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Study of Ajowan oil as antimicrobial agent against cosmetically important microorganisms

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ABSTRACT

Acne and dandruff are common skin problems often treated by using various cosmetic products containing antimicrobial agents. The demand for more and more cosmetics from plant sources is continuously increasing, hence the present study was undertaken to investigate antimicrobial activity of Ajowan oil against cosmetically important microorganisms by agar diffusion method and measurement of zone of inhibition. Ajowan i.e dried ripe fruits of plant *Trychyspermum ammi* Sprague belonging to family Umbellifereae (also called *Carum copticum*, family Apiaceae) were collected from local market of Nagpur, Maharashtra, India and subjected to steam distillation, by using Clevenger apparatus to obtain Ajowan oil. The antimicrobial activity of Ajowan oil (100% concentration), different concentrations of Ajowan oil (1%, 0.75%, 0.5%, and 0.25% v/v) was determined by the agar well diffusion technique against microorganisms associated with acne and dandruff i.e. *Propionibacterium acnes (MTCC 1951), Staphylococcus aureus* (MTCC737), *Staphylococcus epidermidis* (MTCC 6810), *Candida albicans* (MTCC 227), *Malassezia furfur (MTCC 1374), Malassezia furfur (MTCC 1765),* and microorganisms mentioned in Bureau of Indian Standard guidelines for microbial testing and preservatives efficacy test of cosmetic formulations i.e. *Pseudomonas aeruginosa* (MTCC 1688), *Escherichia coli* (MTCC 1687), and *Aspergillus niger* (MTCC 10180). From present study of Ajowan oil against cosmetically important microorganisms, it was found that Ajowan oil (100% concentration) exhibited inhibitory activity against *P. aeruginosa, S. aureus, S. epidermidis, E. coli, C. albicans, P. acnes, M. furfur 1374* and *M. furfur 1765* except against *A. niger*. All the other concentrations of Ajowan oil i.e. 1%, 0.75%, 0.5%, 0.25%, exhibited inhibitory activity against *P. aeruginosa, S. aureus, S. epidermidis, E. coli, C. albicans, and P. acne* except against *A. niger, M. furfur 1374* and *M. furfur 1765*. Hence Ajowan oil can be used as Antiacne agent in cosmetic formulations.

Selection and peer-review under responsibility of the scientific committee of the International Conference on Advanced Functional Materials (Innovations in Chemical, Physical and Biological Sciences).

1. Introduction

Spices are traditionally and most commonly used natural antimicrobial agents in foods and have been used for thousands of years for preserving foods and as a food additive to enhance taste, aroma and flavor. The antimicrobial properties of some spices and their active constituents have been documented. Studies done previously confirm that Ajowan and other spices inhibit the growth of both Gram-positive and Gram-negative pathogens or spoilage bacteria, yeasts and molds [1].

Ajowan is native of Egypt [2] and is cultivated in India, Iraq, Iran, Afganistan and Pakistan. In India, it is commonly cultivated in Madhya Pradesh, Uttar Pradesh, Gujarat, Rajasthan, Maharashtra, Bihar and West Bengal [3]. Ajowan is an erect branched annual herb, upto 60–90 cm tall with stems striate. It is widely grown in arid and semi-arid regions where soils contain the high levels of salts. Flowers are pure white in colour, fruits are ovoid (Fig. 1), ultimately shining, yellow aromatic, with faint ridges, and compressed. Ajowan fruits contain 2–4% of volatile (essential) oil, about 21% fat, 17% proteins and 25% carbohydrates. It is also reported that Ajowan fruits contain tannins, glycoside, saponins, flavone and mineral matter [4].

Ajowan oil mainly contains thymol (35–60%), p-cymene (50–55%), terpinene, α-pinene, β-pinene, β-myrcene, α-terpinene,

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