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**IN VITRO STUDY OF THE EFFECT OF SOME
MEDICINAL PLANTS ON THE GROWTH
OF SOME DERMATOPHYTES**
(With 2 Tables)

By

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دراسة تأثير بعض النباتات الطيبة على نمو بعض الفطريات
الجلدية معملياً

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أجريت هذه الدراسة بغرض تقييم تأثير بعض النباتات الطيبة في صورتها الطبيعية وهي الثوم وحب البركة والحنه وخليط منهم على بعض الفطريات المسببة للقراع والتي تم عزلها من الأغنام المصابة - معملياً ، وهذه الفطريات هي تريكو فيتون منتاجروفيتس ، تريكوفيتون روبريم ، تريكو فيتون سودانيز ، ميكروسبوريم كاتيز وميكروسبوريم جيبسيم وأوضحت النتائج أنه عند إضافة محلول مائي من الثوم الى مستنبت السابارود دكستروز أجار بتركيزات ٢٠٪ ، ٥٠٪ ، ١٠٠٪ فإنه أعطى تأثيراً مثبطاً للفطريات المستعملة في التجربه بنسب تتراوح بين ٠.٥ ر ٤٧ الى ١٠٠٪ وعند استعمال حبة البركة بنفس التركيزات السابقة كان لها تأثير مثبط واضح على الفطريات المستعملة بنسب تتراوح بين ١٣ ر ٣٥٪ الى ١٠٠٪ وعند إضافة مسحوق الحنه بنفس التركيزات السابقة كان لها تأثير مثبط للفطريات المستعملة بنسب تتراوح بين ٨٧ ر ٢١ الى ١٠٠٪ وعند استخدام خليط من المواد الثلاثة بنسب متساوية بتركيز اجمالى ١٠٪ أعطى تأثيراً مثبطاً بنسب تتراوح بين ٥٨٪ الى ١٠٠٪ بالمقارنه بالمجموعه الضابطة في جميع الحالات.

SUMMARY

This study was carried out to evaluate the effect of some medicinal plants in natural form (garlic, nigella and henna) and mixture of them on some dermatophytes isolated from clinical cases of sheep ringworm in different farms. These dermatophytes were *T. mentagrophytes*, *T. rubrum*, *T. soudanense*, *M. canis* and *M. gypseum*. The obtained results revealed that the addition of aqueous solution of garlic to S.D.A. by

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concentrations (2.5%, 5% and 10%) inhibits the growth of tested dermatophytes and that inhibition ranging from 47.5% to 100%. Also the addition of nigella by the same concentrations to S.D.A. inhibit the growth of tested dermatophytes in a range from 35.13% to 100%. In case of henna at the same concentrations the inhibition rate ranged from 21.87% to 100%, while the addition of mixture of three plants to the medium at final concentration 10% (containing equal amounts of three materials) inhibit the growth of experimented dermatophytes with proportions ranging from 58.8% to 100% in comparison to control media with additives of tested medicinal plants.

Keywords: Medicinal plants-Growth-Dermatophytes

INTRODUCTION

Recently the medicinal plants play an important role in the treatment of some infectious diseases in animal and human beings. There is a large number of these plants attributed with antimicrobial and anthelmintic actions. Also some natural products of these plants are generally used as antifungal, (dermatophytes). NAGUI *et al* (1990) and El. shanwany (1993).

The observed encouraging results with some of these plants were reported earlier.

Aqueous garlic (*Allium sativum*) extract from bulbs has been used in the past to control several diseases, such as snake bite, hemorrhoides, rheumatism, abdominal pains and skin infections. It has been found effective against insect, protozoa, fungi, bacteria and viruses CAVALLITO and SUTER (1945); STOLL and SEEBECK (1951); JOHNOSON and VAUGHN (1960); FLIERMANS (1973); NAGAI (1973); TYNECKA and GOS (1973); RIPPON (1974); MOORE and ATKINS (1977); BARONE and TANSEY (1977); UPADHYAY *et al* (1980); PRASAD and SHARMA (1981) and ESANU and PRAHOVEANU (1983).

In vitro and in vivo JUDITH and MICHAEL (1975) and MICHAEL and JUDITH (1975) revealed that garlic aqueous extract 10% significantly inhibits the growth of dermatophytes *M. canis*, *M. gypseum*, *T. mentagrophytes*, *T. rubrum*, while *T. terrestre* approximately equal to control after 21 days of incubation.

In referring to *Nigella sativa* HANAFY and HATEM (1991) revealed that filter paper disc impregnated with diethyl ether extract of *Nigella sativa* seed caused inhibition for Gram positive bacteria represented by *Staphylococcus aureus*, Gram negative bacteria represented by *Pseudomonas aeruginosa* and *E. coli* but not *Salmonella typhimurium* and pathogenic yeast like fungi (*Candida albicans*).

Henna (*Lawsonia alba*) leaves are used in Egypt since time long ago as a dye for foot and hands in wedding ceremonies. Nowadays, it is widely used in hair shampoo or as a paste in water applied to the toes for its strong antifungal activity EL-EMARY (1993). Also HAMODA *et al* (1994) observed in vitro antibacterial activity of some medical plants extracts such as garlic and *lawsonia alba*.

So this study aimed to evaluate the inhibitory effect in vitro of some medicinal plants as garlic, *Nigella sativa*, *lawsonia alba* and mixture of the three plants against some dermatophytes.

MATERIAL and METHODS

Material:

I-5 Species of dermatophytes were isolated and identified from clinical cases of sheep ringworm according to SOLYTIS and SMITH (1969) and FREY *et al* (1975), these isolated dermatophytes were *T.mentagrophytes*, *T.rubrum*, *T.Soudanense*, *M.gypseum* and *M.canis*.

II-3 medicinal plants were used in this investigation:

- Garlic (*Allium sativum*) in the form of aqueous solution
- Nigella* (*Nigella sativa*) in the form of powder.
- Henna (*Lawsonia alba*) in the form of powder.

Method:

1- Each dermatophytic sp. was inoculated in 22 plates of S.D.A. containing chloramphenicol and actidione as followed:

- 2 plates free from medicinal plants (control)
- 18 plates (6 for each medicinal plants), 2 plates for each concentration, 2.5%, 5% and 10%.
- 2 plates for mixture of plants in a final conc. 10% (equal amounts from the three plants).

2- All plates were cultured at 25°C for 15 days, daily examination for culture till the growth become evident. At the end of incubation period, the diameter

of clonial growth was measured in all inoculated plates.

3- Inhibition percents were calculated as followed:

$$\text{Inhibition \%} = \frac{\text{Control growth diameter} - \text{growth diameter at X conc.}}{\text{control growth diameter}} \times 100$$

Where (x) = Various concentrations of tested medicinal plants.

RESULTS

Results are shown in table 1 and 2

DISCUSSION

The presence of naturally occurring substances in medicinal plants has been recognized and play a significant role in human and animal diseases. The results in the present study cleared that aqueous garlic solution (*Allium sativum*) in concentrations 2.5%, 5% and 10% inhibit the growth of some dermatophytes (*T.mentagrophytes*, *T.rubrum*, *M. canis*, *T. soudanense* and *M.gypseum*) and that inhibition ranging from 47% to 100% as shown in table 1. These obtained results agree to that mentioned by CAVALLITO *et al* (1944) and STOLL and SEEBEEK (1951) who isolated allcin as a potent chemical substance from intact garlic cloves and garlic bulbs, which contain allcin as antifungal activity.

JUDTH and MICHAEL (1975), THIND and DAHIYA (1977), MOORE and ATKINS (1977) and SINGH *et al* (1979) reported that Aqueous garlic extract from bulbs has fungicidal activity against many fungi including that cause mycosis, the action is mainly due to allcin, allistatin I and allistatin II

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and scrodimine which agree the results revealed in this study.

Chun wook, BOO (1982) and ESANU and PRAHOVEANU (1983), reported that aqueous garlic solution inhibit the growth of some dermatophytes, *T.mentagrophytes*, *T. rubrum*, *M. canic* and *M. gypseum* and that support our obtained results. Also BARONE and TANSEY (1977); DELAHA and GARAGUSI (1985); MISHRA and DIXIT (1986) and YOSHIDA *et al* (1987) observed significant effect of aqueous extract of garlic against some pathogenic fungi and that correspond to our results.

From above mentioned the inhibitory effect of garlic (*Allium sativum*) may be due to suppression or depression of enzymatic synthesis at nuclear or ribosomal level or changing membrane structure, this due to a new potent chemical preparation (a Joene), SINGH and DESHMUKH (1983) and BLOCK *et al* (1986).

The results in this study revealed that *Niggella sativa* in concentrations 2.5%, 5%, 10% inhibit the growth of some dermatophytes *T.mentagrophytes*, *T.rubrum*, *M.canis*, *T.soudanense* and *M.gypseum* with variable degrees of inhibition ranged from 35.13% to 100%. This agree to that mentioned by HANFY and HATEM (1991) who reported that *Nigella staiiva* inhibit the growth of yeast like fungi (*Candida albicans*). Lack of literature about this subject prevent the full discussion of

this subject, So it needs further investigation.

In this study the in vitro antifungal activity of Henna (*Lawsonia alba*) when added to S.D.A. in concentrations (2.5%, 5%, 10%) it inhibit the growth of some dermatophytes, *T.mentagrophytes*, *T.rubrum*, *M.canis*, *M.gypseum* and *T.soudanense* with variable results. In this investigation it is clear that Henna inhibit the growth of some dermatophytes but less than garlic solution, *Lawsonia alba* and mixed form of the 3 Components. The antifungal activity of Henna may be due to tannins, phenolic compound demonstrated by Mahran *et al* (1993).

The results of the present study showed that the use of mixture of three materials in equal amounts with final concentration 10% inhibit the growth of some dermatophytes *T.mentagrophytes*, *T.rubrum*, *M.canis*, *T. soudanense* and *M.gypseum* and the rate of inhibition ranged from 58.82 to 100%. That inhibiion may be due to the strong action of garlic and addition of *Nigella* and Henna may improve the value of the compound due to the synergism property, also to decrease the disadvantages of garlic especially when used in vivo because it was found that garlic has bad side effects e.g severe allergic, dermatological, endocrine and gastro-intestinal reactions, EL-EMARY (1993).

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Table (1): Effect of some medicinal plants on growth of some dermatophytes.

Dermatophyte	Growth diameter of control cm.	Garlic						Nigella					
		2.5%		5%		10%		2.5%		5%		10%	
		G.D	In%	G.D	In%	G.D	In%	G.D	In%	G.D	In%	G.D	In%
<i>T. mentagrophytes</i>	3.7	0.0	100	0.0	100	0.0	100	2.5	35.13	2.1	43.24	1.4	62.16
<i>T. rubrum</i>	4.0	1.7	57.5	1.5	62.5	1.0	75	2.0	50.0	1.6	60	0.6	85
<i>M. canis</i>	0.9	0.0	100	0.0	100	0.0	100	0.0	100.0	0.0	100	0.0	100
<i>T. soudanense</i>	1.7	0.9	47.05	0.5	70.58	0.3	82.35	0.5	70.58	0.3	82.35	0.3	82.35
<i>M. gypseum</i>	3.2	0.0	100	0.0	100	0.0	100	1.5	53.12	0.8	75	0.4	87.5

Table (2): Effect of some medicinal plants on growth of dermatophytes.

Dermatophyte	Growth diameter of control cm.	Lawsonia alba						Mixture of 3 plants (10%)	
		2.5%		5%		10%		G.D	In%
		G.D	In%	G.D	In%	G.D	In%		
<i>T. mentagrophytes</i>	3.7	0.7	81.08	0.0	100	0.0	100	0.0	100
<i>T. rubrum</i>	4.0	2.5	37.5	2.4	40	1.7	57.5	1.2	70.0
<i>M. canis</i>	0.9	0.0	100	0.0	100	0.0	100	0.0	100
<i>T. soudanense</i>	1.7	1.3	23.52	0.7	58.82	0.0	100	0.7	58.82
<i>M. gypseum</i>	3.2	2.5	21.87	1.8	43.75	1.3	59.37	0.0	100

G.D - growth diameter of the colony

IN - Inhibition percent