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ANTIFUNGAL ACTIVITY OF *IPOMEA CARNEA* EXTRACT ON DERMATOPHYTES FUNGI ISOLATED FROM CHILDREN IN DIWANIYAH CITY -IRAQ

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Abstract

The current study included evaluates the aqueous and alcoholic extracts of the *Ipomoea carnea* plant were used against dermatophytes isolated from school children in the city of Diwaniyah. The study showed the presence of many ringworms spread among children, and the most prevalent is tinea corporis with 33 (35. %) cases, followed by tinea cruris with 24 cases (26%). Males were the most susceptible to infection in most cases, with the exception of Tinea pedis, which was more common in females. As for the isolated species, they were both Trichophyton rubrum and Microsporum canis were superior in terms of the number of isolates with 30 and 28 isolates, respectively. As for as flower extracts, the concentration 30% alcoholic extract was the best in inhibiting fungal growth, as the diameters of the colonies were 1.3, 1, 0.7, 1, 1.2, 1.2 and 6 mm for *Trichophyton rubrum*, *Trichophyton tonsurans*, *Trichophyton violaceum*, *Microsporum canis*, *Microsporum audouinii* and *Epidermophyton floccosum*, respectively, while the diameters of the 30%aqueous extract were 2.4, 2.1, 1.8, 2.3, 2.0, 2 respectively. The leaves Alcoholic extract were the best in compare with water extracts and the concentration 30 % gave the best inhibition for fungal growth, the diameter was 1.3,1,0.7,1.2,1 and 0.6 mm for the fungi for *Trichophyton rubrum*, *Trichophyton tonsurans*, *Trichophyton violaceum*, *Microsporum canis*, *Microsporum audouinii* and *Epidermophyton floccosum*, respectively.

Keyword: *Ipomoea carnea*, Extract, Dermatophytes, Children.

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Introduction

The morning glory plant (the genus *Ipomea*) is a beautiful shrub or climber. It is drought-resistant and fast-growing. It is native to India and Southeast Asia and bears flowers of different colors. This genus includes many species of high aesthetic, industrial and

medical value recently it cultivated in Iraq in public and houses gardens [1].

Ipomoea carnea is one of the species spread globally and its shape is a shrub that bears pink or violet flowers, tubular in shape, and it has heart-shaped leaves and its stems are thin, soft and hollow. This plant belongs to the family Convolvulaceae. The plant has many local names, but the most famous of them is morning-glory bush [2].

This plant has countless uses. It is used for decoration because of its green color and gentle pink flowers. It is used as fodder, except for the seeds, which are toxic. Its hollow wooden stems are also used in pipes for smokers, in the paper industry, and in the medical field as an antioxidant, cancer and liver diseases. All parts of the plant are considered a source of chemicals of medical high importance. Many studies documented

that the antimicrobial and anti-parasite activity of this plant extracts [3, 4].

Dermatophytes fungi are pathogenic fungi that attack the skin, especially the keratinized outer layer that contains keratin, where it is considered a nutrient media. The infection includes skin, hair and nails in humans, and wool, lint, horns and hooves in animals. The source of infection may be human, meaning that the fungus is transmitted from one person to another, and here it is called anthropophilic. It comes from animals and here it is called zoophilic, or it may come from soil and is called geophilic [5].

The infection is usually harmless and does not threaten life, but it causes psychological and aesthetic problems for the injured and pushes him to pay large sums of money for treatment[6].

In some cases, the infection may be purulent, ulcerated, called kerion, and the infection may cause baldness and break nails. Its pathogen is limited to three genera only, which are Trichophyton, Microsporum and Epidermophyton, and for each genus there are species that cause diseases according to the area of infection[7].

The disease it causes is called dermatophytosis, Tinea, or ringworm. The name came because of the symptoms of the disease, which resemble circles with active and scaly edges, while the center is smooth and covered. Different names have been given to dermatophytosis according to the area of infection, for example, Tinea corporis, Tinea favus, Tinea pedis, and so on. There are many Dermatophytes that attack children and cause them different types of Tinea. This is due to their contact with infected animals and their presence in contaminated places due to their ignorance of what might happen to them. Among the things that help the occurrence of skin disease in children is the immaturity and completeness of the glands and the immune system, and their skin is thin and thin and easily penetrated by pathogens.[7, 8]

The treatment of fungal diseases chemically is accompanied by many problems, including the emergence of resistance by fungi to antifungals, as well as some antibiotics that are characterized by their high toxicity towards humans, causing collateral damage to the kidneys, liver, and bone marrow. Therefore, voices appeared calling for alternatives to these antibiotics, and plant extracts are among the successful alternatives that have been used since ancient times. It is still widely used because it is cheap and has few side effects compared to chemicals. Plants have survived in the treatment of fungal, bacterial, parasites, viruses and many other diseases [9, 10].



Figure (1)ipomea carea shrup [3]

Aims of study

There is no local study of fungal control by *Ipomea carnea* extracts, so this study came to test the water and alcoholic extracts of the leaves and flowers of this plant against dermatophytes fungi as an alternative to antifungals.

Material and methods

Dermatophytes Collection

Dermatophyte isolates were obtained by visiting some schools in Diwaniyah Governorate at January 2022, and samples were taken randomly to group ages and for both gender who suffer from problems believed to be caused by dermatophytes. Skin scales were taken by wiping them with cotton soaked in alcohol, 70%, then scraped with a sharp blade diagonally, hair strands were cut with scissors, and the nails were cut off by nail nippers. The samples were placed in a dark envelope and transported as soon as possible to the laboratory, where they were examined directly using Potassium hydroxide 10 % as described in [11], while the rest of the samples were cultured on the culture media prepared for this purpose. It consisted of Petri dishes containing Sabouraud Dextrose Agar medium (SDA) to which cycloheximide and chloramphenicol were added, according to the concentrations mentioned in[12].All plates were incubated at 27 °C for a week until colonies arising. Classification was done by investigation the

macro and microscopic observation and according to the keys [8, 13, 14].

Plant samples collecting

Samples were collected from the *Ipomea carnea* shrubs, which were the leaves and flowers of the plant during the month of April of the year 2022, as this time is considered appropriate because the temperatures are suitable for the growth of leaves and flowers. The samples were taken and dried in an electric oven at 70 °C for two days until dryness is confirmed. After that, the samples were taken and ground with a mill until a powder was obtained. It was kept in dry and dark containers until extraction [15].

Extraction

Two hundred grams of powder was taken and 1000 ml of distilled water or alcohol 70 % was added to it depending on the type of extract required, so that the ratio was five to one of powder and liquid as described in [16]. Then the solution was placed in a water bath at a temperature of 25 °C for 24 hours, after which the extract was filtered with several layers of medical gauze, then Whitman No. 1 paper until a clear solution was obtained, then it was subjected to centrifugation at 500 r/ m for one hour. Then the extract is spread in glass Petri dishes and left to dry in an incubator at 45 °C for three days, after which the extract is scraped with a clean knife, weighed and kept in dark plastic bags until use [16, 17].

Effect of Plant Extract on Dermatophytes

SDA medium supplemented with cycloheximide and chloramphenicol was used to test the effect of plant extracts on fungi isolated by poisoning the nutrient medium, where the extracts were added to the nutrient medium sterilized by moist heat (autoclave) when it became cold and before coagulation by a percentage of 10% 20% 30% in three replicates for each concentration while 3 plates were left without addition for comparison, while the antifungal itraconazole 2 mg per ml was added to other 3 plates as a positive control, then all plates were incubated in an incubator at 37 °C for a week, after which the diameters of the colonies were recorded [18].

Results and discussion

Type, number and percentage of tinea in primary school children

Figure 1 shows the distribution Tinea in primary school children in the city of Diwaniyah. The results showed that the most common type of it is Tinea corporis with 33 (35%) cases, followed by Tinea cruris with 24 cases (26%), then Tinea unguium 12 cases (13%) and tinea capitis 10 cases (11%), and tinea magnum 8 cases (9%), and each of Tinea faciei and pedis 3 cases each, at a percentage of (3%).

The cause of dermatophytes in children is that their skin is soft and easy to penetrate. The reason is also due to the fact that these children are ignorant of the danger of contact with infected persons, not to mention that they are a lot of movement and mobility and love to explore things. To come into contact with fungi when playing or using contaminated clothes, and in the area between the thighs there is moisture and a suitable environment for the growth of fungi that target keratin as food for them. [13, 19]

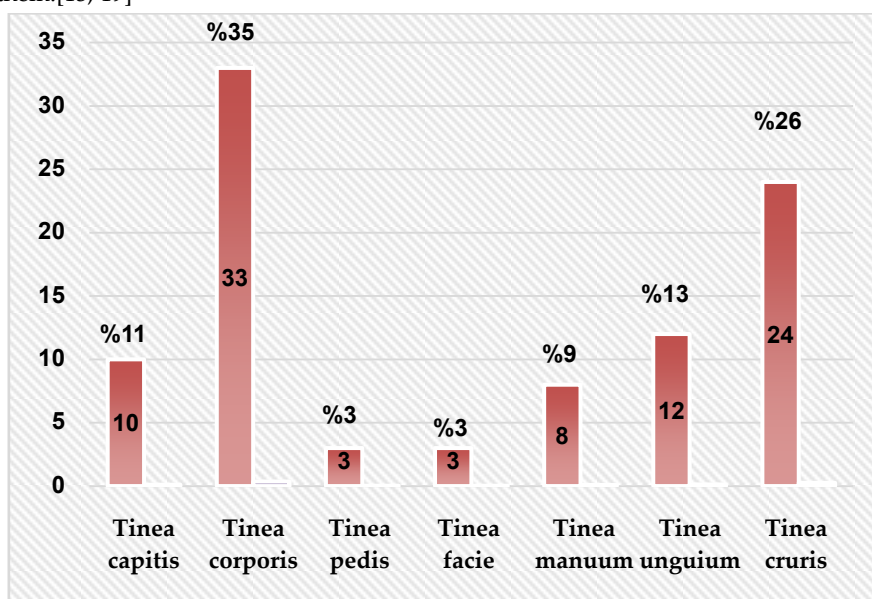


Figure (1) type of tinea in children in primary school in Diwaniyah city

Effect of patient's gender on infection

The current study showed that there are differences in the distribution of tinea according to the gender of infected child figure (2). Tinea corporis was the highest among males with 28 cases compared to only 6 for females. The reason for this may be that males are more mobile and more inclined to violent games and more contact dust and animals compared to females.

We can generalize this to the rest of the disease cases, except for Tinea unguium, in which the females were more affected, due to the fact that they may work to lengthen these nails, and perhaps because of the use of cleaning powders and constant humidity [8, 13].

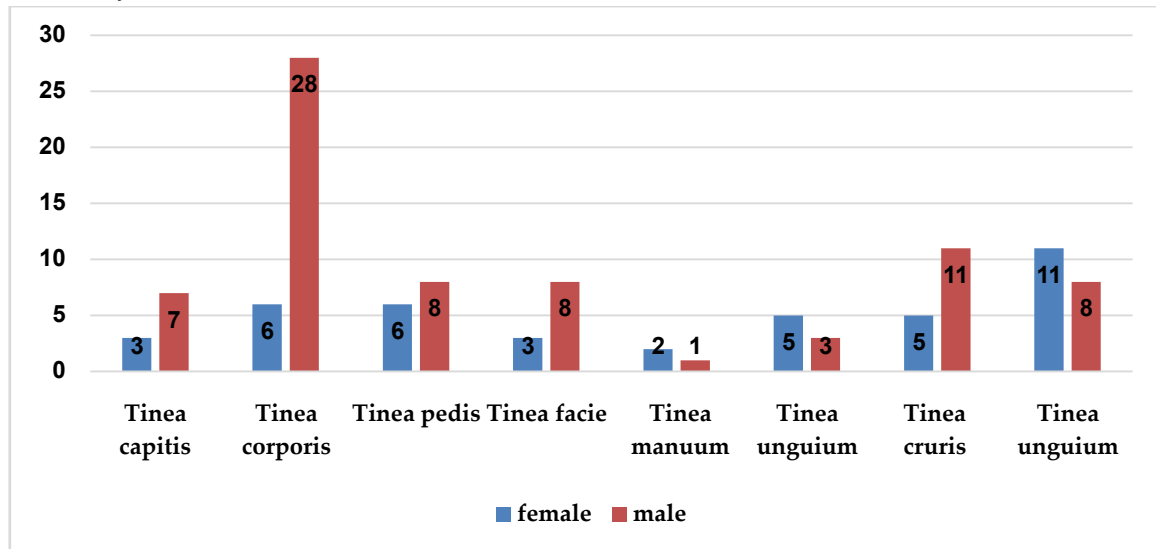


Figure (2) Distribution of Tinea according to gender of patients

Isolated fungi

As for the isolated species, the study indicated the isolation of 6 species distributed as follows: three belong to the genus Trichophyton, two to Microsporium and one to Epidermophyton. The predominance of *T. rubrum* isolates in 30 isolates was 37.5%, followed by *M. canis* with 28 isolates and percentage of 35%, then the rest of the isolated species which included *T. tonsurans*, *T. violaceum*, *M. audouinii* and *E. floccosum* with percentages of 8.75 and 13.75. 5 and 6.25%.

fungi belonging to *Trichophyton rubrum* and *Microsporium canis* are considered to be species that spread widely in general and cause various types of ringworm disease, which include all parts of the body or some of them, and this is due to the high virulence factors of these species.[20]

Previous studies have shown that they possess the enzymes necessary for colonization of the host, which function efficiently and are genetically highly expressed. It includes proteases (especially keratase), lipase, phospholipase, pigments, adhesion capacity, hemolysin, and melanin. These fungi also have the ability to withstand difficult and harsh conditions, especially animal species that are highly virulent and cause kerion [21, 22].

Table (1) Dermatophytes fungi isolated from primary school children

Dermatophytes	Number	%
<i>Trichophyton rubrum</i>	30	37.5
<i>Trichophyton tonsurans</i>	7	8.75
<i>Trichophyton violaceum</i>	11	13.75
<i>Microsporium canis</i>	28	35
<i>Microsporium audouinii</i>	4	5
<i>Epidermophyton floccosum</i>	5	6.25
Total	80	100

Effect of Ipomea carnea extracts on Dermatophytes isolated from children

Table 2 shows the effect of the water and alcoholic extract of *Ipomea carnea* flowers on dermatophytes isolated from children, where it seems that the 30% alcoholic extract was the best in inhibiting fungal growth, as the diameters of the colonies were 1.3, 1, 0.7, 1, 1.2, 1.2 and 6 mm for *Trichophyton rubrum*, *Trichophyton tonsurans*, *Trichophyton violaceum*, *Microsporum canis*, *Microsporum audouinii* and *Epidermophyton floccosum*, respectively, while the diameters of the 30% aqueous extract were 2.4, 2.1, 1.8, 2.3, 2.0, 2 respectively. Its significant effect was similar to that of the antifungal itraconazole, while the control was 4 mm.

Table (2) Effect of Ipomea carnea flower extract on colony diameter of Dermatophytes (mm).

Dermatophytes	flowers extracts %						Itraconazole 2 mg/ml	Control
	Water extract			Alcoholic extract				
	10	20	30	10	20	30		
<i>Trichophyton rubrum</i>	3.0	2.8	2.4	4	2.7	1.3	1.5	4.0
<i>Trichophyton tonsurans</i>	3.1	2.7	2.1	3.7	2.5	1	1.8	4.0
<i>Trichophyton violaceum</i>	3.4	2.6	1.8	3.0	2.1	0.7	1.2	3.9
<i>Microsporum canis</i>	3.0	2.7	2.3	3.3	2.8	1.2	1.7	4.3
<i>Microsporum audouinii</i>	2.9	1.5	2.0	4	2.2	1	1.2	5.1
<i>Epidermophyton floccosum</i>	3.5	2.4	2	3.9	2.5	0.6	1.0	4.4

Table (3) showed the effect of *Ipomea carnea* leaves extracts on isolated fungi, alcoholic extract were the best in compare with water extracts and the concentration 30 % gave the best inhibition for fungal growth , the diameter was 1.3,1,0.7,1.2,1 and 0.6 mm for the fungi for *Trichophyton rubrum*, *Trichophyton tonsurans*, *Trichophyton violaceum*, *Microsporum canis*, *Microsporum audouinii* and *Epidermophyton floccosum*, respectively. Its significant effect was similar to that of the antifungal itraconazole, the negative control was 4 mm .

Table (3) Effect of Ipomea carnea leaves extract on colony diameter of Dermatophytes (mm).

Dermatophytes	leaves extracts %						Itraconazole 2 mg/ml	Control
	Water extract			Alcoholic extract				
	10	20	30	10	20	30		
<i>Trichophyton rubrum</i>	3.2	2.7	2.1	3.7	2.0	1.5	1.5	4.0
<i>Trichophyton tonsurans</i>	3.6	3	2.1	3.7	2.4	1.8	1.8	4.0
<i>Trichophyton violaceum</i>	3.8	3.2	2.8	3.0	2.0	1.1	1.2	3.9
<i>Microsporum canis</i>	3.3	3	2.9	3.3	2.7	1.4	1.7	4.3
<i>Microsporum audouinii</i>	3	2.5	2.2	4	2.2	1.9	1.2	5.1
<i>Epidermophyton floccosum</i>	3.5	3.0	2.5	3.9	2.4	1.6	1.0	4.4

Ipomea carnea contain many active substance may consider as antifungal substances some of this substances found in flowers ,leaves and roots found in leaves there are hexadecenoic acid, stearic acid, 1, 2 diethyl phthalate, n-octadecanoyl, octacosane, hexatriacontane, tetracontane, 3- diethylamino-1- propanol leaves shows presence of swainsonine and calystegines B1, B2, B3 and C1 were detected in the aqueous ethanolic extract of leaf, While in flowers there are flavonoids, tannins, glycosides, alkaloids, carbohydrates and phenolic compound [3, 23, 24].

Conclusion

1. There are many cases spread in primary school children in Diwaniya city but the more prevalent is *Tinea corporis* and *Tinea cruris*.
2. The most dominant fungus cause dermatophytosis in primary school children was *T. rubrum* and *M. canis*.
3. The flowers extract of *I. carnea* was better than leaves extracts in inhibition of dermatophytes growth invitro.

Conflict of Interest

Authors are declared No Conflict of Interest

Acknowledgement

Not Applicable

Author Contribution

All Authors Contributed equally

Ethical Considerations

Not Applicable

Inform Consent

Not Applicable

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