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The effectiveness *Sesamum indicum* L. seeds extract against Dermatophytosis

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Abstract

In the present study, we evaluated the antimicrobial activity of *Sesamum indicum* L. seeds extract against Dermatophytosis pathogens, including those responsible for human infection. Sensitivity testing against some pathogenic fungi were studied with sesame seed extract. *Trichophyton mentagrophytes* and *Trichophyton rubrum* were the microorganisms used and they were identified, confirmed and obtained from the Biology laboratory of the hospital of wasit, Iraq. The results showed that the inhibitory activity of the extracts against the tested fungi depended on the type of fungi, the extract type (alcohol or acetone), and its concentration. As a result of the strong tendency that has emerged recently to use plants and their active ingredients in the medicine.

The acetone extract has a high inhibitory activity, followed by the alcohol extract. This article focuses on natural products used as antifungal properties, their effects on the minimum inhibitory concentration value, as well as their environmental value. The study suggested that sesame seeds are potential sources of functional food to prevent chronic diseases.

Keywords: *Sesamum indicum* L, Dermatophytosis, Dermatophytes, prevent chronic diseases

Introduction

Dermatophytes are causing a common type of infection in humans and it mainly affects the keratinized tissues like hair, skin, and nails (Sepahvand A, *et al*, 2018) [14]. This fungal infection is called dermatophytosis which leads to breaking down between societies and disturbs the life of millions of people every year. Those patients represented around 10-15% of the dermatologists' patients.

The dermatophytosis lesion was first described in the time of the Romans when the causative agent was attributed to *Tinea* which means a larva of the clothes moth. Greeks described it as "Herpes" which means ring (Davis CP, 2022) [8]. Later, the English term "Worm Ring" was used which came from the summation of both Roman and Greek meanings due to the circular appearance of lesions. Different names were used to describe the type of *Tinea* according to its site in the body (CDC a, 2021) [4].

Tinea Pedis, foot Athletes, or worm wring sandal, it is known as millions of people are exposed to wet toes and caused by *Trichophyton mentagrophyte*. *Tinea manuum* occurs between the fingers of the hand and then spreads to the whole hand and from *T. rubrum* (Nozawa *et.al* 2003). *Tinea corporis* appears in the trunk and areas without hair in the body and it's caused by *Microspore canis* (Kokollari F, *et al.*, 2015) [10]. *Tinea imbricata* is a special case of *Tinea corporis* caused by *T. concentricum*. *Tinea Cruris* occurs in the hairy sites around the groin are the *epidermophyton floccosum* (Shalaby, M. F., *et al*, 2016) [15] *Tinea Barbae* or *Tinea Facial* or *Sycosis Tinea* that affects areas of the neck, beard, and mustache and is caused by *T. verrucosum*. For *Tinea capitis*, which appears on the scalp and caused by *T. violacium* (Handler MZ, 2020) [9].

The effect of sesame extract on tinea

Pedaliaceae family has now assumed position as one of most popular traditional foods, as well as its medicinal value. In some conditions like amenorrhea, saddle, ulcers, and bleeding piles the powder of sesame is prescribed.

Sesamin has been commonly found in sesame and sesame oil, numerous studies view that sesamin can do/have the job (of) preventing hypertension, thrombogenesis (Noguchi *et al.*, 2001; Dalibalta S, Majdalawieh AF, and Manjikian H, 2020) [7].

There are two factors that make skin diseases in any part of the world relative. The treatments that make the skin more normal and arguing with complicated deformities are available, cheaper and low side effects.

Materials and Methods

Study design: This is an experimental study to assess the effect of sesame extract on the dermatophyte's growth in the culture media.

Collection and Examination

Samples were obtained (80) of patients who visited the dermatology clinic, located in the teaching hospital Salaam, in the city of Al-Kut (Wassit province) consulted the doctor about the external mycosis. The study participants' age group at the time of the data collection was between 18 to 60 years old, both male and female were included in the study. The period of data collection was from the beginning of March until the end of June 2021. Every patient was clinically diagnosed based on the traditional symptomatic features of this fascinating disease *tiangi*. The lesion is characterized by a fast-red center and feathered edges which are scaly in appearance (CDC b, 2021) [4]. Skin samples were gathered by means of scalpel blade from lesions and held in clean paper bag to absorb specimens from the skin affected after sterilizing with ethyl alcohol (70%) to create infection-free environment. A KOH solution is applied to sample for direct microscopic examination if the fungal elements are found in them. In microscopic imaging the hyphae can be of septate or branched profile, and arthrosporic or even budding would indicate a fungal infection (Ponka D and Baddar F, 2014) [12].

Regarding more direct proof to the point of dermatophytes canes, a culture of different media at the Sabouraud's Dextrose Agar (SDA) with the acidic pH of 5.6 at 25 °C with an addition of chloramphenicol supplement (Black WD, 2020). Along with community's other programs, culture program will take 2-4 weeks to be in place. Dermatophyte test medium (DTM) is specifically utilized for selective isolation and identification of Group of dermatophytes fungi (as mentioned by Rahman, M. A, *et al.*, 2018) [13].

Seeds collection and preparation of crude extract *Sesamum indicum*

Seeds were purchased corals are one of the most important species in the coral reef ecosystems and are vital to life as we know it. Sampling of corals in the marine parks of Egypt from local markets and college of science, Department of Biology, Wasit University. The of the seed components was done away with other less desirable matter or plant ingredients. The seed grinder then crushed them into fine particles and stored them in clean plastic bins as they await to be used.

Sesame active compound extracting (lignans)

After the defatting process (grounding), dry sesame (100 g) was crushed and sieved after the mixing with n-hexane (500 ml), stirred at room temperature. It was filtered through

Buckner funnel with Whatmann No.1 and the residue was air-dried for 12 ho

If statements include the if keyword followed by the logical expression to evaluate. Enclose the logical expression inside parentheses. The resulting defatted residue (63 g) was mixed with 80% ethanol for 6 hours. The obtained slurries were then filtered by Buckner funnel and the extract was evaporated under vacuum at 40 °C by rotary evaporator until dryness. The extract was consequently kept at 4 C° until the time of usage and conducted by (Grande *et al.* 2006).

Antibiotics Solutions

Each of Benzylpenicillin, sodium salt (1000000 IU), and streptomycin 1 gm were dissolved in 5 ml of distilled water and stored at -20 °C. From each of these stocks, 0.5 ml was added to one liter of the culture medium under preparation. One tablet of Nystatin containing 0.5gm of Nystatin was dissolved in 50 ml distilled water to produce (10mg/ml) suspension and kept suspension in the refrigerator, 0.25 ml of this suspension was added to 1 liter of culture media.

Ethical consideration

Ethical approval was obtained from the College of Medicine/Wasit University. All the patients were consented to participate as a part of this study. Informed consent was obtained either from the patients themselves or from their surrogates.

Statistical analysis

Done by using SPSS 15 software (Statistical Product and Services Solutions, Inc, Chicago, IL, USA).

Result and Discussion

The study involved 80 people out of who there were only 70 (55 males and 15 women) who were confirmed to have *Tinea culmus* infection (fungal infection of the skin). The minimum age to this event was three days and there was no upper limit - it could be anyone from seventy years old up to seventy years old. From the clinics we are aware of that we have up to two types of tinea in patients infected with *Trichophyton mentagrophytes* and *Trichophyton rubrum*.

The effect of different plant extracts on the growth of pathogenic fungi

The effect of different plant extracts on the growth of pathogenic fungi: The efficient development of new drugs which involves the usage of plants and their natural active components could be considered a latest tendency and this means, my study was carried out to discover the antifungal activity of the chosen plant's extract against both the human pathogenic T. These are three extracts and the solvents for distillation were used to prepare aqueous and alcoholic extracts as well as acetone 70% as this typology of extract will ensure the extraction of active compounds that the plant maybe contain. The effect of alcoholic, acetone, and aqueous extracts of sesame seeds on the growth of pathogenic fungi. The effect of alcoholic, acetone, and aqueous extracts of sesame seeds on the growth of pathogenic fungi

The development of the area of inhibition of the tested *T. rubrum* and *T. mentagrophytes* strains treated with alcoholic extract of sesame seed extract was noted when evaluated in a plaque assay. The average growth of *T. rubrum* (34.25 mm and (51%) reduction at 3% v/v, the concentration while

(3.0%) v/v. The rapidity of *T. rubrum* strain growth was 9.95 (mm), and the inhibition rate amounting to (86.03%) was at 10% concentration. The attributed diameters for all

isolates were intercepted by the curve at the concentration levels of 20%, showing that the inhibition is 100%. (Figure 1).

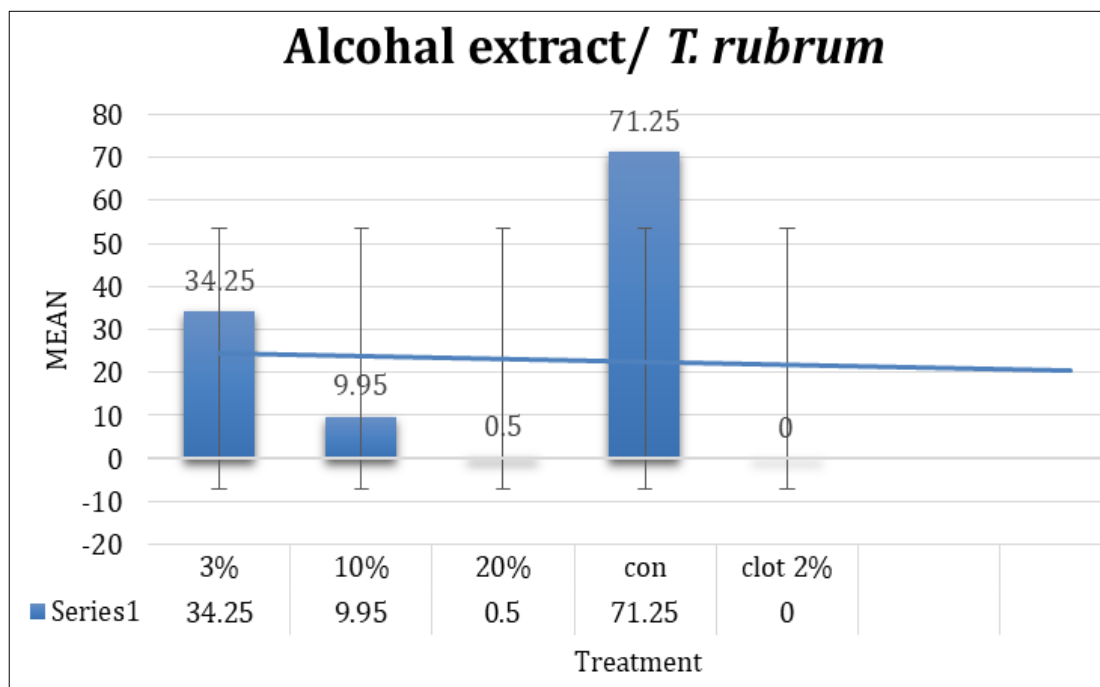


Fig 1: Mean *T. rubrum* growth rate with different concentrations of alcohol extract of sesame seeds.

While, The percentage of inhibition was more affected in the alcoholic extract against *T. mentagrophytes* which also directly proportional to the increase in the concentration of the sesame extract. The mean fungal growth was on (43.25) mm, and its inhibition by (74.56%) at 3% v/v while the

growth rates of the fungi were 22.75 (mm), with an inhibition rate (231.8%) at the 10% concentration. The mean diameter of all isolates reached fungal infection was zero at the concentrations 20% for alcohol extract, so the inhibition percentage was 100% (Figure 2).

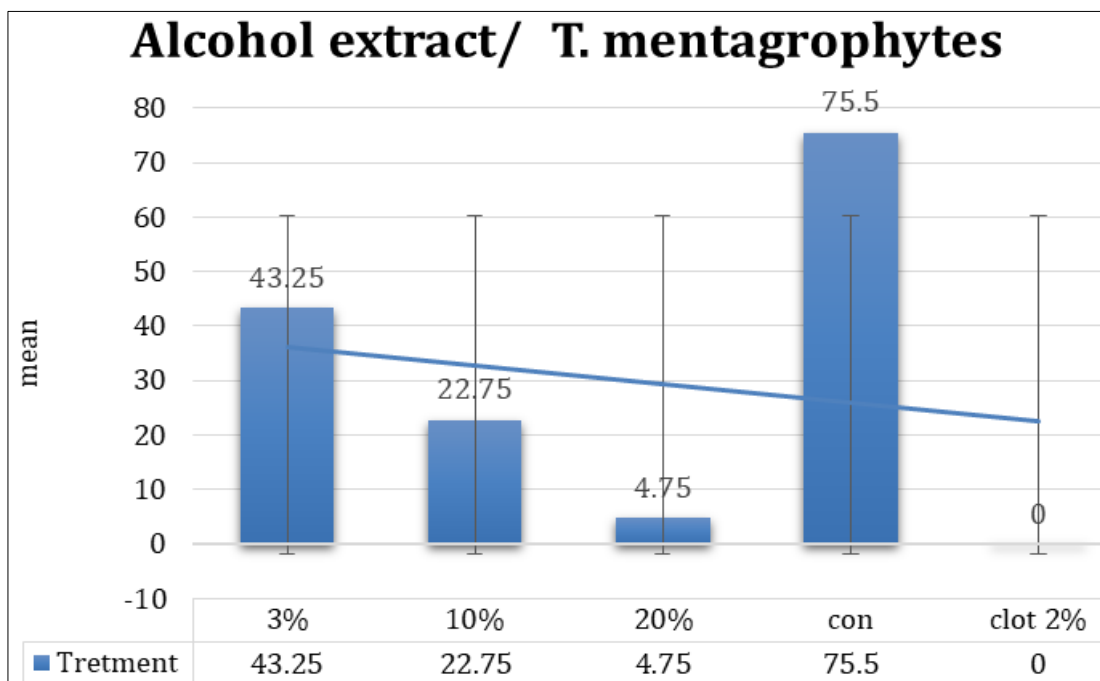


Fig 2: Mean *T. mentagrophytes* growth rate with different concentrations of alcohol extract of sesame seeds.

As for the acetyl extract, it showed an inhibitory activity that varied according to the concentration and the type of isolate tested. The average diameters of the fungal colonies' growth for *T. rubrum* reached (30.5) mm with a percentage of inhibition of (138.5%) at a concentration of 3%, while at

a concentration of 10%, the average diameters of the colonies were (8.375) mm and inhibition (88.5%). The percentage of inhibition reached 100% as the average colony diameter was 0 mm for the fungus at the concentration 20% (Figure 3).

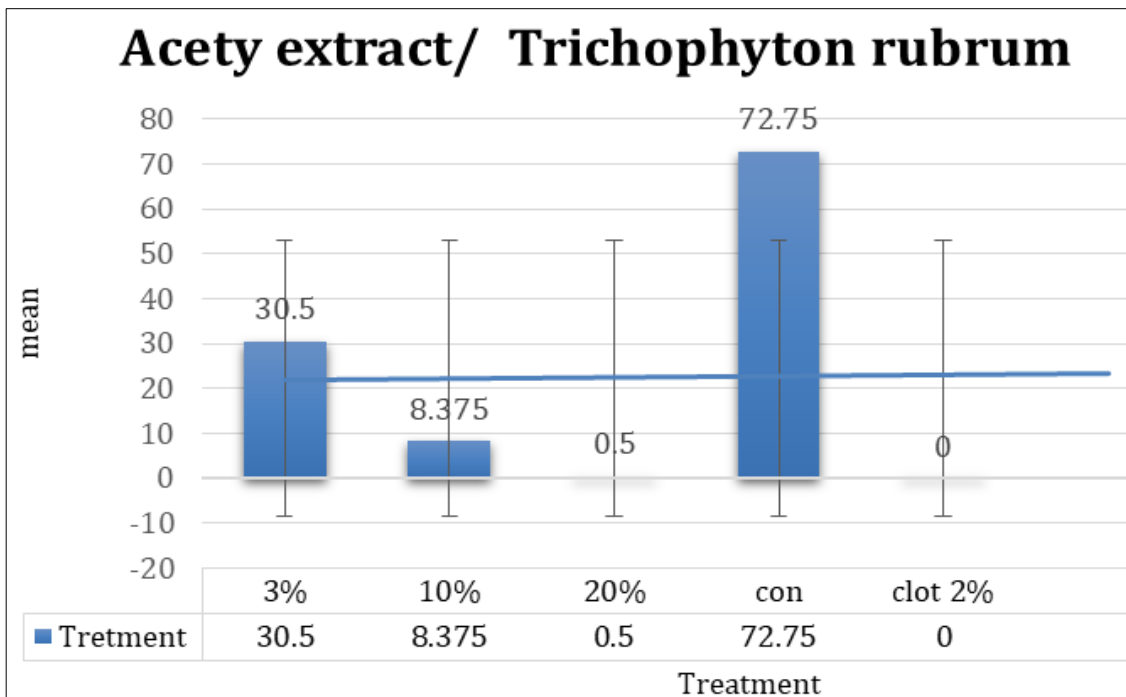


Fig 3: Mean *T. rubrum* growth rate with different concentrations of acetyl extract of sesame seeds.

For 3%, 10%, and 20% acetone concentrated sesame extract, the growth of *T. mentagrophytes* was 46.75mm,

31.5mm, and 2.25mm in the same order (Figure 4).

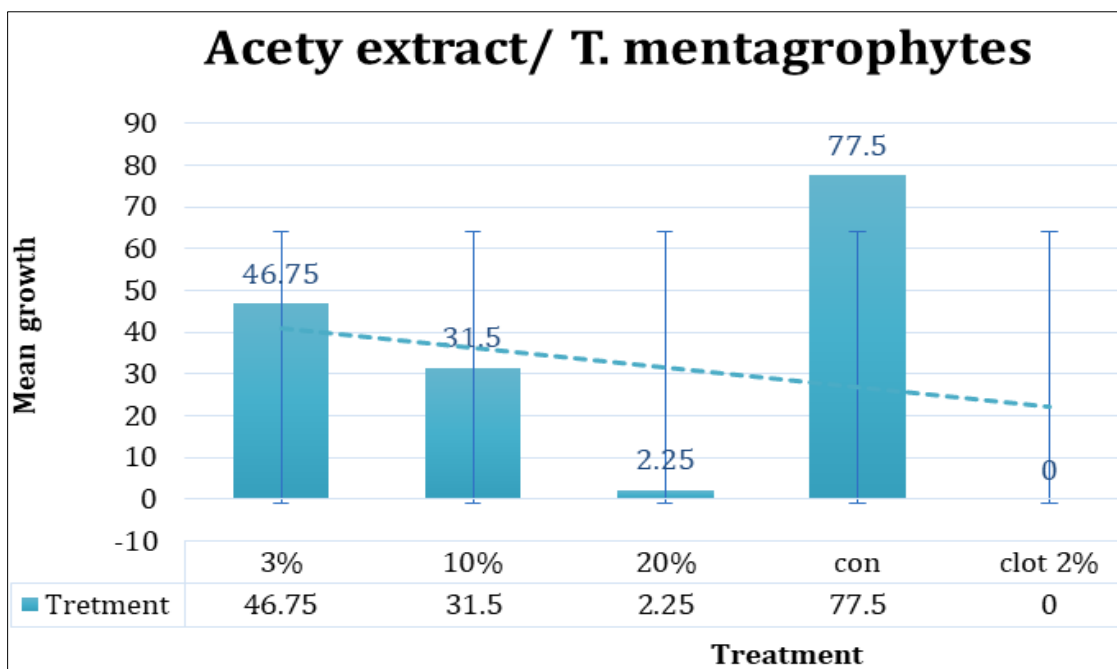


Fig 4: Mean *T. mentagrophytes* growth rate with different concentrations of acetyl extract of sesame seeds.

From the stages of the analysis and ANOVA statistics test it was detected (P-Value=0.01) significant differences between the alcohol and acetone extracts. Acetone extract turned out more efficient in inhibiting the formation of plaques in comparison to the acetone extract and we analyzed the difference between them at the various concentrations used. Different from the testing fungi, were a highly significant difference and the ANOVA showed there was a significant difference amongst the three. The fungus, *T. rubrum*., demonstrated the highest Plant Extracts based sensitivity, and the fungus *T. mentagrophyte* was the second. Such percentages were calculated comparing (0.01)

probabilities of separation, which were similarly similar to those of the (2% Clotrimazole). *T. rubrum*'s anti-fungal effects were seen at 0.5 mg/mL, but the effect was not so apparent for *T. mentagrophytes*, which showed no anti-fungal effects until they reached 0.75 mg/mL. The extract showed an effect of a strength equal to the antifungal drug against the fungi *Floccosum E* and *Niger*. On the other side, the extract as concentrated as 7% was associated with the same effect, if not better, as the drug on the fungus *trichophytum rubrum*. Meanwhile, acetone extract as which a 10% concentration was recognized as the same The widespread effectiveness of crude extracts against some

fungus may be accounted by the different polarity of the used solvents (Distilled water, ethyl alcohol and acetone) as a result of the difference in dielectric constant (4.78 for water, 5.24 for alcohol ethyl and 7.20 for acetone) which affects the solubility of some active sub. The inhibitory mentioned effect finds its role in dissolving some active ingredients, e.g. resins, which are renowned antibacterial and antifungal factors (Siddeeqh S, 2021) ^[17]. Microorganisms may lie in their essential oils, and this is consistent with the results of the study, as sesame seed is rich in essential oils that dissolve in alcohol and do not dissolve in water that contain many active substances against skin fungi and bacteria that cause skin infections (Bhavaniramy S, 2019) ^[2]. So, it is here, the alcoholic extract was superior to other extracts, as well as the solubility of some active substances, such as tannins, inhibit the enzymes and transport proteins present in the cell membrane (Othman L, 2019) ^[11].

Conclusion and recommendation

The results showed that the inhibitory activity of the extracts against the tested fungi depended on the type of fungi, the extract type (alcohol or acetone), and its concentration. The acetone extract has a high inhibitory activity, followed by the alcohol extract. The growth rate of the fungal colonies was inversely proportional to the increase in the concentration of the extract, while the percentage of inhibition was directly proportional to the increase in the concentration of the extract. We recommend farther studies to use different types of plant extract against the fungal infection.

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