**Abstract**

A series of experiments were conducted to evaluate the bactericidal activity of extracted crude terpenoids, alkaloids, and phenoles from *Euphorbia minuta*. Study findings clearly indicated that the extracted compounds strongly affected the growth of all bacterial species under the study.

Extracted terpenoids caused a complete eradication to *Klebsiell pneumonia*, *Staphyllococcus aureus*, and *Pseudomonas aeruginosa* in all concentration used. Followed by alkaloids, and phenols. A direct correlation was found between extract concentration and the inhibitory activity of all extracted compounds.

**Introduction**

Finding healing power in plants is an ancient idea. Two hundred and fifty years ago, there were few or no synthetic medicines. The 250,000-300,000 species of higher plants were the main source of drugs of the world population. Today, 75% of the world population, the poor 3/4ths, still relying on those plants and other tools of traditional medicine [1].

Medicinal plants constitute an effective source of both traditional and modern medicine. Herbal medicine has been shown to have genuine utility, and about 80% of rural populations dependant on them for their primary health care [2]. Recently, there has been a significant increase in the use of therapeutically active compounds extracted from plants, commonly called (phytochemicals). However various spp.of plants were used in attempts to develop a new antimicrobial agents[3]. Moreover, some compounds were extracted from Iraqi flora and tested as...
antimicrobial agents against some pathogenic microorganisms [4-6].

**Materials and Methods**

**Plant samples**

Dried whole plant of *Ephorbia minuta* were collected from residential gardens around Baghdad area. The dried materials were milled into fine powder using electrical mill. The active materials of the plant (alkaloids, phenols, and terpenoids) were extracted according to [7, 8]. The allelochemics mentioned above were sterilised by using a membrane filtration unit (sartorious), then transferred into labelled sterile bottles. Different concentrations (5, 10, 15, 20, 25 mg/ml) were prepared from each separated group. Three replicates of each concentration were used in addition to control treatment.

**Tested bacteria**

The following bacteria were isolated from patients with otitis media whom referred to the hospitals in Baghdad. They were used as tested organisms: *Pseudomonas aeruginosa, Staphylococcus aureus, Klebsiella pneumonia, Proteus spp., Escherichia coli, Streptococcus, Staphylococcus epidrimal*. The bacteria isolates were maintained on blood agar slopes [6], at 4°C and subcultured for 24 hrs. before used.

**Bacterial sensitivity testing**

Inocula containing 10⁶ cell / ml were introduced onto the surface of sterile nutrient agar plates. They were distributed evenly with a sterile glass sprader. A sterile paper discs were previously soaked with different concentrations of extracted alkaloids, phenols, or terpenoids [6]. They were carefully placed at the center of the labelled plate of each bacterial strain. The plate were incubated at 37°C. They were examined for zone of inhibition after 24 hrs.

Sensitivity test for antibiotics was applied for bacterial isolates under the study according to [6]. The most three resistant isolates were selected for the evaluation of plant extracts antimicrobial activity.

**Results and Discussion**

Sensitivity test for antibiotics (Table 1) revealed that *P. aeruginosa, St. aureus*, and *K. pneumonia* were the most resistant to antibiotic tested in this study. These species were chosen for the evaluation of antimicrobial activity of extracted allelochmics.

Study results revealed that the extracted crude phenols, alkaloids, and terpenoids, exerted severe effects on all bacterial species, in all concentration used, at varying degree (Table 2). A direct correlation was found between extract concentration and the diameter of inhibition zone. Extracted crude terpenoids causes a complete eradication of all bacterial species tested. *K. pneumonia* was the most sensitive species in all extracted compounds. Followed by *P. aeruginosa*, and *St. aureus* (Table 2).

Different phenolic compounds have different mechanisms in their effects, such as substrate deprivation, membrane disruption, complex with cell wall, inactivate enzymes, material ion complexation, and interaction with eucaryotic DNA “antiviral activity”[3]. Whil terpenoids causes membrane distribution [9]. Alkaloids intercalated into cell wall and/or DNA [10].

No previous study was conducted on *E. minuta*. But there are some studies were conducted to evaluate the antimicrobial activity of plant extracts. Rasadah and Houghton[11] found that the extracts of some bignoniaceae species showed antibacterial activity against the gram-positive bacteria: *B. subtilis, St. aureus, P. aeruginosa*, and gram-negative, *E. coli*. While [12] found that five different species have antimicrobial
activity. Llori et.al [13] found that leaves extracts of *Ocimum gratissimum* were active against *Aeromonas sobria*, *E. coli*, *Plesiomonas shigelloids*, *Salmonella typhi*, and *Shigella dysenteriae*. Generally the above mentioned findings are supported present study findings. More studies are needed for the separation, purification, and identification of active compounds present in *E. minuta*.

**Table 1** The biosensivity of isolated bacteria to different antibiotics

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th><em>P. aeruginosa</em> (47) Isolates (%) resistant</th>
<th><em>S. aureus</em> (38) Isolates (%) resistant</th>
<th><em>K. pneumoniae</em> (15) Isolates (%) resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cip</td>
<td>75</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td>CN</td>
<td>83.3</td>
<td>44.7</td>
<td>13.3</td>
</tr>
<tr>
<td>FOX</td>
<td>91.6</td>
<td>42.1</td>
<td>0</td>
</tr>
<tr>
<td>TOB</td>
<td>75</td>
<td>52.6</td>
<td>46.6</td>
</tr>
<tr>
<td>E</td>
<td>61.6</td>
<td>18.4</td>
<td>100</td>
</tr>
<tr>
<td>TE</td>
<td>100</td>
<td>52.6</td>
<td>53.3</td>
</tr>
<tr>
<td>AMC</td>
<td>91.6</td>
<td>65.7</td>
<td>40</td>
</tr>
<tr>
<td>AM</td>
<td>91.0</td>
<td>63.1</td>
<td>100</td>
</tr>
<tr>
<td>RF</td>
<td>100</td>
<td>21</td>
<td>100</td>
</tr>
</tbody>
</table>

* (100) all Resist
(0) No Resist (all sensitive)

**Table 2** The inhibitery activity of different concentrations (mg/ml) of phenolic, alkaloids, and terpenoid extracted from *Euphorbia minuta* (in mm) on some pathogenic bacteria.

<table>
<thead>
<tr>
<th>Compound</th>
<th>Phenols</th>
<th>Alkaloids</th>
<th>Terpenoids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteriak spp.</td>
<td>C* 5 10 15 20 25</td>
<td>C 5 10 15 20</td>
<td>C 5 10 15 20</td>
</tr>
<tr>
<td><em>P. aeruginosa</em></td>
<td>0 9 ±1 9 ±.9 10 ±2 12 ±1.3 13 ±6</td>
<td>0 - - - -</td>
<td>0 - - - -</td>
</tr>
<tr>
<td><em>St. aureus</em></td>
<td>0 10 ±1.3 14 ±3.6 17 ±2.3 20 ±4 35 ±1.3</td>
<td>5 15 ±1.6 20 ±3.6 25 ±2.1</td>
<td>25 ±6.3 30 ±2.2</td>
</tr>
<tr>
<td><em>K. pneumonia</em></td>
<td>0 - - - -</td>
<td>5 ±0.6 10 ±1.3</td>
<td>10 ±2.3</td>
</tr>
</tbody>
</table>

C* : control treatment
(0) : zero inhibition
(-) : complete eradication

**References**