Antimicrobial Activity Of Aloe Vera And Opuntia Ficus Extract Against Certain Pathogenic Bacteria

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Abstract: The aim of current study is detect the activity role of Aloe vera and Opuntia ficus extract against certain pathogenic bacteria and evaluation of Aloe vera and O. ficus extract against certain pathogenic bacteria inhibition in vitro. 100 samples were obtained from patients with different diseases at age 6 Mon. to 65 years from both genders. This study was carried out in Lab. of Biology Dept., Science College/Tikrit University, at the period from 1st of June 2019 to end of January 2020. The antimicrobial activity was performed with the agar well diffusion method. The results show the ability of Aloe vera for inhibition of bacteria according on concentration and the concentrations of 100% was caused in inhibitory effect on E. coli, Acinetobacte, S. aureus, S. epidermidis and S. haemolyticus isolates at diameter 13, 12, 11, 9.8 and 15 mm respectively. While, Opuntia ficus extract at 100% concentration was caused in inhibitory effect bacteria isolates at diameter 10, 9.7, 8.2, 7 and 12 mm respectively. The results also show Aloe vera was found to be able for inhibition of bacteria concentration of 40% was caused in inhibitory effect on E. coli, Acinetobacte, S. aureus, S. epidermidis and S. haemolyticus isolates at diameter 14, 12, 11, 9 and 15 mm respectively. While, Opuntia ficus extract at 40% concentration was caused in inhibitory effect bacteria isolates at diameter 11, 10, 8, 7 and 13 mm respectively, while other concentrations 10%, 20, 30% show less inhibitory effect compare with 100% and 40% concentrations

Keywords: Aloe vera; Opuntia ficus; Staphylococcus spp; E. coli; Acinetobacter.

INTRODUCTION
Aloe vera has been known and utilized to centuries for its health, medicinal activity and skin care properties [1]. It belongs to Asphodelaceae (Lilaceae) family, and is a shrubby or arborescent, perennial, xerophytic, succulent, pea green color plant [2]. The active components of aloe include anthraquinones, chromones, polysaccharides, and enzymes. The anthraquinones and chromones [3-4]. The plant leaves used in emollient, purgative, antimicrobial, anti-inflammatory [5], anti-oxidant, aphrodisiac, anti-helmenthic, antifungal, anti-cancer activity [6], antiseptic [7] and cosmetic values for health care [4]. Cactus plant usually called as prickly pear (family: Cactaceae). O. ficusindica synthesis and produces sweet and that nutritionally fruits; its tender cladodes are utilized such as green vegetable [8-9]. The mucilage comprise of D-glucose, glucuronic acids, D-galactose, Lrabinose, D-xylose, L-rhamnose and D-galacturonic [10-11]. Other studies reffered that the plants undergo Cactaceae family consist of quercetin with kaempferol and isorhamnetin, the dihydroflavonols, the flavonones and flavanones. The fruit of cactus pear consist of pigments of the betalain which can use as a good potential for food colorant [12-13]. It's used in folk medicine in several counties for several medicinal purposes because of its role in treating different diseases and disorders, anti-inflammatory properties [13], hypoglycemic properties [14], antimicrobial activity [15], anticancer effect [16], inhibition of stomach ulceration [17], antioxidant effects [18], and
neuroprotective effects [19]. So, the aim of this study is elevated the role of Aloe vera and Opuntia ficus extract against certain pathogenic bacteria.

MATERIAL AND METHODS

Preparation of Ethanolic extract
To preparation the ethanol extract, fresh gel was dried by using oven at (85°C for 48 h) and after that powdered. 20 grams was filtered in (200ml) ethanol through paper called Whatman filter (no. 1) and filtrate was evaporated to dryness. The extract was powdered and after that dissolved by using distilled water. Various concentration of A. vera and Opuntia ficus gel extract was prepared for study the antimicrobial activity.

Preparation of Ethanolic stock solution
0.1 gm of powder was dissolved in (100ml) distilled water to obtained 0.001gm i.e 1mg /1ml concentration that is labeled like solution called stock solution. 1ml was dissolved in (100ml) distilled water to obtained 0.1mg /1ml concentration that was used like stock solution. Several concentrations as 10, 20, 30, and 40 μg were prepared from stock solution [20].

Sample
100 samples were obtained from patients with different diseases at age 6 mon to 65 years from both gender. This study was carried out in Lab. of Biology Dept., Science College/Tikrit University, at the period from 1st of June 2019 to end of January 2020.

The test microorganism
All isolates were collected from private hospital that include E. coli from urine, S. aureus from Ear, Staphylococcus epidermidis from skin , Staphylococcus haemolyticus from skin and burns and Acinetobacter from wounds has been collected all bacterial isolates were maintenance by culturing on specific media until use.

The test of antimicrobial activity
Activity of antimicrobial was done by using diffusion method on agar [21]. Bacterial strain culture was prepared in a concentration of (1×106 cell per ml) according to standard of McFarland opacity. the plates of Mueller Hinton agar were inoculated by using (0.1 ml) for all bacterial isolates (1×106 cell per ml) using method called spreading method. 10 ml of extract as a control were inoculated wells. Petri dishes kept at 30min. before they were transport to the incubator device. All petri dishes were incubated at 37°C for 24 h. inhibition zones were measured.

Statistical Analysis
The measurements were analyzed according to one way ANOVA test by utilizing SPSS program version 17. All measurements are expressed as mean ± SE. (significant level of P<0.05) [22].

RESULTS

The test of antibiotic sensitivity
Pathogenic bacteria lead to major and dangerous medical disorders. This condition was resulting in hard to select the suitable treatment for patient. The diffusion method by using Muller Hinton medium to determine antibiotic sensitivity versus isolates; it was explained according to CLSI, (2016) to detect the sensitive or antibiotics resistance. The results of bacterial isolates showed different patterns of antibiotic resistance Tables (1).
Table (1): show the effect of antibiotics

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Polymyxin B</th>
<th>Clindamycin</th>
<th>bacitracin</th>
<th>Doxycycline</th>
<th>dicloxacillin</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. coli</td>
<td>9</td>
<td>31</td>
<td>32</td>
<td>19</td>
<td>16</td>
</tr>
<tr>
<td>Acinetobacter</td>
<td>9</td>
<td>13</td>
<td>9</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>S. haemolyticus</td>
<td>15</td>
<td>R</td>
<td>17</td>
<td>16</td>
<td>R</td>
</tr>
<tr>
<td>S. aureus</td>
<td>20</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>S. epidermidis</td>
<td>25</td>
<td>R</td>
<td>10</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>

The inhibitory effect of ethanol extracts of Aloe vera and Opuntia ficus

The inhibitory effects of *Aloe vera* and *Opuntia ficus* extract on bacteria at different concentration. The results show ability of Aloe vera for bacteria inhibition according to concentration. Concentrations of *Aloe vera* were caused in inhibitory effect on E. coli, Acinetobacte, S. aureus, S. epidermidis and *S. haemolyticus* isolates at diameter 13, 12, 11, 9.8 and 15 mm respectively. While, *Opuntia ficus* extract at 100% concentration was caused in inhibitory effect bacteria isolates at diameter 10, 9.7, 8.2, 7 and 12 mm respectively as shown in table (2).

Table (2): show the effect of ethanolic extract of *Aloe vera* and *Opuntia ficus* at concentration 100%

<table>
<thead>
<tr>
<th>Bacteria type</th>
<th>Treatment</th>
<th>Aloe vera</th>
<th>Opuntia ficus</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. coli</td>
<td></td>
<td>13.0± 0.9 a</td>
<td>10.0±0.25 a</td>
</tr>
<tr>
<td>Acinetobacter</td>
<td></td>
<td>12.0±0.75 b</td>
<td>9.7±0.6 a</td>
</tr>
<tr>
<td>S. haemolyticus</td>
<td></td>
<td>11.0± 0.68 ab</td>
<td>8.2±0.5 b</td>
</tr>
<tr>
<td>S. aureus</td>
<td></td>
<td>9.8± 0.25 c</td>
<td>7.0±0.2 c</td>
</tr>
<tr>
<td>S. epidermidis</td>
<td></td>
<td>15.0±0.3 a</td>
<td>12.0±0.38 ab</td>
</tr>
</tbody>
</table>

The results also show *Aloe vera* (40%) was obtained to be able for bacteria inhibition and resulting in inhibitory effect on E. coli, Acinetobacte, S. aureus, S. epidermidis and *S. haemolyticus* isolates at diameter 14, 12, 11, 9 and 15 mm respectively. While, *Opuntia ficus* extract at 40% concentration was
caused in inhibitory effect bacteria isolates at diameter 11, 10, 8, 7 and 13 mm respectively, while other concentrations 10%, 20, 30% show less inhibitory effect compare with 100% and 40% concentrations as shown in table (3) and figures (1-10).

Table (3): show the effect of ethanolic extract of Aloe vera and Opuntia ficus at different concentration (10%, 20%, 30%, 40%)

<table>
<thead>
<tr>
<th>Bacteria type</th>
<th>Diameter of inhibition zone (mm)</th>
<th>Treatment</th>
<th>Aloe vera</th>
<th>Opuntia ficus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td>E. coli</td>
<td></td>
<td>6</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Acinitobacter</td>
<td></td>
<td>5</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>S. haemolyticus</td>
<td></td>
<td>–</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>S. aureus</td>
<td></td>
<td>–</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>S. epidermidis</td>
<td></td>
<td>7</td>
<td>9</td>
<td>12</td>
</tr>
</tbody>
</table>

Figure (3): Aloe Vera Effect of on S. haemolyticus midis at different concentrations

Figure (4): Aloe Vera Effect of on S. aureus midis at different concentrations
Note: 1= 10% , 2= 20% , 30= 30% and 4= 40% concentrations
DISCUSSION

The antimicrobial activity of aloe vera and *Opuntia ficus* was tested against pathogenic bacteria like *S. e. coli*, *Acinetobacte*, *S. aureus*, *S. epidermidis* and *S. haemolyticus* isolates by using cup plate diffusion method. The A. vera extracts were show to possess compounds which has antimicrobial activity that utilized as antimicrobial agents [23-31]. The results of current study are similar to results of [24] who referred that the methanol and petroleum ether of *Aloe vera* extract at a dose of 20 mg/ml has showed significant activity against *E. coli*. In comparative study to show the antimicrobial activity of Aloe vera gel against bacteria isolates from the fast food [25] demonstrate lower inhibition zones compare to current study, that might be produce from secondary metabolites type which synthesized by Aloe sp. [26]. Antimicrobial activity of *Opuntia ficus* extracts against both gram-positive and gram-negative bacteria. It was clear that *O. ficus* extract is an efficacy extract as antibacterial activity and anti-fungal activity. The most common sensitive bacteria was Staphylococcus spp. These findings may significant to isolate and extract the active compounds, explain the structure and estimate it versus a various types of bacteria that describe as antibiotic resistant. Different studies have been demonstrated the efficiency of herbs against many genus and types of bacteria [27-28]. Also, Our findings agree with other works and studies exhibiting inhibitory effect of phenols that extracted from *O. ficus* are more efficient to Gram v+ compare with Gram v- bacteria [29]. Moreover, other authors [30] referred Opuntia cladodes properties as antimicrobial activity against *E. coli* and *S. aureus*.

REFERENCES


