Original Article

Insignificant antidermatophytic activity of *Brassica campestris* oil

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Abstract

Introduction: The aim of the present study was to investigate the antidermatophytic activity of *Brassica campestris* oil against selected dermatophytes through a disc diffusion technique. **Materials and Methods**: Four concentrations of mustard oil, 100%, 75%, 50%, and 25%, were screened against *Trichophyton rubrum*, *Trichophyton simii, Chrysosporium indicum,* and *Chrysosporium tropicum* through the disc diffusion technique. **Results**: The result showed that 25% and 50% concentrations of oil did not show any zone of inhibition. 75% and 100% concentration showed very poor activity against *T. rubrum, T. simii,* and *C. indicum* but in the case of *C.tropicum,* no zone of inhibition was observed**. Conclusion:** The mustard oil does not exhibited significant antidermatophytic activity in the disc diffusion method.

Key words: Dermatophytes, dermatophytosis, fungi, griseofulvin, trichophyton

INTRODUCTION

Dermatophytoses pose a serious concern to the sociologically backward and economically poor population of India.[1-3] Dermatophytoses represents systemic or deep fungal infections that may have prominent cutaneous and systemic manifestations. The disease is predominant in tropical and sub-tropical countries due to their prevailing moisture and temperature regimes and pose a therapeutic problem. Despite the availability of new systemic antifungal therapies, dermatophytic infections are difficult to eradicate completely, with recurrence reported in up to 25-40% of cases.[4] Many antifungal synthetic drugs namely imidazoles, butanafine, and terbinafine are effective in the treatment of dermatophytoses[5] but disease recurrence, resistant dermatophytic strains, and adverse effects are some drawbacks associated with popular antifungals.[6] In the present scenario, plants and their products have gained more importance as a possible source of alternative and effective drugs. Because of the long history of plants in the treatment of different human ailments, most of the herbal drugs are believed to be safer than the synthetic drugs with no side effects. Plants remain as an untapped reservoir of potentially useful chemical compounds not only as drugs but also as unique templates that could serve as a starting point for synthetic analogs.[7-10]

Brassica campestris belonging to the family Brassicaceae is commonly known as mustard. Mustard oil has about 60% monounsaturated fatty acids (42% erucic acid and 12% oleic acid); it has about 21% polyunsaturated fats (6% the omega-3 alpha-linolenic acid and 15% the omega-6 linoleic acid) and it has about 12% saturated fats.

In our previous studies, flower, leaves, and stem parts of *B. campestris* plant were extracted for their water, methanol, free and bound extracts against dermatophytes and found excellent results.[11] These finding prompted us to explore other plant products that could be exploited as antifungal. Antimicrobial activity of mustard oil has been studied by various workers.[12,13] Therefore, in the present investigation, we used *B. campestris* oil against selected dermatophytes.

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MATERIALS AND METHODS

Mustard oil was procured from the authorized Engine marked company store from Jaipur. The oil was store in amber color bottle in a refrigerator.

Micro organism for *in vitro* studies

B. campestris oil was evaluated for their antifungal properties against selected pathogens. *T. rubrum* and *T. simii* were isolated from infected skin scrapings of Tinea patients from SMS Hospital, Jaipur, while *C. tropicum* and *C. indicum* were isolated from soil samples through To.Ka.Va. hair-baiting technique of Vanbreuseghem.[14] These fungi were maintained on Sabouroud's dextrose agar medium.

Screening of Oil

The filter paper disc diffusion assay by Wannisorn *et al*.[15] was used with slightly modification for screening the essential oils against dermatophytes. Standard size whatman no. 1 filter paper discs 6.0 mm in diameter, sterilized by dry heat at 140°C in an oven for 1 hour were used to determine antifungal activity. 20 ml sterilized Sabouraud's dextrose agar medium was taken in each autoclaved Petri dish and allowed to solidify. Fungal spore suspension was prepared in sterilized 0.85% saline water by transferring a loopful of 15 day-old culture. 1 ml of spore suspension of approximately 0.5 to 5 × 10^4 (cfu/ml) was spread over the respective agar medium plates. Sterilized filter paper were soaked in neat undiluted oil. An oil saturated disc was placed on an agar plate containing fungal spore suspension. Ketoconazole was used as a standard drug. These plates were incubated. Five replicates were kept in each case and the average values were determined and inhibition zones were observed. The antifungal activity was determined by measuring the inhibition zone around the disc. The activity of oil was measured by the following formula.

$$\text{Activity Index (AI)} = \frac{\text{Inhibition Zone (IZ) of samples}}{\text{Inhibition Zone (IZ) of standard}}$$

RESULTS AND DISCUSSION

During the present investigation, the disc diffusion method was not found to be good for the screening of mustard oil against test dermatophytes. All the four concentrations of mustard oil could not exhibit good antifungal properties against these test fungi. According to data incorporated in Table 1, *Chrysosporium tropicum* was found to be a resistant strain with all the four concentrations of mustard oil. Seventy-five percent and 100% concentration of oil showed little activity against *Trichophyton rubrum*, *T. simii,* and *C. indicum*. The maximum zone of 10 mm was observed when 100% concentrated oil was used against *T. rubrum* and *T. simii*. However, the maximum AI = 0.529 was seen against *C. indicum*. Fifty percent and 25% oil did not exhibit any response against these fungi. When the activity of oil was compared with standard drug, Griseofulvin, Itraconazole, and Ketoconazole, it was found that mustard oil is a very poor agent against selected fungi in the present study. In our previous work,[11] free and bound flavonoid fractions of leaf, flower, and pod of *B. campestris* showed the excellent antidermatophytic activity as compared to standards. Previous reports[12,13,16] showed *B. campestris* oil as effective antifungal but present studies showed negative result. In the present investigation, we used the disc diffusion method. Mustard oil is very viscous oil which could not be diffused as compared to other essential oil. However, in other method like the food poisoning method, we add oil in liquid medium containing fungal inoculum where oil show effective result. The present investigation concluded that disc diffusion technique is not an effective technique for viscous oil like mustard oil.

Table 1: Comparison of efficacy of Brassica campestris oil with commercial antifungal drugs

Concentrations of Oil (%)	Test Fungi													
	Trichophyton rubrum				Trichophyton simii				Chrysosporium indicum		Chrysosporium tropicum			
	IZ	AI			IZ	AI			IZ	AI	IZ	AI		
		TC/G	TC/I	TC/K		TC/G	TC/I	TC/K		TC/K		TC/G	TC/I	TC/K
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
75	8	0.286	0.381	0.157	9	0.375	0.45	0.243	7	0.412	-	-	-	-
100	10	0.357	0.476	0.196	10	0.417	0.5	0.270	9	0.529	-	-	-	-

IZ: Inhibition zone including 6 mm diameter of filter paper disc; AI: Activity index; TC: Test compound. Inhibition zones of standard Griseofulvin (G) against T. rubrum=28 mm; T. simii=24 mm; C. tropicum=35 mm. Inhibition zones of standard Itraconazole (I) against T. rubrum=21 mm; T. simii=20 mm; C. tropicum=17 mm. Inhibition zones of standard Ketoconazole (K) against T. rubrum=51 mm; T. simii=37 mm; C. tropicum=39 mm; C. indicum=17 mm.

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