

***Microsporium gallinae* growth response to some plant extracts**

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Abstract: The biological activity of eight plant extracts on growth of *Microsporium gallinae* (the causal organism of skin disease in human) was studied. The obtained results showed that all plant extracts examined reduced growth of the fungus compared to the control. It was found that garlic and black paper extracts caused a high significant reduction ($P= 0.01$) to the fungus (100% and 93.6%). Followed by black seed (67.2%); ginger (56.1%); worm wood (50.2%); and alfalfa root (45.5%); in descending order. Whereas, anise; and doum palm ranked as the lowest plant extracts in reducing the fungal growth. Their reductions were (10.2% and 17.7%) respectively.

Introduction

Skin and skin structures (hair, nail, and subcutaneous tissues) in human and animal are subjects to infection by several factors including organisms (mainly fungi), hormonal, and /or chronic inflammatory skin disorder. (Zouboulis *et al.*, 1998; Betty Johnson and Julia Nunley, 2000).

It is well established that genetic, environmental factors and nutritional factors as well as other comorbid diseases may predispose to further development of skin diseases (Basset-Segvin *et al.*, 1998). The disease is widely distributed all over the world with various degrees and is more common in men than in women. There are three genera of mould that contain the dermatophytosis – causing species. These are *Epidermophyton*, *Trichophyton*, and *Microsporium*.

Scytalidium dimidiatum, *Geotrichum candidum*, *Candida albicans*, *Pityriasis versicolor*, *Hortaea werneckii*, *Piedraia hortae*, *Trichosporon beigelii*, *Fonsecaea pedrosoi*, *Lacazia loboi*, *Chrysosporium indicum*, or *C. Keratinophilum*, *Malassezia furfur* and *Pityrosporum ovale* (a lipophilic yeast of the *Malassezia*) were reported to be the most frequently pathogenic fungi causing skin strictures diseases (أطلس العالم).

Different treatments have been recommended to overcome skin and skin structures diseases. In general, hygiene issues play a key role in controlling the diseases. UV –A and UV- B light inhibit the growth of *Pityrosporum ovale* (Wikler *et al.*, 1990). Pharmacological treatment option include antifungal preparation (Selenium sulfide, pyrithione zinc, a zole agent, sodium sulfacetamid, salicylic acid and topical terbinafine), other treatments with variety of oil (Peanut, olive or mineral) followed by use of detergent agent or medicated shampoo (Peter and Richarz-Barthaver, 1995; Faergeman *et al.*, 1996; Hay and Graham- Brown, 1997; and Zouboulis *et al.*, 1980).

More recently, use of some natural plant products has been emerged to inhibit the causative organisms. These plants involve (garlic, lemon grass, datura, acacia, a triplex, caster bean, ginger, black seed, neem, basil, eucalyptus, alfalfa (lucerne) saponin *etc.* (Omar and Abdelhalem, 1992 and Ali *et al.*, 2000).

These natural plant materials are safe to human and the ecosystem than the chemical synthetic compounds, and ease to be use by the public as well as its economic value. The objective of this study was to determine effects of eight plant extracts on growth of microsporium (one of the fungi causing skin and skin structures diseases in human and animals).

Material and Methods

Powder of eight plant samples: Ginger (*Zingiber officinarum*); Anise (*Pimpinella anisum*); Black pepper (*Pipper nigrum*); Wormwood (*Artemisia herba- Alba*); Doum palm

(*Hyphaene thebaica*); Black seed (*Nigella sativa*); Alfalfa root (*Medicago sativa*) and Garlic (*Allium sativum*) were used in this study.

Dry powder (0.5g) of each plant material was added to 250ml autoclaved Sabouraud medium before solidification and mixed thoroughly. Sabouraud medium was previously autoclaved with steam under pressure at 121 °C for 20min. The powder of plant materials incorporated medium was poured into 90mm sterilized plastic Petri dishes. Sabouraud medium used only as a control.

Agar disc (5mm) from 25 days old actively growing culture of *Microsporium gallinae*. Fungus was placed in the center of each plate. The fungal isolate was kindly provided by King Fahad Hospital at Al-Baha K.S.A. The plates were then incubated at 25 °C. Four plates were used for each plant sample as replicates. Radial colony growth was measured daily and recorded at the end of experiment.

Results

Effect of some plant extract on the radial growth of *Microsporium* are listed in Table (1) and illustrated in Fig (1).

The obtained result show that all plant extracts tested reduced the fungal growth compared with the control (sabouroud- plant extract free). Variations among the examined plant extracts in their biological effect on the fungal growth were noted.

Both garlic (*Allium sativum*), and black pepper (*Piper nigrum*) ranked as the most effective plant materials in diminishing the growth of the fungus. The percentage reduction of the fungus was 100.0 % and 93.61 %. Followed by black seed *Nigella sativa* (67.22%) ; ginger *Zingiber officinarum* (56.11 %); worm wood *Artemisia herba –alba* (50.27%) and alfalfa root *Medicago sativa* (45.55%); respectively.

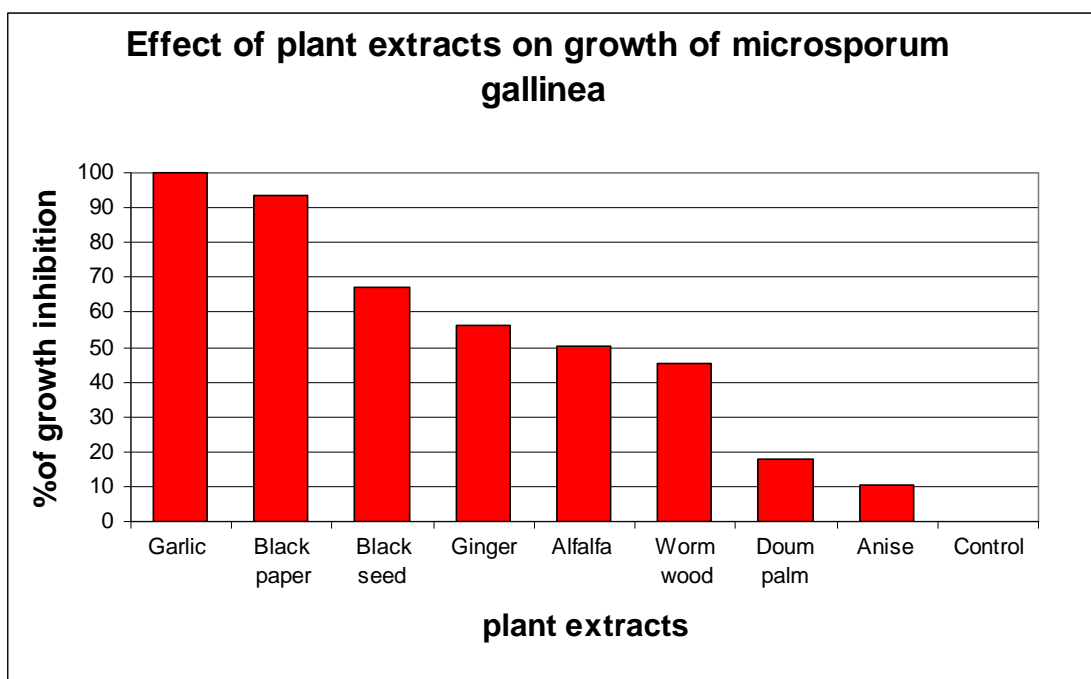
On the other hand, anise *Pimpinella anisum* ranked as the lowest effective plant extract in reducing *Microsporium* fungus growth. The reduction of the fungus was (10.27%), followed by doum palm *Hyphaene thebaica*, it reduced the fungal growth by (17.77%).

Table (1) Effect of some plant extracts on growth of *Microsporium gallinae*

Plant extract	Fungal growth (mm)	Reduction than the control (%)
Garlic (<i>Allium sativa</i>)	0.0	100.00
Black paper (<i>Piper nigrum</i>)	0.5	93.6
Black seed (<i>Nigella sativa</i>)	2.9	67.2
Ginger (<i>Zingiber officinarum</i>)	3.9	56.1
Alfalfa (<i>Medicago sativa</i>)	4.4	50.2
Worm wood (<i>Artemisia herba –alba</i>)	4.9	45.5
Doum palm (<i>Hyphaene thebaica</i>)	7.4	17.7
Anise (<i>Pimpinella anisum</i>)	8.0	10.2
Control	9.0	

L.S.D. 5% 0.26

L.S.D. 1% 0.35



Discussion

The pure culture study in the laboratory revealed that plant extracts reduced growth of *Microsporium* fungus. The reduction was great obvious in case of garlic, pepper, black seed, worm wood and alfalfa root. Percentage reduction ranged between 45.5 % to 100 %.

While, it was less pronounced in case of anise and doum palm, it ranged between 10.2% to 17.7%. The differences in the effect of the eight plant extracts on growth reduction of *Microsporium* fungus possible due to the differences in the type and /or amount of such antifungal material exist in the tested plant extracts.

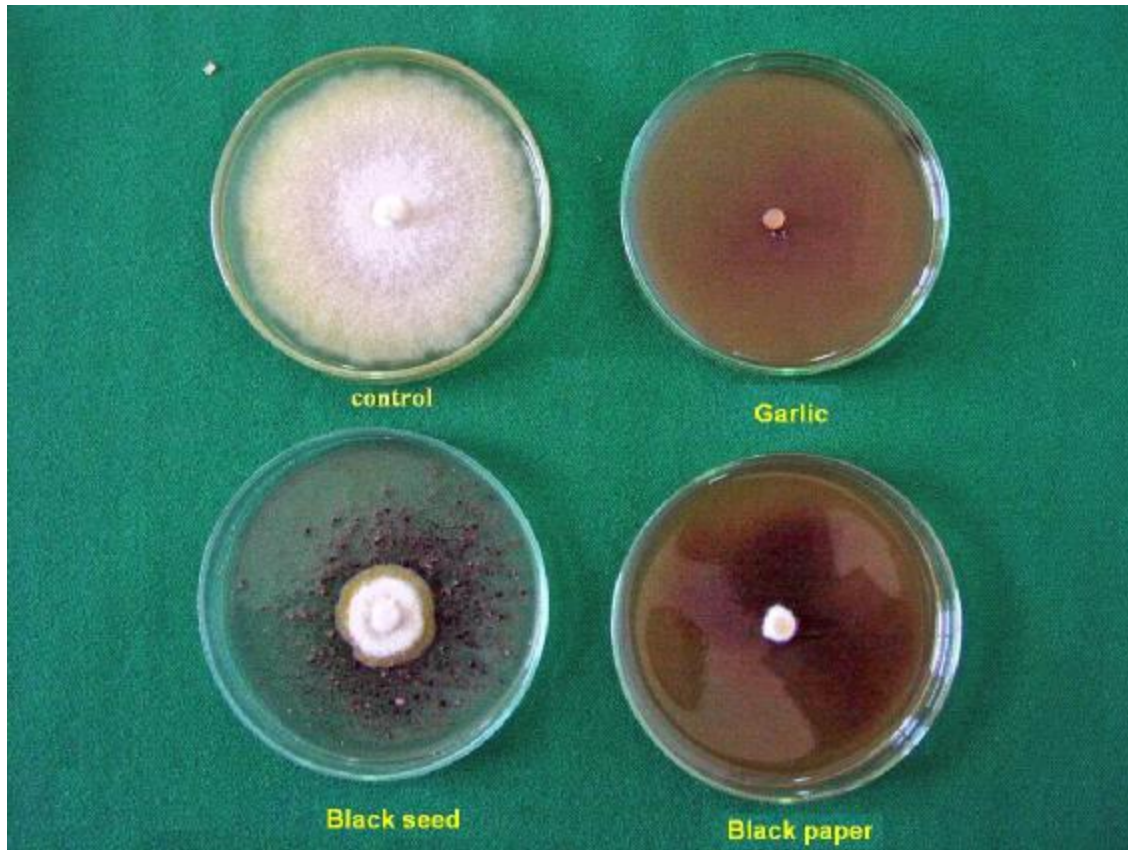
The results of the present study are supported by finding of earlier research workers (Leath *et al.*, 1972, Omar and Abd-halim, 1992 and Abdel-Momen *et al.*, 2000) who demonstrated that some specific plant extracts possesses antifungal activity against some fungi. It is well worth mention that each particular plant extract contains one or more than one compound(s) responsible for diminishing fungal growth. These compounds are glycoside, steroid, saponin, medicagenic acid 3-O-B-D-glucopyranoside (3-Gle MA), ajone *etc.*, (Gestetner *et al.*, 1971; Spiewak *et al.*, 1999; Betty Johnson and Julia Unnley, 2000).

For example, saponins are steroidal or triterpenoid glycosides found in many different plant species (Hostettmann and marston, 1995). Many saponin have potent antifungal properties, and hence, it has been suggested that these compounds may play a role in protecting plants and humans against attack by fungal pathogens (Aly *et al.*, 2000) in cotton plant against *Fusarium oxysporum*; *Rhizoctonia solani*; *Macrophomina phaseolina*, and *Sclerotium rolfsii* and (Spiewak *et al.*, 1999) in humans against *Trichophyton mentagrophytes* the fungus causing skin diseases.

Although, the present study did not investigate isolation, separation, and identification of such antifungal compound(s) in the plant extracts used. However, garlic, alfalfa, and black seed plants- which showed considerable reduction in *Microsporium* fungal growth, these plants contain saponin. Therefore, one can speculate about the partial role of the biological effect of saponin on the fungal growth reduction.

It can be concluded that, further studies are needed to determine the antifungal compound(s) in such plant extract (Isolation, separation and identification) as well as its

formulation to be applicable – as alternative methods – to be used in treatment skin and skin structures diseases in human and animal.







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تأثير مستخلصات بعض النباتات علي نمو فطر ميكربوريم جالينا

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تم دراسة التأثير البيولوجي لثمانية مستخلصات نباتية علي نمو فطر ميكربوريم جالينا (احد مسببات أمراض الجلد في الإنسان والحيوان) معمليا. أظهرت النتائج أن كل المستخلصات النباتية قللت نمو الفطر بدرجات مختلفة مقارنة بالكنترول. وجد نقص معنوي عالي في نمو الفطر عند زراعته علي مستخلص الثوم أو الفلفل الأسود بنسبة (100,0 % و 93,3%) علي الترتيب ، يليه مستخلصات الحبة السوداء (67,2 %) والزنجبيل (56,1 %) والشيح (50,2 %) وجذور البرسيم الحجازي (45,5 %) علي الترتيب التنازلي. من ناحية أخرى وجد أن مستخلص الينسون والدوم كانوا اقل تأثيرا علي نمو الفطر وكانت النسبة المئوية للتنشيط في النمو هي (10,2 %) و (17,7 %) علي الترتيب.