

The Effect of Mushroom Extract on the Growth of The Pathogenic Fungus *Trichophyton Rubrum*

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Abstract

The effect of the alcoholic and aqueous extract of the mushroom *A.bisporus* against the growth of the pathogenic fungus *T.rubrum* was studied, the results showed that the aqueous extract of the mushroom *A.bisporus* was more efficient than the alcoholic extract in inhibiting the growth of the pathogenic fungus *T.rubrum*, as the growth was completely inhibited by 0.00 cm at concentrations (10-15-20-25) mg/ml, as for the alcoholic extract of the mushroom *A.bisporus*, it gave a total inhibition of 0.00 cm against the growth of the pathogenic fungus *T.rubrum* at concentrations (15-20-25) mg/ml.

Keywords: mushroom extract; pathogenic fungus; *Trichophyton rubrum*

1. Introduction

Dermatophyton is a group of fungi that have the ability to attack keratinized tissues of humans and animals such as hair, nails and skin (Faway et al., 2021), causing superficial fungal infections in the skin known as Dermatophytosis (Alharbi et al., 2022), This group includes three genera, *Microsporum*, *Trichophyton*, and *Epidemophyton* (Janardhan, 2017). Fungal diseases are among the most prevalent infectious diseases around the world, but the percentage of people infected with them does not exceed 20% of the world's population (Kadhim et al., 2015). Skin fungi are divided according to their locations in their preferred environment into three types: anthropophilic fungi and Zoophilic fungi and Geophilic fungi (Priyam et al., 2019).

Additionally, it became vital to look for therapeutic alternatives due to the importance of skin fungus and the challenges associated with treating and eradicating them, so food mushrooms were used because they possess a number of therapeutic and medicinal properties, as *A.bisporus* is one of the most cultivated types of mushroom in the world and is known for its anti-cancer, anti-tumor, anti-fungal, anti-microbial and anti-inflammatory therapeutic properties, and lowers cholesterol (Sami et al., 2021). Therefore, the current study aimed to: Study the effect of alcoholic and aqueous extract of the mushroom *A.bisporus* on the growth of the pathogenic fungus *T.rubrum*.

- Collecting clinical samples

Clinical samples were collected from patients of different ages and for both genders who were diagnosed by the dermatologists at Al-Salam Teaching Hospital in Mosul, for the period from 1/11/2021 to 1/2/2022. (53) samples were collected after sterilizing the area with medical alcohol 70% by means of a sterile scalpel, by rubbing the affected

part and keeping them with sterile dishes, and they were brought to the fungus laboratory in the College of Education for Girls/University of Mosul for the examination and cultivation.

- Collecting mushroom samples

Samples of the mushroom *A.bisporus* were collected from the local markets in the city of Mosul, and after cleaning them from dust and impurities, they were dried completely in the air and ground with an electric mill to obtain a fine powder and kept in glass containers in the refrigerator until use (Radulovic et al., 2007).

- Direct microscopic examination and culture of samples

A part of the sample was taken by a sterile needle and placed on a clean glass slide and a drop of 10% KoH solution was added to it, then the cover of the slide was placed on it and it was passed over the flame three times and left for 10 minutes. All glass slides were examined under a microscope using powers of 10x and 40x to note the presence of branched filamentous structures and articular spores, then they were planted on Petri dishes containing SDA medium, and the dishes were incubated at a temperature of 27±2°C for 7-14 days (Kwon-Chung and Bennett, 1992).

- Identification of isolated fungi

The dishes were examined by taking a part of the fungal colony using a sterile needle and placing it in a drop of methyl blue dye on the glass slide, then a slide cover was placed on it, and it was examined microscopically using the following taxonomic sources (Forbes et al., 2002; Jorgensen et al., 2015; Eliss et al., 2007).

- Preparation of alcoholic and aqueous extract of *A.bisporus*

50 gm of dried *A.bisporus* mushroom powder was

taken and placed in a beaker and 400 ml of petroleum ether solvent was added to it and placed on a magnetic stirrer for 72 hours, then the mixture was filtered and the precipitate was taken and placed in a beaker to which (400) ml of ethyl alcohol with a concentration of 70% was added and left for 72 hours, after that the solution was filtered and kept in the refrigerator (Le-Grand, 1988), after which the extract was concentrated with the RVE device at 40°C, then the precipitate was taken again and soaked in (400) ml of distilled water with the temperature turned on at (40-60) °C to obtain the hot water extract, and the extracts were kept in the refrigerator until use (Harborne, 1984).

- Sterilization of extracts

The alcoholic and aqueous extracts were sterilized according to the concentrations used by pasteurization in a water bath at a temperature of 50°C for 15 minutes (Al-Nu'man, 1998).

- Preparation of concentrations and testing of extracts

2 g of alcoholic and aqueous extracts of *A.bisporus* were dissolved in 10 ml of DMSO as a standard concentration for the preparation of dilutions (0.5-1.0-1.5-2.0-2.5) ml and each was added to Petri dishes containing SDA before hardening with shaking, with the volumes (17.5-18.0-18.5-19.0-19.5) ml, respectively, to obtain concentrations (5-10-15-20-25) mg/ml, in addition to a control plate that does not contain additives (Al-Khafaji, 2000), and after hardening the medium, a tablet was taken from the edge of a fungal colony of *T.rubrum* at the age of 14 days and was placed in the center of the plate, and the dishes were incubated at 27±2°C for 14 days with recording the inhibitory activity of the extracts by averaging every two orthogonal drops every 3-6-12-14 days.

2. - Statistical analysis

The SPSS statistical program was used to analyze the data of the study, as Duncun multiple test (Duncun, 1955) was used to determine the least significant difference at the probability level of 0.05.

Results and discussion

It was found from studying the effect of different concentrations (5-10-15-20-25) mg/ml of alcoholic and aqueous extracts of the mushroom *A.bisporus* against the growth of the pathogenic fungus *T.rubrum* on SDA medium that the water extract of the mushroom *A.bisporus* is more efficient than the extract alcohol in inhibiting the growth of the pathogenic fungus *T. rubrum*, as the growth was completely inhibited at the concentrations (10-15-20-25) mg/ml and the average colony diameter was 0.00 cm compared to the control treatment, while the concentration

(5) mg/ml, it inhibited the growth of the pathogenic fungus *T.rubrum*, as the average diameter of the

colony, after an incubation period of 14 days, reached (4.11) cm (Table (1)) and these results are consistent with what was found by (Kumar et al., 2018) which showed that aqueous extracts of mushrooms are good extracts with effective effect in inhibiting the pathogenic fungus *T.rubrum*, as well as consistent with

(Gebreyohannes et al., 2019), which showed that the aqueous extracts of mushrooms are effective extracts against the growth of pathogenic fungi and microbes, as mentioned (Gao et al., 2003) that the mushrooms contain polysaccharides, which make them highly effective in inhibiting the growth of pathogenic fungi and microbes. As for the alcoholic extract of the mushroom, it gave a total inhibition of (0.00) cm at concentrations (15-20-25) mg/ml after 14 days, while the pathogenic fungus *T. rubrum* gave growth at the two concentrations (5-10) mg/ml was (3.25-1.00) cm respectively compared with the control treatment. These results are consistent with what was mentioned by (Elsayed et al., 2014) about the effectiveness of alcoholic extracts against fungi and microbes, and agree with (Al-Zubaidi, 2015) that the alcoholic extracts showed an inhibitory effect against some bacterial isolates.

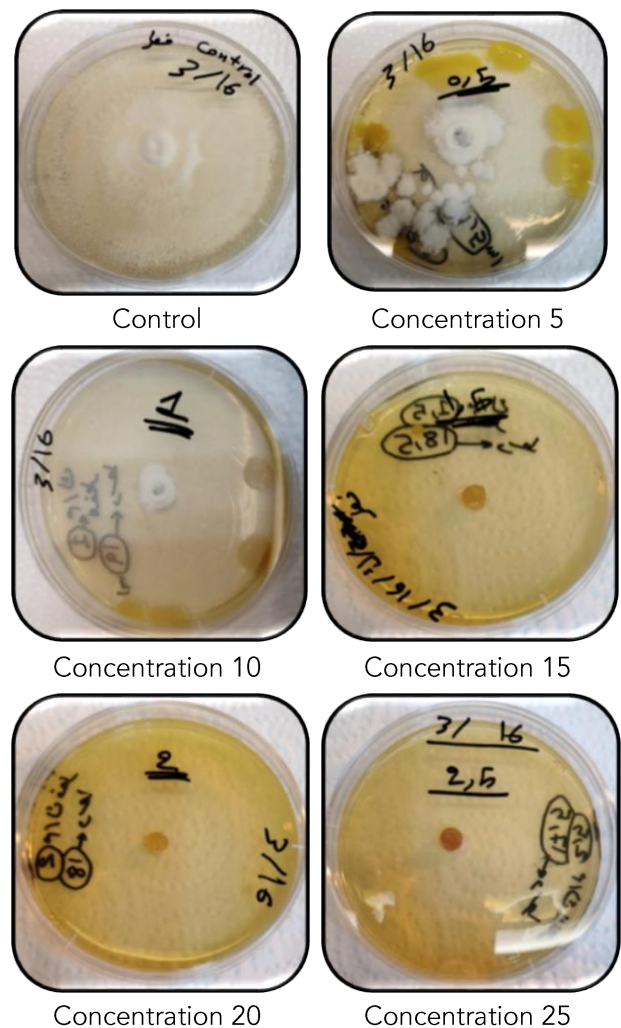


Figure (1): Effect of different concentrations of alcohol extract of food fungus *A. bisporus* and with different incubation periods in the growth of pathological mushrooms *T. rubrum* in a high concentration method.

Table 1: Effect of different concentrations of alcohol extract of food fungus *A. bisporus* and with different incubation periods in the growth of pathological mushrooms *T. rubrum* in a high concentration method.

incubation period (day) Concentration (mg/ml)		3	6	9	12	14
The effect of the extract on the growth of the pathogenic fungus <i>T.rubrum</i> (cm)	Control	3.38 g ± 0.16964	4.25 h ± 0.0000	5.25i ± 0.09129	7.00j ± 0.09129	8.50 k ± 0.00000
	5	1.00 b ± 0.00000	1.50 c ± 0.09129	2.00 d ± 0.00000	2.50 e ± 0.09129	3.25 f ± 0.0000
	10	0.00 a ± 0.00000	1.00 b ± 0.00000	1.00 b ± 0.00000	1.00 b ± 0.00000	1.00 b ± 0.00000
	15	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000
	20	0.00 A ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000
	25	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000

- Similar letters between aggregates indicate no moral differences between aggregates at P ≤ 0.05 morale level.
- Different letters between aggregates indicate that there are moral differences between aggregates at P ≤ 0.05 morale level.

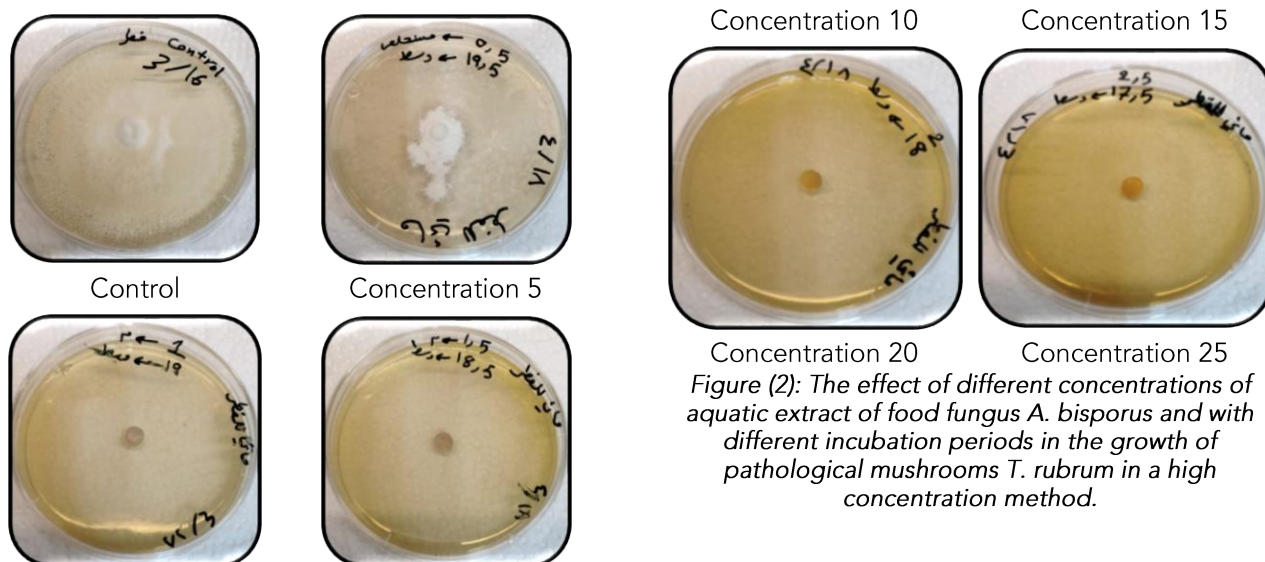


Figure (2): The effect of different concentrations of aquatic extract of food fungus *A. bisporus* and with different incubation periods in the growth of pathological mushrooms *T. rubrum* in a high concentration method.

Table (2): Effect of different concentrations of aquatic extract of food fungus *A. bisporus* and with different incubation periods in the growth of pathological mushrooms *T. rubrum* in a high concentration method.

incubation period (day) Concentration (mg/ml)		3	6	9	12	14
The effect of the extract on the growth of the pathogenic fungus <i>T.rubrum</i> (cm)	Control	5.2 c ± 0.09129	4.25 f ± 0.09129	6.25 g ± 0.09129	8.00 h ± 0.00000	8.50 i ± 0.00000
	5	1.50 b ± 0.09129	2.50 c ± 0.09129	3.50 d ± 0.09129	4.00 e ± 0.09129	4.11 e ± 0.04595
	10	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000
	15	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000
	20	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000
	25	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000	0.00 a ± 0.00000

- Similar letters between aggregates indicate no moral differences between aggregates at P ≤ 0.05 morale level.
- Different letters between aggregates indicate that there are moral differences between aggregates at P ≤ 0.05 morale level.

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