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Antagonistic activity of extracts of Edible mushroom *pleurotus osreatus* Against some fungi isolated from soil

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ABSTRACT

The results of the current study that the extract of the food fungus *Pleurotus sp* and its compounds isolated from it have an effect in inhibiting the growth of some fungi isolated from the soil. Thus, different concentrations were used and in three ways are: the method of high concentration, wells method and disc method. where the aqueous extract using the high concentrations method showed better results than the ethanolic extract against some isolated fungi under study, especially at the concentration (2.5) (2) (1.5) ml except for *Penicillium natatum*, which gave a slight growth at two concentrations of (2.5) (2) ml. As for the tablets method, where the ethanolic extract had a greater effect on the growth of the fungi under study than the aqueous extract, and the results of the wells method for the extract showed. The aqueous extract edible mushroom *pleurotus sp*. More effective than ethanolic extract.

Introduction

Many fungal species have medicinal value and some of them have been used in folk medicine all over the world since ancient times as a healthy food. Oyster mushrooms have been used in foods that positively affect the functional activities of humans in several ways. Food consists of products of animal, vegetable and microbial origin and contains Physiologically active compounds are beneficial to human health and reduce the risk of chronic diseases [1]. Medicinal effects of many fungi used, including the edible mushroom *Pleurotus sp.*[2]. Studies indicate the medical importance of extracts of the edible mushroom *Pleurotus sp.* This is evidenced by the studies. The medical importance of the extract of *Pleurotus sp*. is considered a natural source of antifungal agents and may open a new source for obtaining alternative antifungal products through fungal resistance to its compounds[3]. Some fungi are often pathogenic to various organisms including plants[4]. The larger fungi have antitumor, antifungal, and antibacterial activities due to their chemical structure[5]. Natural compounds with biological activity are found in plants, as well as edible mushroom. Edible mushroom need anti-fungal and anti-bacterial compounds in order to survive in the natural environment and these compounds with strong activities can be isolated from mushroom species that can be beneficial to humans [6].The use of Mushroom with curative properties came to show the efficiency of mushrooms against many diseases and metabolic disorders such as cancer. Also, biologically active compounds can be obtained from many fruit bodies or from fungal biomass[7] .The collection and identification of wild mushrooms may have different applications in taxonomic and ethnological studies with traditional mushroom use and local markets[8]. Mentioned[9]. The presence of biologically active phenolic compounds in mushroom extracts made it able to resist free add the aim of the study.

Materials and method of work:

Sample collection and work site

The edible mushroom *pleurotus osreatus* Obtained the local markets in Turkey for the purpose of studying and conducting experiments on it. The experiment was conducted at the University of Mosul, College of Education for Girls, in the laboratories of the Department of Life Sciences.

Isolation of fungi: The fungi used for the study were isolated Obtained two different areas in the city of Mosul and the dilution method was used to make microbial suspensions from soil samples of a concentration of 10-1-10-10, and 1 ml of each concentration of 10-3-10-10 was placed on a nutrient medium Potato Dxtrose Agar PDA. Incubate before solidification and move the plate to the right and left to spread the available ingredients at a temperature of 26.5 degrees Celsius for 7 days. The antibiotic streptomycin was added to in hibit bacterial growth nutrient medium at a concentration of 1 mg / 1 liter, with 3 replicates for each dish. The dishes petri were incubated at a temperature of 26 ° C and observed every 3 to 7 days [3].

Fungus diagnosis:

The fungi isolated from the soil were diagnosed according to the outward appearance, shape and color of the colony, in addition to the microscopic diagnosis and the composition of the fungal hyphae through the taxonomic keys [10,11].

Preparation of the Mushroom extract:

Extracts of the edible mushroom *Pleurotus osreatus* was prepared to evaluate the property of containing fungi, 25 grams of dried mushroom powder were weighed and using a solvent petroleum ether 200 ml at room temperature and placed on a stirrer device for 72 hours and filtered through filter paper and the extract was taken and placed in the Rotary Vacuum Evaporator to obtain crude extract to be dried in Oven at a temperature not exceeding 40 ° C. After filtering the petroleum ether extract, ethanol at a concentration of 70% was added to the remaining precipitate in a volume of 200 ml and in the same previous steps with ethanol and water, but the water was placed on a stirrer at a temperature of 40 _ 60 ° C [12].

Sterilization of extracts:

The aqueous and alcoholic extracts were sterilized by the high concentration method in a water bath at a temperature of 50 °C for 15 minutes[13]. As for the aqueous and alcoholic extracts by the disc and well method, they were sterilized using 0.22µl millipor microfilters [14].

Antifungal activities of mushroom extracts

1-High concentration method

One gram of each extract was dissolved in 5 ml to obtain a concentration of 200 mg/ml to prepare the required concentrations of the required amount (0.5, 1, 1.5, 2, 2.5) ml% to the nutrient media dishes containing PDA at concentrations (19.5, 19, 18.5, 18, 17.5) ml. 2- Disc method:

The antifungal activities of the aqueous and alcoholic extracts were determined by means of filter discs and methods of diffusion of the extracts in the nutrient media. Discs of sterile filter paper with a diameter of 6.0 mm and 5 tablets were soaked in 100 µl with different concentrations of the extracts of the edible mushroom *Pleurotus osreatus* and dried them at a temperature not exceeding 40 °C. The tablets were placed on the PDA media and left for 12 hours to allow the extract to diffuse inside the nutrient media. Then the fungi sample under study was cultured inside the dish and the plates were incubated at a temperature of 26 degrees Celsius for 7 days [15].

3- Method of wells:

The extracts were tested by making holes in the nutrient media PDA with a diameter 6.0Mm by cork cutter, and 5 µl of each concentration were placed inside each hole, then the mushroom sample was placed in the middle of the dish and the dishes were incubated at a temperature of 26 degrees Celsius for 7 days, and the diameter of the inhibition zone for each concentration was measured[16].

Statistical analysis

The data were analyzed according to a factorial experiment 2 * 2 * 4 * 7 * 2 using the complete random design (CRC) and the significant differences between the means of the transactions were determined using the least significant difference LSD at the level of significance 0.01. The ready-made statistical analysis program SPSS was used to analyze the data.

Results and discussion

Extracts of the edible mushroom *Pleurotus osreatus* It has effective activity against many pathogenic fungi under study and isolated from the soil. Three methods were used to show the effect of the above mushroom extracts (high concentrations, wells method and disc method). The results of the high concentration method showed that the effect of the aqueous extract of the edible mushroom *P. osreatus* at concentrations (1.5), (2.0), (2.5) ml% had a high inhibition of fungal growth and was (0.0) Cm except for *Penicillium natatum*, which gave the growth of (3.0) (1.65) Cm for my concentration. (1.5) (2.0)ml % respectively as in Table (1). As for the ethanolic extract of the fungus *P. osreatus*, the growth of the fungi was different, as its growth was inhibited at (0.0) Cm at a concentration of (2.5) ml%, except for *Asperigllus niger*, which showed growth at a concentration of (2.5) ml% and at (1.50) Cm as in Table (2). The disc method showed that the ethanolic extract of *P. osreatus* It has a greater effect than the aqueous extract, and that the rate of fungal growth inhibition increased with the increase in the concentration of the extract. The most inhibiting rate was for the two fungi *Penicillium natatum* and *Aspergillus niger* (3.50) mm at a concentration of (2.5)ml compared to the rest of the fungi and concentrations, followed by the fungus *Rhizopus stolonifer* and then the fungus *Trichoderma hanzianum* Figure (2). As for the aqueous extract by disc method, the fungus *Rhizopus stolonifer* did not show any effect at all concentrations in terms of growth inhibition except at the concentration of (2.5)ml (2.0)mm (Fig. 1). The greatest effect was for the growth of *Asperigllus niger*, where the inhibition was at a concentration of (2.5)ml, followed by *Trichoderma hanzianam* (3.15) (3.40) mm, respectively, and this is by the way of tablets (Fig. 1).

The aqueous extract of *P. osreatus* Inhibit the growth of the fungus *Trichoderma harzianum*. And it has a greater effect than the ethanolic extract, as well as the aqueous extract of the food fungus *P. osreatus* by wells method gave better results in inhibiting the growth of fungi than the alcoholic extract, and *Penicillium natatum* was the most affected fungus by the aqueous and ethanolic extracts Fig. (3),(4).

Table 1: Effect of aqueous extract of edible mushroom *Pleurotus osreatus* on the growth of some pathogenic fungi by high concentration method, with three replicates, and incubation for 7 days.

2.5	2	1.5	1	0.5	control	Concentration ml% / Fungi
0.0 g	0.0 g	0.0 g	5.50 c	5.45 c	9.0 a	*R. stolonifer*
0.0 g	0.0 g	0.0 g	3.10 e	4.85 d	7.65 b	*T. hanzianam*
0.0 g	1.65 f	3.0 e	3.50 e	4.65 d	5.0 cd	*P. natatum*
0.0 g	0.0 g	0.0 g	2.05 f	5.10 cd	8.0 b	*A. niger*

Table 2: Effect of the ethanolic extract of edible mushroom *Pleurotus osreatus* on the growth of some pathogenic fungi by high concentration method, with three replicates and incubation for 7 days.

2.5	2	1.5	1	0.5	control	concentration %ml / Fungi
0.0 j	0.0 j	1.0 i	6.57 c	7.0 c	9.0 a	*R. stolonifer*
0.0 j	0.0 j	1.85 gh	2.80 ef	3.40 e	8.0 b	*T. hanzianam*
0.0 j	2.55 fg	2.0 gh	1.85 gh	1.10 i	5.35 d	*P. natatum*
1.50 hi	2.55 fg	2.40 fg	2.75 ef	7.90 b	6.50 c	*A. niger*

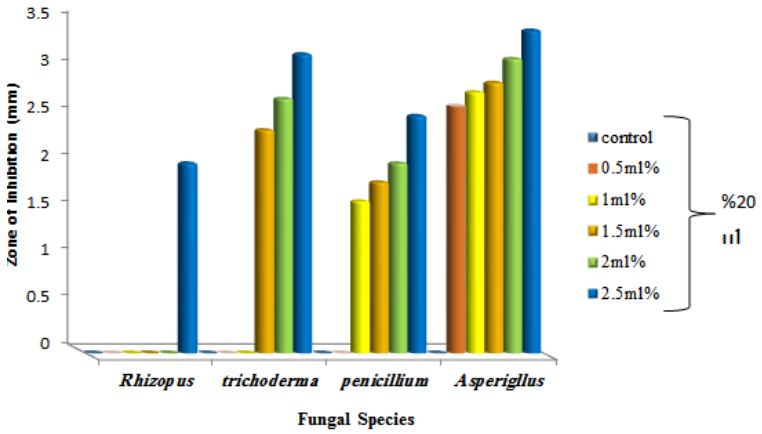

Fig. 1: Effect of aqueous extract of edible mushroom *Pleurotus osreatus* On the growth of some pathogenic fungi by disc method, with three replicates, and incubation for 7 days.

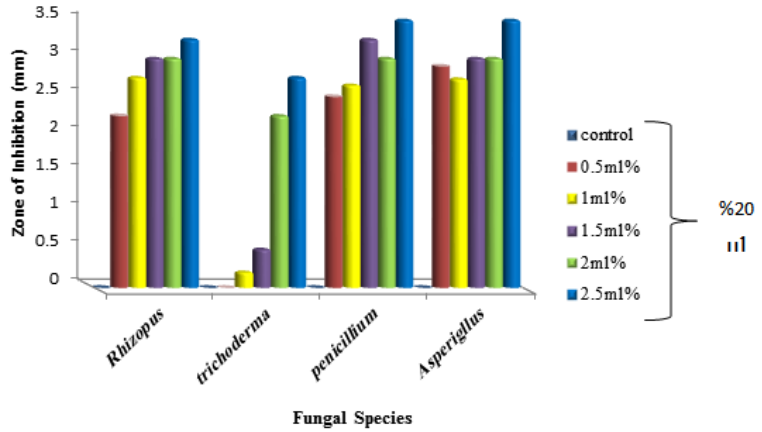

Fig. 2: Effect of the ethanolic extract of edible mushroom *Pleurotus osreatus* On the growth of some pathogenic fungi by disc method, with three replicates, and incubation for 7 days

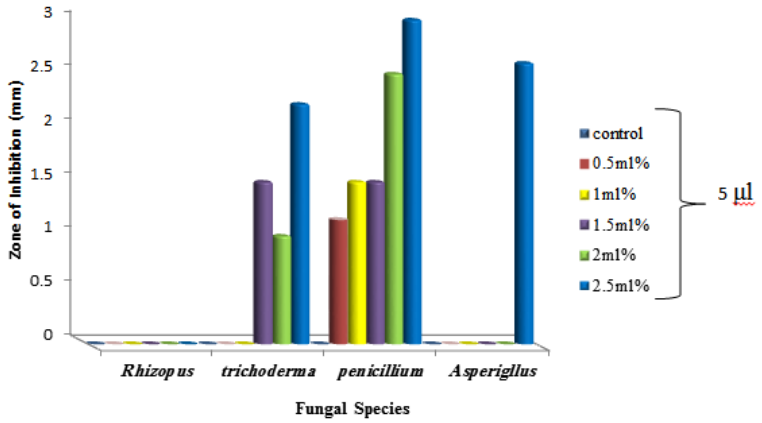

Fig. 3: Effect of aqueous extract of edible mushroom *Pleurotus osreatus* on the growth of some pathogenic fungi by wells method with three replicates and incubation for 7 days.

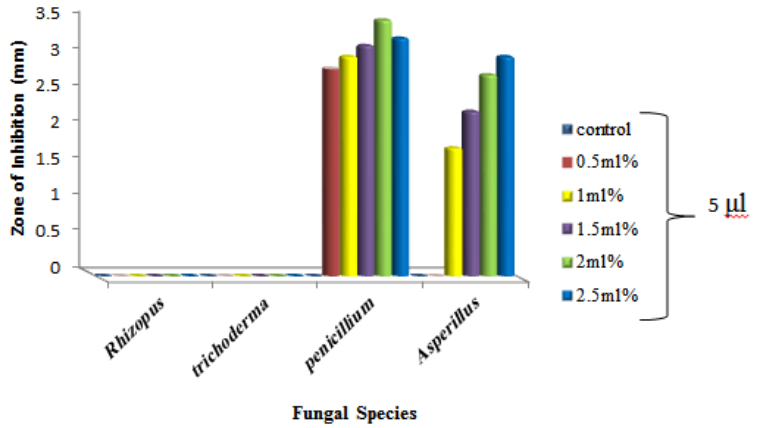

Fig. 4: Effect of the ethanolic extract of edible mushroom *Pleurotus osreatus* on the growth of some pathogenic fungi by wells method with three replicates and incubation for 7 days.

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النشاط التضادي لمستخلصات الفطر الغذائي *pleurotus osreatus* ضد بعض الفطريات المعزولة من التربة

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الملخص

بينت النتائج ان مستخلص الفطر الغذائي *pleurotus osreatus* ومركباته المعزولة منه لها تأثير في تثبيط نمو بعض الفطريات المعزولة من التربة .وبذلك استخدمت تراكيز مختلفة وبثلاث طرق هي: طريقة التراكيز العالية ، طريقة الحفر وطريقة الأقراص، حيث اظهر المستخلص المائي بطريقة التراكيز العالية نتائج افضل من المستخلص الايثانولي ضد بعض الفطريات المعزولة قيد الدراسة خاصة عند تركيز (1.5) (2)(2.5) ml عدا فطر *Penicillium natatum* حيث اعطى نمو طفيف عند تركيزي (2)(2.5)ml .اما طريقة الأقراص حيث اعطى المستخلص الايثانولي تأثير اكبر على نمو الفطريات قيد الدراسة من المستخلص المائي ، وبينت نتائج طريقة الحفر للمستخلص المائي للفطر الغذائي *pleurotus osreatus* اكثر فعالية من المستخلص الايثانولي .