used as an antiseptic. *Carum copticum* seeds increase virility and cure premature ejaculation (Dubey, 1980; Khare, 2001; Peter, 2004). *Carum copticum* seeds have high medicinal value and possess various pharmacological activities such as antiasthmatic or bronchodilatory (Boskabady et al., 2003, 2007), antihypertensive, antispasmodic, hepatoprotective (Gilani et al., 2005), antitussive (Boskabady et al., 2005), antibacterial (Kaur & Arora, 2009; Singh et al., 2002; Rani & Khullar, 2004), anticataract (Biswas et al., 2001), antihistaminic (Boskabady & Shaikhi, 2000), analgesic (Dashti-Rahmatabdy et al., 2007), cholinomimetic (Devasankaraiah et al., 1974), anticancer (Yin et al., 2012), antiepileptic (Rajput et al., 2013; Rezvani et al., 2011), antioxidant (Deb et al., 2012; Zahin et al., 2010), antifungal (Alizadeh et al., 2010), antihyperlipidaemic (Javed et al., 2006), and antifilarial (Mathew et al., 2008). Seeds of *C. copticum* have been prescribed for the treatment of asthma and rheumatism in the traditional system of medicine (Nadkarni, 2002; Norman, 1990). Rheumatoid arthritis is a chronic, systemic autoimmune disorder that causes the immune system to attack the joints resulting in inflammation (arthritis) and destruction. It

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