ANTIMICROBIAL AGENTS AND CHEMOTHERAPY, Aug. 1974, p. 225-226

Vol. 6, No. 2
Printed in U.S.A.

NOTE

Antimicrobial Activity of the Volatile Oil of *Nigella sativa* Linneaus Seeds

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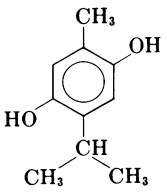
Received for publication 21 March 1974

The antimicrobial activity of the volatile oil of *Nigella sativa* Linneaus seeds was studied. The antimicrobial principle has been isolated, identified as thymohydroquinone, and found to be active against gram-positive bacteria and yeasts.

The seeds of *Nigella sativa* Linneaus are used by the Egyptian public as carminative and flavoring agents in bread. An anti-asthmatic compound, nigellone, was isolated from the volatile oil of the seeds of *N. sativa* (2). In the present work, the antimicrobial spectrum of the volatile oil (obtained by the steam distillation of the fixed oil prepared by expression of *N. sativa* seeds) and its alcoholic dilution (1:25) were determined by the disk method (Table 1). The procedures used for growing the stock culture, dilution, and testing the oil were described previously (3). The antimicrobial activity was found to reside solely in the alcohol-soluble fraction.

The isolation of the antimicrobial agent of the volatile oil was achieved by the refrigeration of the oil at 4 C for 3 days, during which time white crystalline needles separated out. The chemical structure of the compound was deduced from its physical and chemical properties, as well as its ultraviolet, infrared, proton magnetic resonance, and mass spectral data. The active principle was found to be thymohydroquinone (I) (El-Alfy et al., manuscript in preparation).



Thymohydroquinone (I)

The minimal inhibitory and minimal bactericidal concentrations of the isolated compound were determined by the broth dilution method (1; Table 2). The data indicate that the compound is of high antimicrobial activity against gram-positive bacteria and yeasts, but has no sporicidal activity. Thus, the use of the oil as flavoring agent in food and as antiseptic agent in topical pharmaceutical preparations can be recommended.

TABLE 1. *Antimicrobial spectrum of the volatile oil of N. sativa seeds*[a]

Organism	Oil	1:25 Dilution in 95% alcohol
Escherichia coli	+	−
Salmonella typhi	+	−
Pseudomonas aeruginosa	+	−
Bacillus subtilis	+	−
Staphylococcus aureus	++	+
Micrococcus lysodeikticus	++	+
Sarcina lutea	++	+
Candida albicans	+	−

[a] The disk method was used. Symbols: + and ++, relative inhibition zones; −, no inhibition zone.

TABLE 2. *MIC and MBC of the isolated antimicrobial principle*[a]

Microorganism	MIC (μg/ml)	MBC (μg/ml)
Escherichia coli	125	125
Salmonella typhi	125	125
Pseudomonas aeruginosa	125	125
Bacillus subtilis	4	—[b]
Staphylococcus aureus	8	8
Micrococcus lysodeikticus	8	8
Sarcina lutea	16	16
Candida albicans	125	125

[a] MIC, minimal inhibitory concentration; MBC, minimal bactericidal concentration.

[b] —, No activity.

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