In vitro, the Antimicrobial activity of some medicinal plant extracts on the growth of some bacterial and fungal pathogens

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Abstract. This study was done during the period between October to December 2018. The antimicrobial activity of ethanolic extracts of some medicinal plants Daucus carota (seeds), Rheum ribes (roots), Rumex vesicarius (leaves) and Punica granatum (peels) were tested against some clinical isolate of Gram-negative bacteria (Proteus mirabilis, Helicobacter pylori and Klebsiella pneumonia), Gram-positive bacteria (Staphylococcus epidermidis and Streptococcus mutans) and against some pathogenic fungi Trichophyton violaceum and Microsporum audouinii that get from Al-Diwaniyah teaching hospital. The result showed P. granatum have the highest antibacterial activity against all bacterial isolates under study than other extracts, the diameters ranged between (24.4-31.3) mm followed with the D. carota extracts which the diameters ranged between (20.4-28.5) mm, also the result obtained that the most inhibition percentage against fungal isolates was with P. granatum extract which ranged between (64.5-68.6) %, followed with D. carota extract which ranged between (60.7-63.4) %.

Keywords: Antimicrobial activity, Medicinal plants, bacterial and fungal pathogens

Introduction:

In the current time, enjoyable in the using medicinal plants to control the growth of the pathogenic microorganisms such as bacteria and fungi, due to a large numeral of pesticides were more expensive and show side effect, so People's award is turned into herbal antimicrobial (Sassi, et al., 2007). The artificial medication has been barred in the world because of their unwanted qualities such as high and severe, lengthy degradation times (Dossari et al., 2004). Many pathogenic bacteria and fungi increasing in progress of drug resistance in human pathogens as well as the appearance of the unwanted result of certain antimicrobial agents (Phongpaichit et al., 2004). Some plants are recognized as therapeutic because they have active material that causes certain responses to treatment of diseases (Sibanda and Okoh, 2007). Also, it commonly used for its several pharmacological characteristic and compounds of it such as saponins, flavonoids, tannins, essential oils, alkaloids and others that have antimicrobial activity. (Burt, 2004; Choi et al., 2011).

The aim of current study was the examining the antimicrobial activity of ethanolic extracts of D. carota (seeds), R. ribes (roots), R. vesicarius (leaves) and P. granatum (peels) against some clinical isolated of...
Gram-negative bacteria \((Proteus mirabilis, Helicobacter pylori\) and \(Klebsiella pneumonia\)), Gram-positive bacteria \((Staphylococcus epidermidis\) and \(Streptococcus mutans\)) and against some pathogenic fungi \(Trichophyton violaceum\) and \(Microsporum audouinii\).

**Materials and Methods:**

**Preparation of plant extracts:**

The current study was done during the period between October to December 2018, The \(D. carota\) (seeds), \(R. ribes\) (roots), \(R. vesicarius\) (leaves) and \(P. granatum\) (peels) were collected from some market and garden in Al-Diwaniyah city/Iraq, then washed well with distilled water. The used plant parts dried well, then they were mixing with an electric mixer. 30 gm of plant parts were soaked in separate in 100 ml of Alcohol Ethanol (70) % for 2 days. The mixture was filtered through Whatman No.1 filter paper. Rotatory vacuum evaporator was used to concentrate the ethanolic plant extracts at 40 °C. then the extracts reserved in sterile containers at 4 °C until usage (Saxena and Methela,1996).

**Antibacterial assays:**

25 clinical isolated Gram-negative and Gram-positive bacteria got from Al-Diwaniyah teaching hospital. In vitro antimicrobial activity of ethanolic extracts were tested, 50 mg/ml concentrations of all extracts were used, then placed in sterile containers. The agar diffusion technique was used to estimate the antimicrobial activity of ethanolic plant extracts under study. cultural of bacteria were grown in (NB), then placed in Muller Hinton Agar Petri dishes, after that 0.1 ml from it spread in separately with L shaped glass rod under sterile environments, left to dry for 1 minute, then holes (4 mm) were made by using cork borer in the Petri dishes center, 0.1 ml of the deferent extracts were added. The treatment also involved 0.1 ml Chloramphenicol (250 mg) as a control. The Petri dishes were incubated at 37°C for 1 day. Three duplicates were formed for every treatment (Murray et al., 2015).

**Antifungal assays:**

12 clinical isolated of \(Trichophyton violaceum\) and \(Microsporum audouinii\) got from Al-Diwaniyah teaching hospital, then 3 ml of concentration 50 % of different extracts added to flask contained 27 ml of (SDA) separately in a water bath at 50 °C, the mix was shaken very well, after that added into Petri dishes. Holes (4 mm) were made by used cork borer in the Petri dishes center, then filled from the deferent extracts. The treatment also involved distilled water as a control. The Petri dishes were incubated at 25 °C for 1 day. Three duplicates were formed for every treatment (Prize, 1990).

**Statistical analysis:**

(ANOVA) was used to test significant differences between the rates by using Duncan multiple range test at the 0.05 probability level (Daniel and Cross, 2018).

**Result and Discussion:**

The results in the current study showed that the ethanolic extracts of \(D. carota\) (seeds), \(R. ribes\) (roots), \(R. vesicarius\) (leaves) and \(P. granatum\) (peels) had antibacterial activity against all Gram-negative and Gram-positive bacterial isolates (Table 1). \(P. granatum\) have the highest antibacterial activity against all bacterial isolates than other extracts, the diameters ranged between (24.4-31.3) mm followed with the \(D. carota\) extracts which the diameters ranged between (20.4-28.5) mm, also control medium (Chloramphenicol) obtained the most effective against all used bacteria with no significant differences with all \(P. granatum\) treatments and some \(D. carota\) treatments. Usually, the plant extracts have been shown antibacterial activity against some pathogenic bacteria such as \(S. mutans\), \(S. aureus\) and \(E. coli\).
In addition, the ethanolic extract of *P. granatum* shows a significant role against *E. coli* and *Helicobacter pylori* (Sirirak *et al.*, 2005). Also, the result showed the most inhibition percentage against fungal isolates was *P. granatum* extract which ranged between (64.5-68.6) %, followed with *D. carota* extract which ranged between (60.7-63.4) % (Table 2). The antimicrobial effects for plant extracts were significant differences, it may be due to deferent in the active materials in plant extracts, it had contained a numeral of compounds, such as essential oils, tannins, proteins, saponins which had antimicrobial activity and they cause damage of the cell membrane (Kwon *et al.*, 2003; Jasica-Misiak *et al.*, 2004; Vincken *et al.*, 2007). also, these compounds reduce the synthesis of DNA and inhibiting synthesis of protein, which results in death cells (Lisgarten *et al.*, 2002).

**Table 1.** Antibacterial activity of some medicinal plants.

| Extracts | Bacteria              | D. carota (seeds) | R. ribes (roots) | R. vesicarius (leaves) | P. granatum (peels) | Chloramphenicol |
|----------|-----------------------|-------------------|------------------|------------------------|---------------------|-----------------|
| P. mirabilis | 27.8 mm B | 17.9 mm D | 23.7 mm C | 31.3 mm A | 33.5 mm A |
| H. pylori | 23.6 mm B | 18.4 mm C | 19.5 mm C | 26.5 mm A | 28.8 mm A |
| K. pneumonia | 28.5 mm A | 19.3 mm C | 22.1 mm B | 28.7 mm A | 29.6 mm A |
| S. epidermidis | 20.4 mm A | 16.4 mm C | 18.5 mm B | 24.4 mm A | 25.9 mm A |
| S. mutans | 24.7 mm B | 18.1 mm C | 17.6 mm C | 29.5 mm A | 30.5 mm A |

* The same Capital letters within rows indicate no significant differences between means at 5 %.

**Table 2.** Antifungal activity percentage of some medicinal plants.

| Extracts | Fungi              | D. carota (seeds) | R. ribes (roots) | R. vesicarius (leaves) | P. granatum (peels) | Control |
|----------|--------------------|-------------------|------------------|------------------------|---------------------|---------|
| T. violaceum | 63.4 % | 48.3% | 44.2% | 68.6% | 0 % |
| M. audouinii | 60.7 % | 41.7% | 50.3% | 64.5% | 0 % |

**Conclusion:**

The ethanolic extracts of *P. granatum* (peels) and *D. carota* (seeds) has significantly affected the growth of bacterial and fungal isolates under study because it contains a number of important substances in the medical field and the possibility of extraction and purification and uses for the treatment of other bacterial and fungal infections.

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