

Antifungal Activity of Ajawain Seeds (*Trachyspermum ammi*)

Nida Tabassum Khan* and Namra Jameel

Department of Biotechnology, Faculty of Life Sciences and Informatics, Balochistan University of Information Technology Engineering and Management Sciences, Quetta, Pakistan

Abstract

Trachyspermum ammi's seeds/leaves alcoholic and aqueous extracts were investigated for antifungal potency using disc diffusion method. Obtained result revealed that the alcoholic extracts of *Trachyspermum ammi*'s seeds/leaves possess good antifungal property and could be used to cure fungal infections. Such antifungal activity, may yield candidate compounds for developing new antifungal drugs.

Keywords: Antifungal; Ethanolic extract; Disc diffusion method; Thymol; Antimicrobial activity

Introduction

Trachyspermum ammi belongs to family Apiaceae commonly known as ajwain [1,2]. It is widely used in Indian food and is popular for its remedial use [3]. It is a grass like plant producing brownish color seeds which is commonly used in traditional medicine [4,5]. It is also investigated that *Trachyspermum ammi*'s seeds/leaves extracts possess antimicrobial, anthelmintic and antidiarrheal properties for which it is used to treat gastric related ailments [6,7]. Thus, *Trachyspermum ammi* is a source of therapeutically active constituents.

Nevertheless, very scarce data is obtainable on the antimicrobial activity of *Trachyspermum ammi* seed/leave extract. Therefore the aim of this study design was to investigate the antifungal potency of *Trachyspermum ammi*'s seed /leave extract against different pathogenic fungi.

Materials and Methods

Trachyspermum ammi leaves/seeds were purchased from a local shop in Satellite town Quetta. Leaves/seeds of *Trachyspermum ammi* were washed with tap water then sterilized, air dried and grinded to fine powder with a mortar and pestle. Preparation of aqueous and alcoholic (ethanolic and methanolic) extract of *Trachyspermum ammi*'s leaves/seeds was prepared by dissolving 10 gram of *Trachyspermum ammi* leave /seed powder in 50 ml of distilled water, 50 ml of ethanol and methanol respectively. Fungal cultures were maintained on YM agar at 37°C and antifungal activity of the extracts were determined by using disc diffusion method [8]. Fungal species including *C. albicans*, *C. glabrata*, *C. parapsilosis*, *C. tropicalis*, *C. krusei*, *A. fumigatus* and *A. niger* were used as test organisms. Known volume (10, 15, 20, 25, 30 etc.) of each extracts were impregnated on sterile Whatman No. 1 filter paper discs of size 6 mm in size. Fungal inoculum was spread on to the surface of each agar plate and impregnated discs were positioned in the centre of inoculated agar plate which was incubated for 24 h at 37°C. Presence/absence of inhibition zone surrounding the disc was used as a measure of antifungal activity.

Results

Antifungal activity of aqueous, methanolic and ethanolic extract of *Trachyspermum ammi*'s seed is indicated in Table 1 and antifungal activity of *Trachyspermum ammi*'s leaves is given in Table 2.

(+) indicates the inhibition of growth

(-) indicates no inhibition of growth

Bacterial species	Aqueous extract	Methanol extract	Ethanol extract
<i>C. albicans</i>	-	+	+
<i>C. glabrata</i>	+	-	+
<i>C. parapsilosis</i>	-	-	+
<i>C. tropicalis</i>	+	+	-
<i>C. krusei</i>	+	-	+
<i>A. fumigatus</i>	-	+	+
<i>A. niger</i>	+	+	+

Table 1: Antifungal activity of *Trachyspermum ammi*'s seeds.

Bacterial species	Aqueous extract	Methanol extract	Ethanol extract
<i>C. albicans</i>	+	+	+
<i>C. glabrata</i>	-	+	+
<i>C. parapsilosis</i>	-	+	-
<i>C. tropicalis</i>	+	+	+
<i>C. krusei</i>	+	+	+
<i>A. fumigatus</i>	-	-	-
<i>A. niger</i>	+	-	+

Table 2: Antifungal activity of *Trachyspermum ammi*'s leaves.

Discussion

Our study revealed that *Trachyspermum ammi* possess antifungal potency which is due to the thymol content present in *Trachyspermum ammi*'s extract [9]. As confirmed in previous studies that a large proportion of antimicrobial activity is contributed due to the presence of thymol [10,11]. Obtained results indicated that the aqueous extracts of both *Trachyspermum ammi*'s seeds and leaves were found to be less effective than its alcoholic extracts against the test pathogenic fungi. This is due to the fact that phenolic compounds such as thymol is more soluble in polar solvents such as ethanol and methanol than in water [12,13]. Therefore such extracts of *T. ammi* were found to be

*Corresponding author: Nida Tabassum Khan, Department of Biotechnology, Faculty of Life Sciences and Informatics, Balochistan University of Information Technology and Management Sciences, Pakistan, E-mail: nidatabassumkhan@yahoo.com

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more effective as indicated in Tables 1 and 2. However due to lack of solubility of the active constituents of *Trachyspermum ammi* in water such extracts were not that effective against fungi [14]. Such as alcoholic extracts of tea tree, rosemary, basil, clove, cinnamon and bay displayed varying degrees of antifungal activity against variety of fungal species [15-20]. On the other hand it was reported *C. citratus* ethanolic extract was found to be effective against fungal pathogens causing diseases in plants and human beings [21]. Another study revealed that the alcoholic extracts of *Azadirachta indica*, *Zingiber officinale* and *Mentha piperita* (pepper mint) have strong antifungal activity against *Candida* species [22-24]. Thus evaluation of plant alcoholic extracts is of pharmacological importance to investigate potential antifungal compounds [25]. Since plants are an important source of valuable fungicides that can be utilized in the synthesis of antifungal drugs [26].

Conclusion

Thus present study have shown that extracts of *Trachyspermum ammi* possess antifungal activity due to the presences of its organic phenolic compounds. Such bioactive molecules could be utilized for the synthesis of antifungal agents.

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