

Antimicrobial Effects of *Trachyspermum ammi* on Oral Microbes

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ABSTRACT

Aim: To evaluate the antibacterial activity of Ajwain oil against *Enterococcus faecalis* and *streptococcus mutans*

Material and Methods: Antibacterial activities of Ajwain oil have been evaluated against one *Enterococcus faecalis* (*E.faecalis*) and *Streptococcus mutans* (*S.mutans*) by agar well diffusion method

Result and conclusion: In this study that ajwain oil showed dose dependent antimicrobial activity against *Enterococcus faecalis* and *streptococcus mutans*. The ajwain oil showed a maximum zone of inhibition 40 mm against *E.faecalis* and 48 mm against *S.mutans* at 100 µl/ml. Compared to control, chlorhexidine 0.2%, 35 mm and 40 mm respectively showing its efficacy as an antibacterial agent. Thymol, the major phenolic compound present in ajwain may be responsible for its antibacterial activity. So it may be used for clinical management of oral microbes.

Keywords: - Antibacterial, Ajwain, zone of inhibition

INTRODUCTION

Oral health is the window to an individual's overall health. Good oral health contributes positively to one's physical, mental and social well being. Dental caries remains the most important dental health problem in developing countries [1]. Isolation of active compounds from plants seeds has recently gained popularity and scientific interest. Many plants and its derivatives have been used for different purposes, such as foods and drugs [2] Plant materials were used as dietary regimens and preservatives is mainly due to their antioxidant, antimicrobial and other biological potentials [3]. Ajwain (*Trachyspermum ammi*) is a plant growing in India, Pakistan, South East and Near East of Iran, where the seeds are used as a spice. These seeds are used in Asian cooking, especially in India and for baking biscuits, breads and in bean dishes (4). Ajwain seeds are rich in fiber, minerals, vitamins and anti-oxidants. Thymol, the major phenolic compound present in Ajwain, has been reported to be a germicide, antispasmodic and anti-fungal agent (5). Ajwain seeds contain phenols (30-50% thymol, 1-7% carvacrol) and monoterpenes (20-35% -terpinene and 20-25% paracycmane, -pinene and limonene). Thymol, the major phenolic compound present in ajwain, has been reported to be a germicide, antispasmodic, and antifungal agent (6). In addition, ajwain also contains small amounts of other phyto-chemicals such as pinene, cymene, limonene and terpinene. The presence of terpenes, glycosides and sterols in plant has been found to possess anti-inflammatory properties [7]. The phenolic constituents of ajwain are mainly responsible for the antiseptic and antitussive properties (8). In India, ajwain seeds are used to ease asthma (9). The indigenous Indian system of medicine uses Ajwain as an antimicrobial [10], antihypertensive, anti-spasmodic, broncho-dilating, antilithiasis [11], carminative and antipyretic against other uses. Real-time RT-PCR analyses showed that 2-Isopropyl-5-methyl-phenol isolated from these seeds were found to significantly suppress of the genes involved in biofilm formation and thus affect the carcinogenicity of *S.mutans* [12]. The present study was undertaken to evaluate the anti microbial property of *Trachyspermum ammi* on oral microbes.

MATERIAL AND METHOD

Trachyspermum ammi oil was obtained from Allin Exporters, Uttar Pradesh, India as a complement, and used for present investigation.

Test organisms

The bacterial strains used were, *Enterococcus faecalis* and *Streptococcus mutans*. The organisms were obtained from Department of microbiology, Saveetha Dental College and Hospitals, Chennai, India

Methodology

The Antimicrobial activity of ajwain was evaluated against the two pathogens mentioned above by agar well diffusion technique. Broth culture of the test organisms compared to Mac Farland's standard 0.5 was prepared. Lawn culture of the test organisms were made on the Muller Hinton Agar [MHA-Hi media M-1084] plates using sterile cotton swab and the plates were dried for 15 minutes. Wells measuring 4mm in depth was made on the agar using sterile cork borer. 100microlitres of the essential oil was added to the wells. 0.2% chlorhexidine was used as a positive control. The plates were incubated at 37 degree Celsius overnight and the zone of inhibition of growth was measured in mm diameter. The entire test was done in triplicate to minimize the test error.

RESULTS AND DISCUSSION

In the experiment carried out, the antibacterial activity of ajwain oil is screened against the oral microbes using agar well diffusion assay and the zone of inhibition is measured in mm diameter. The area of inhibition where the growth of microorganisms was inhibited by ajwain was observed to be significant with the test organism used when compared with the control chlorhexidine 0.2%. Three concentrations (40µl/ml, 80µl/ml, 100µl/ml) were used along with control group(table:1) for testing the antibacterial activity. Ajwain oil showed dose dependent antibacterial activity against *Enterococcus faecalis* and *Streptococcus mutans*. The maximum zone of inhibition observed was 40 mm against *Enterococcus faecalis* and 48mm against *Streptococcus mutans* at 100 µl. In fact the oil was found to be more active against *Streptococcus mutans*. This effect is seen most effective because 2-Isopropyl-5-methyl-phenol isolated from these seeds were found to significantly suppress of the genes involved in biofilm formation and thus affect the carcinogenicity of *S.mutans*.

Concentration µl/ml	Zone of inhibition in (mm) <i>Enterococcus faecalis</i>	Zone of inhibition in(mm) <i>Streptococcus mutans</i>
40	28	30
80	32	39
100	40	48
Control (Chlorhexidine 0.2%)	35	39

Table 1: Zone of inhibition produced by Ajwain oil against *E.faecalis* and *S.mutans*

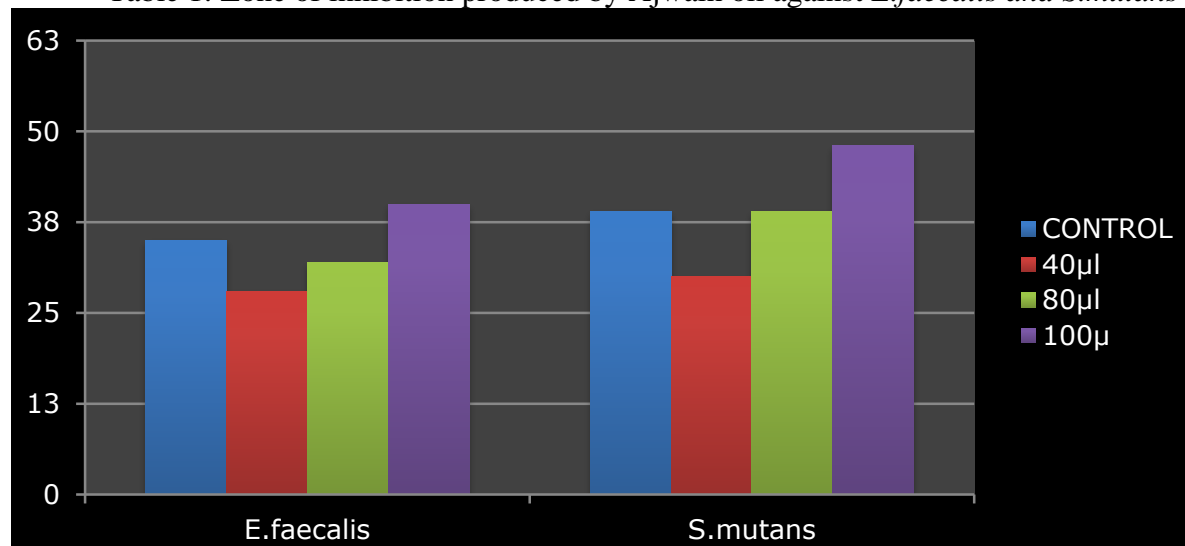


Figure1: Zone of inhibition produced by Ajwain oil against *E.faecalis* and *S.mutans*

Ajwain also exhibited antibacterial activity against *K. pneumoniae*, *E. aerogenes* and *S. aureus*. The thymol in ajwain seeds extracts maybe responsible for its antibacterial effect. Ajwain seeds yield 2 to 4% brownish essential oil, with thymol as the major constituent at about 35 to 60% [13]. The thymol exhibited potent antimicrobial activity with minimum inhibitory concentrations ranging from 0.625 to 10.0 mg/mL [14]. The research suggests that thymol may be successfully used as an alternative preservative to increase the lag time as well as to decrease the maximum cell load reached in the stationary phase of growth cycle of bacteria [15]. The structure of thymol may potentially be used as a basic structure for development of drugs aimed against the bacterial virulence factors [16]. Our results suggest the possibility of using ajwain oil, which possesses strong antimicrobial activity, in the treatment of oral diseases caused by the microorganisms tested.

CONCLUSION

This study concludes that ajwain oil has very effective anti- microbial property and can be used to fight against various oral diseases, infection and other problems which are being caused by pathogens like, *Enterococcus faecalis* and *Streptococcus mutans*.

CONFLICT OF INTEREST : Nil

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