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ANTIMICROBIAL ACTIVITY OF THREE MEDICINAL PLANTS

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الخلاصة

تستخدم النباتات الطبية تقليديا لعلاج بعض الأمراض المسببة بواسطة الجراثيم . الغرض من هذه الدراسة اختبار ثلاثة أنواع من النباتات مستخدمه في الطب الشعبي كمضادات حيوية وقورنت مع المواد المرجعية.

أظهرت المستخلصات الكحولية لهذه النباتات نتائج متفاوتة. وجد أن للعفص نشاطا عاليا ضد الايشريكيه القولونية بينما ابدي مستخلص عرق السوس نشاطا ملحوظا علي الزائفة الزنجبارية, كذلك نتج اثر تثبيطي علي الايشريكيه القولونية عند استخدام حب الرشاد. يمتلك العفص وحب الرشاد أثرا واضحا علي فطر المبيضة البيضاء بينما افتقر عرق السوس هذا الأثر.

يمكن أن نستنتج أن الثلاث نباتات المختبرة تعتبر مصادر متوقعة لمضادات حيوية جديدة ولذلك يرجى عمل بحوث أخري لفصل المواد المسؤلة عن النشاط المضاد للميكروبات.

ABSTRACT

Background: Medicinal plants have been traditionally used for different kinds of ailments including infectious diseases.
Objectives: The present work was undertaken to investigate the antimicrobial activity of three plants used in folk medicine.
Methods: Plant extracts of (*Quercus infectoria*, *Glycyrrhiza glabra* and *Lepidium virginicum*) were *in vitro* tested against four bacterial strains and one type of fungi for their antimicrobial activities by using well diffusion techniques.
Results: The ethanolic extracts of these plants showed varying results. *Quercus infectoria* was found to possess the highly marked antibacterial activity against both *E. coli* and *Staphylococcus aureus* while *Glycyrrhiza glabra* exhibited a significant antibacterial effect against *Pseudomonas aurginosa*. *Lepidium*

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virginicum produced antibacterial activity against *E.coli*. Both *Quercus infectoria* and *Lepidium virginicum* caused a considerable antifungal effect, while *Glycyrrhiza glabra* devoid of such antifungal activity.
Conclusion: The three tested plant extracts could be considered as potential sources of new antimicrobial agents. Further researches should be made to isolate compounds responsible for antimicrobial activities.

Key words: Antimicrobial activity, Medicinal plants, Folk medicine.

INTRODUCTION

Some bacteria and fungi are extremely pathogenic causing serious human infections. The discovery of antibiotics to combat these pathogens marked a resolution in the 20th century (1). Unfortunately, because of the inappropriate use of antibiotics in human, certain strains of bacteria and fungi developed the ability to produce substances which block the action of antimicrobial agents or change their target or ability to penetrate cells (2, 3). To substitute synthetic agents, many of today modern and effective drugs have their origin in traditional Folk Medicine (4). Plants have been used to treat human, animals, and plant diseases from time immorial. Also herbal medicines have been known to man for centuries (5, 6). Therapeutic efficacy of many indigenous plants for many disorders has been described by practitioners of traditional medicine (7–9).

The discovery of medicinal plants in different parts of the world is important to medicine sector, helping in establishment of new directions towards propagation of alternative medicinal plants that offer safe, effective, non toxic, better economic and social benefits (10).

MATERIALS AND METHODS

Plants materials:

Plants used for this study were purchased from the local market. All plant samples were taxonomically identified by the Department of Chemistry and Pharmacognosy, Faculty of Pharmacy, University of Gezira (Table 1).

Microorganism used:

The following strains of bacteria were used: *Pseudomonas aueroginosa*, *Klebsiella pneumoniae*, *Staphylococcus aureus and Escherichia coli*. The yeast strain used in this study was *Candida albicans*. All microorganisms used in the present study were previously identified and kindly supplied by Medical Laboratory, University of Gezira.

Table 1: Plants screened for antimicrobial activities

Botanical name/ family	Common/vernacular name	Plant part tested
1. *Quercus infectoria* Family: Fagaceae	Gall nut (Afas)	Fruit
2. *Glycyrrhiza glabra* Family: leguminosae	Liquorice root (Irgsoos)	Root
3. *Lepidium virginicum* Family: Brassicaceae	Hab-Elrashad	Seed

Extraction of plant materials

This was carried out as described by Doughari *et al*., 2007. Twenty grams of the coarsely powdered plant samples were extracted separately by maceration, using ethanol, in a conical flask for 72 hours, filtered and dried at room temperature and kept in a refrigerator until use. Working solutions were then made for each plant extract by using distilled water to have the corresponding concentrations of 1 gram (plant material)/ml.

***In vitro* testing of extracts for antimicrobial activity:**

Testing for antibacterial activity:

The cup-plate agar diffusion method was adopted according to (12) to assess the antibacterial activity of the prepared ethanolic extracts (1gm\ml). Microorganisms were sub-cultured from slope agar into nutrient agar, incubated at 37 ºC for 18 hours in the incubator. Wells were made at the center of each of the four different sectors of the plate, three of them were filled with 100 µl of plant extract and the other was filled with 100µl of the control (Ceftriaxone 0.1gm). Each extract was tested against organisms in four replicates. Plates were then left for 2 hours at room temperature and then incubated at 37 ºC for 18 hours. The inhibition zones were observed and the results were interpreted by measuring the diameter of clear zones of inhibition (Table 2).

Testing for antifungal activity:

The same method as for bacteria was adopted. Instead of nutrient agar, yeast and mould extract agar was used. The inoculated medium was incubated at 25 ºC for 48 hours for *Candida albicans*. Nystatin the commonly used antifungal agent was used as control (100,000 I.U). Results were displayed in Table2.

RESULTS AND DISCUSSION

The *in vitro* antibacterial and antifungal activities of various morphological parts of the three ethanolic plant extracts against selected microorganisms are shown in Table 2.

It was found that the three plant extracts produced a considerable antifungal

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activity against the tested species except *Glycyrrhiza glabra* which produced no effect against *Candida albicans*.

High antibacterial activity was produced by *Quercus infectoria* against *E. coli*, followed by *Glycyrrhiza glabra* against *pseudomonas aueroginosa* and the least antibacterial effect was elicited by *Glycyrrhiza glabra* against *E. coli*.

These results coincide with those reported in literature (13 – 16).

Furthermore, this study revealed that *Quercus infectoria* and *Lepidium virginicum* extracts were found to possess remarkable inhibitory effects on both bacterial and fungal growth that make such plant species to be considered as a promising antimicrobial agent (17 – 19).

Quercus infectoria gave negative antibacterial effect against *Pseudomonas aueroginosa* as well as *Glycyrrhiza glabra* that lacks anticandidal effect in contrast to data reported in literature(1) and as claimed by practice. These varying results can be attributed to the differences in methods of extraction and biological variations in species used.

Table 2: Antimicrobial activity of the tested plants

	Mean diameter of clear zone of inhibition in (mm)				
Plant Extracts (Plant material) I gm/ml	*Pseudomonas aurginosa*	*Klebsiella pneumoniae*	*Staphylococcus aureus*	*E.coli*	*Candida albicans*
Quercus infectoria	-	15	35	37	22.7
Glycyrrhiza glabra	25.7	14.7	15.7	4.3	-ve
Lepidium virginicum	16	15	28	6.3	19.7
Control Cefteriaxone 0.1g/ml	21	16.7	45	20	-
Nystatin 100000IU/ml	-	-	-	-	25

CONCLUSION

The three tested plant extracts could be considered as potential sources of new antimicrobial agents. Further researches should be made to isolate compounds responsible for antimicrobial activities.

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