Antibacterial activity of extract Chamomilla nobile against some human pathogenic bacteria

Saeide Saeidi1, Zahra Sepehri2, Fereshteh Javadian3, Mahmoud Anbari2, Arezoo Azizi2 & Shahla Sahraei2
1Department of Microbiology, Kerman Science and Research Branch, Islamic Azad University, Kerman, Iran.
2Zabol University of Medical Sciences, Zabol, Iran.
3Zabol Medicinal Plant Research Center, Zabol University of Medical Sciences, Zabol, Iran.
*Corresponding Author

Abstract

The present study was carried out to determine the potential antibacterial activity of extract Chamomilla nobile against some human pathogenic bacteria. The antimicrobial effect of ethanol extracts of Chamomilla nobile on pathogenic bacteria namely Streptococcus pyogenes ATCC® 19615™, Strepertococcus pneumoniae ATCC 49619, Staphylococcus saprophyticus ATCC® 15305, Hafnia alvei ATCC 51873, Acinetobacter baumannii ATCC 19606, Enterococcus faecalis ATCC 29212, Proteus mirabilis ATCC 35659, Serratia marcescens ATCC 274, Staphylococcus aureus ATCC© 2592 were determined using broth microdilution method. The levels of MIC was observed ranges from 2.5 to 10 mg/ml. The highest MIC value was observed against Enterococcus faecalis and Serratia marcescens.

Keyword: Chamomilla nobile, Antibacterial activity, Standard bacteria

Introduction

Plants are of great medicinal importance to the health of man. The curative potentials of these plants are locked up and embedded in some chemical components that effect physiological responses in man (1). Many of these medicinal plants are used as spices and food plants; they are also sometimes added to foods meant for pregnant and nursing mothers for medicinal purposes (2,3). The genus Chamaemelum nobile of the plant family Asteraceae is a low-growing evergreen perennial that forms a spreading mat of aromatic foliage typically growing 3-6” tall and spreading by decumbent stems to 12” wide. Daisylke flowers with white rays and yellow centers bloom throughout the summer and into early fall. It is native to the Southwest Europe (France, Spain and Portugal) but the plant is present in all over Europe, North Africa and Southwest Asia. The plant is used to flavor foods, in tisanes, perfumes, and cosmetics. It is used to make a rinse for blonde hair, and is popular in aromatherapy; its practitioners believe it to be a calming agent to reduce stress and aid in sleep. Chamomile is considered to be an antiseptic, antibiotic, disinfectant, bactericidal and vermifuge. Components of the oil include (-)-alphabisabolol oxide A and B, (-)-alphabisabolone oxide A, spiroethers (cis- and trans- enyndicycloether), sesquiterpenes (anethecolitid), cadinene, farnesene, spathulenol, and proazulene (matricarin and matricin). The present study was carried out to determine the potential antibacterial activity of extract Chamomilla nobile against some human pathogenic bacteria.

Bacterial Strains and Culture Conditions

Bacterial strains were obtained from standard laboratory. Evaluate the antibacterial activity of the plant extracts were investigated using strain of bacteria Streptococcus pyogenes ATCC® 19615™, Strepertococcus pneumoniae ATCC 49619, S. saprophyticus ATCC© 15305, Hafnia alvei ATCC 51873, Acinetobacter baumannii ATCC 19606, Enterococcus faecalis ATCC 29212, Proteus mirabilis ATCC 35659, Serratia marcescens ATCC 274, Staphylococcus aureus ATCC© 2592. The typed cultures of bacteria was sub-cultured on Nutrient agar (Oxoid) and stored at 4°C until required for study.

Agar disk diffusion assay:

The susceptibility of all antibiotics was carried out using disc diffusion method on Muller-Hinton agar as recommended by CLSI (11). The procedure followed is briefly described here. Streptococcus pyogenes ATCC® 19615™, Strepertococcus pneumoniae ATCC 49619, S. saprophyticus ATCC© 15305, Hafnia alvei ATCC 51873, Acinetobacter baumannii ATCC 19606, Enterococcus faecalis ATCC 29212, Proteus mirabilis ATCC 35659, Serratia marcescens ATCC 274, Staphylococcus aureus ATCC© 25923 plates were grown overnight on blood agar, Nutrient agar and colony suspension was prepared using the sterile salin water equivalent to a 0.5 McFarland standard. Suspension (100 μl) was spread over the media plate and antibiotic disc was transferred aseptically on the surface of inoculated media plate. Isolated plates were tested with different antibiotics and their concentration shown in parenthesis viz. Ceftazidim(30 μg), erythromycin (15 μg), ceftazidime(30 μg) and tetracyclin (30 μg).
Plant materials:
The flower *Chamomilla nobile* was collection in the region of Iran (Kerman- south-eastern, Iran) and dried at room temperature. Samples were crashed and transferred into glass container and preserved until extraction procedure was performed in the laboratory.

Preparation of extracts:
Plants were properly dried and pulverized into a coarse powder. Each of 20 g grinded powders was soaked in 60 ml ethanol 95 %, separately for one day (shaking occasionally with a shaker). After one day of dissolving process, materials were filtered (Whatman no. 1 filter paper). Then the filtrates were evaporated using rotary evaporator. At last, 0.97 g of dried extracts were obtained and then stored at 4°C in air tight screw-cap tube.

Minimum Inhibitory Concentration (MIC) of plant extracts:
The broth microdilution method was used to determine MIC. All tests were performed in Mueller Hinton broth supplemented with Tween 80 at a final concentration of 0.5% (v/v). Briefly, serial doubling dilutions of the extract were prepared in a 96-well microtiter plate ranged from 2.5 to 10 mg/ml. The highest MIC value was observed with also positive bacteria to chamomile oil. Two additional in vitro studies showed that chamomile blocked the aggregation of Helicobacter pylori and numerous strains of Escherichia coli

Result and Discussion
Plants extracts showed inhibitory activity against bacteria with varying magnitudes and these effects were dose dependent manner. The levels of MIC was observed ranges from 2.5 to 10 mg/ml. The highest MIC value was observed against *Enterococcus faecalis* and *Serratia marcescens* (Table1). Two such studies demonstrated that gram-positive bacteria were more susceptible than gram-negative bacteria to chamomile oil (4). It was most effective against *Staphylococcus aureus*, *Streptococcus mutans*, and *Streptococcus salivarius;* with also *Bacillus megatherium*, *Leptospira interoamaemmphagiae*, and *Trichomonocidal* bactericidal activity (5). Two additional in vitro studies showed that chamomile blocked the aggregation of *Helicobacter pylori* and numerous strains of *Escherichia coli* (6,7).

<table>
<thead>
<tr>
<th>Bacterial</th>
<th>MIC extract plant</th>
<th>Antibiotic resistance</th>
</tr>
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<tbody>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>2.5</td>
<td>E,CE,TE</td>
</tr>
<tr>
<td><em>Streptococcus pyogenes</em></td>
<td>2.5</td>
<td>-</td>
</tr>
<tr>
<td><em>Streptococcus pneumoniae</em></td>
<td>2.5</td>
<td>E,CE,CF</td>
</tr>
<tr>
<td>Hafnia alvei</td>
<td>5</td>
<td>E,TE</td>
</tr>
<tr>
<td><em>S. saprophyticus</em></td>
<td>5</td>
<td>E,CF,TE</td>
</tr>
<tr>
<td><em>Acinetobacter baumannii</em></td>
<td>5</td>
<td>CE,TE</td>
</tr>
<tr>
<td><em>Enterococcus faecalis</em></td>
<td>10</td>
<td>E,CE</td>
</tr>
<tr>
<td><em>Proteus mirabilis</em></td>
<td>5</td>
<td>E,TE</td>
</tr>
<tr>
<td><em>Serratia marcescens</em></td>
<td>10</td>
<td>CE</td>
</tr>
</tbody>
</table>

E = Erythromycin, CE = Cefixime, CF = Ceftazidime, TE = Tetracycllin

Reference