ANTIMICROBIAL ACTIVITY OF FRUITS OF **PRUNUS ARMENIACA** (L.)

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**ABSTRACT**

*Prunus armeniaca* (L.) is known as apricot. It belongs to family *Rosaceae*. It is a hard tree bearing stone fruit which is closely related to peach. It is found in Asia, Europe, North America, China, Maharashtra, and Himachal Pradesh. The present study describes the antimicrobial activity of ethanolic and aqueous extracts of fruits of *Prunus armeniaca* (L.). These activities were tested against human pathogenic microorganisms using disc diffusion method and zone of inhibition of each active extract was determined. The most effective antibacterial activity was observed in the ethanolic extract of fruits against *Staphylococcus aureus* and *Bacillus subtilis*. Additionally, the ethanolic extract was effective against *Proteus vulgaris* and *Escherichia coli*. Significant activity against *Candida albicans* was also observed with the ethanolic extract. The ethanolic extract showed more significant antimicrobial activity as compared to aqueous extract.

**Key Words:** *Prunus, armeniaca, rosaceae, antimicrobial*

**INTRODUCTION:**

A large number of medicinal plants are claimed to be useful in bacterial and fungal diseases in all traditional system of medicine and folklore. While these plants are required proving scientifically. The apricot (*Prunus armeniaca* L.) is a member of the Rosaceae family.1,2 Apricot fruit being a rich source of vitamins & minerals is one of the most familiar crops worlds wide. Apricot trees are not ubiquitous since they can only grow in certain regions where the environmental conditions are favourable. In general *Prunus armeniaca* (L.) is used in folk medicine in the treatment of skin diseases3,4 & parasitic diseases5,6. As a part of search for new biological activity of a plant extracts preliminary bioscreening7 were performed to evaluate the antibacterial and antifungal activity of ethanolic and aqueous extracts of *Prunus armeniaca* (L.).

**MATERIALS AND METHODS**

The plant *Prunus armeniaca* (L.) has been collected from private farm of Simla, district of Himachal Pradesh; India. The plant was identified at Plant Anatomy Research Center, West Tambaram, Chennai (PARC/2009/478).

**ANTIBACTERIAL ACTIVITY**8,9:

**Preparation of culture media:**10

**Mueller Hinton Agar:**

- Beef, Infusion Form - 300 gm
- Casein Acid Hydrolysate - 17.50 gm
- Starch - 1.50 gm
- Agar - 17.00 gm
- Distilled water - q.s.to make 1000 ml

Beef extract, Casein acid Hydrolysate, starch and agar were mixed with 800 ml of distilled water and digested for an hour on water bath. The pH was adjusted to 7.4. Volume was adjusted to 1000 ml with distilled water. It was then again digested on autoclaving at 121°C, 15 lbs pressure for 20 minutes, cooled and stored in a refrigerator for over night.

**Preparation of standard discs:**

Commercially available standard discs (Hi Media Company) were taken as a standard drug.

**Preparation of sample:**

From stock solution of test extracts different concentration were prepared for performing antibacterial activity. The dilute extracts were stored in a sterile container and kept in a refrigerator.

**Method of inoculation in solid media:**

A platinum loop was well sterilized by keeping it vertically on a flame and it was made red hot and allowed to cool. The loop was touched with well-mixed specimens and rubbed on one side of dry media in little area (A). The loop was again sterilized and plate was rotated for 90°. The loop was rubbed 3-4 times on media of previously inoculated side (A) and little part of non-inoculated media was (B). Again the plate was rotated and above process was repeated.

** Screening of antibacterial activity**11,12:

**Cup plate method:**

Micro- wells were made on culture media in 6 mm in diameter with the help of gel puncture machine. The micro- wells were filled with 100 µl from different concentration of ethanolic and aqueous extracts. Standard disc (Ciprofloxacin) was also impregnated on the medium. The Petri dishes used for antibacterial screening were incubated at 37°C for 24-48 hours. The activity was measured in terms of diameter of zone of inhibition appearing around the micro -wells.
Results of screening of antibacterial activity with different extracts of *Prunus armeniaca* (L.) are given in the Table No. 1.

Table 1: Antibacterial effect of various extracts of fruits of *prunus armeniaca* (l.) on various pathogenic microorganisms

<table>
<thead>
<tr>
<th>Microorganisms</th>
<th>ZONE OF INHIBITION (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ethanolic Extract 4mg/ml</td>
</tr>
<tr>
<td><em>Escherichia coli</em></td>
<td>20</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>27</td>
</tr>
<tr>
<td><em>Proteus vulgaris</em></td>
<td>30</td>
</tr>
<tr>
<td><em>Bacillus subtilis</em></td>
<td>44</td>
</tr>
</tbody>
</table>

Figure 1: Graphical representation of antibacterial activity of various extracts of fruits of *Prunus armeniaca* (l.)

ANTIFUNGAL ACTIVITY:

Preparation of culture media:

Sabouraud's dextrose broth:

Dextrose - 4.0 gm
Peptone - 1.0 gm
Agar - 1.50 gm
Chloramphenicol - 5.0 mg
Distilled water - q.s.to make 1000 ml

Dextrose, peptone, agar and Chloramphenicol were mixed with 800 ml of distilled water and digested for an hour on water bath. The pH was adjusted to 5.4-5.8. Volume was adjusted to 1000 ml with distilled water. It was then again digested on autoclaving at 121°C, 15 lbs pressure for 20 minutes, cooled and stored in a refrigerator for 3-5 days.

Preparation of standard discs:

Commercially available standard discs (Hi Media Company) were taken as a standard drug.

Preparation of sample:

From stock solution of test extracts of concentration 200 µg/ml were prepared for performing antifungal activity. The dilute extracts were stored in a sterile container and kept in a refrigerator.

Method of inoculation in solid media:

A platinum loop was well sterilized by keeping it vertically on a flame and it was made red hot and allowed to cool. The loop was touched with well-mixed specimens and rubbed on one side of dry media in little area (A). The loop was again sterilized and plate was rotated for 90°. The loop was rubbed 3-4 times on media of previously inoculated side (A) and part of non-inoculated media was (B). Again the plate was rotated and above process was repeated.

Screening of antifungal activity:

Cup plate method:

Micro- wells were made on culture media in 6 mm in diameter with the help of gel puncture machine. The micro- wells were filled with 100 µl by 200µg/ml of ethanolic and aqueous extracts. Standards disc (Amphotericin B 50 µg/disc) was also impregnated on the medium. The Petri dishes used for antifungal screening were incubated at 37°C for 24-48 hours. The activity was measured in terms of diameter of zone of inhibition appearing around the micro-wells.

Results of screening of antifungal activity with different extracts of *Prunus armeniaca* (L.) are given in the Table No. 2.
Table 2: Antifungal effects of various extracts of Prunus armeniaca (L.) on various pathogenic microorganisms

<table>
<thead>
<tr>
<th>Micro-organisms</th>
<th>Zone of Inhibition (mm)</th>
<th>Ethanol Extract 200 µg/ml</th>
<th>Aqueous Extract 200 µg/ml</th>
<th>Standard Drug (Amphotericin B) 50 µg/Disc</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Candida albicans</em> 32354 - B311</td>
<td>08</td>
<td>00</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td><em>Aspergillus niger</em> 38857 (IFO4407)</td>
<td>00</td>
<td>00</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

**RESULTS AND DISCUSSION**

Antibacterial activity of ethanolic and aqueous extracts of *Prunus armeniaca* (L.), were investigated.

Ethanolic and aqueous extracts of *Prunus armeniaca* (L.) showed the antibacterial activity against *Escherichia coli*, *Staphylococcus aureus*, *Proteus vulgaris* and *Bacillus subtilis*.

For *Escherichia coli*: Ethanolic extract at different concentrations (400, 200 and 100 µg/ml) showed the zone of inhibition 20mm, 12mm, 0 mm respectively. Aqueous extract at different concentrations (400, 200 and 100 µg/ml) showed the zone of inhibition 18, 12, 0 (mm) respectively as compared to standard drug (Ciprofloxacin 30 µg/disc) 30mm.

For *Staphylococcus aureus*: Ethanolic extract at different concentrations (400, 200 and 100 µg/ml) showed the zone of inhibition 27, 30, 40(mm) respectively. Aqueous extract at different concentrations (400, 200 and 100 µg/ml) showed the zone of inhibition 22, 24, 27 (mm) respectively as compared to standard drug (Ciprofloxacin 30 µg/disc) 15 mm.

For *Proteus vulgaris*: Ethanolic extract at different concentrations (400, 200 and 100 µg/ml) showed the zone of inhibition 30mm, 16mm, 06 mm respectively. Aqueous extract at different concentrations (400, 200 and 100 µg/ml) showed the zone of inhibition 21, 06, 00 (mm) respectively as compared to standard drug (Ciprofloxacin 30 µg/disc) 28 mm.

For *Bacillus subtilis*: Ethanolic extract at different concentrations (400, 200 and 100 µg/ml) showed the zone of inhibition 44mm, 30mm, 22 mm respectively. Aqueous extract at different concentrations (400, 200 and 100 µg/ml) showed the zone of inhibition 40, 18, 16(mm) respectively as compared to standard drug (Ciprofloxacin 30 µg/disc) 30 mm.

**Antifungal Activity:**

Antifungal activity of ethanolic and aqueous extracts of *Prunus armeniaca* (L.), were investigated.

For *Candida albican*: Ethanol extract at concentration (200 µg/ml) showed the zone of inhibition 08mm. Aqueous extract at concentration (200 µg/ml) showed the zone of inhibition 00mm as compared to standard drug (Amphotericin B 50 µg/disc) 10 mm.

For *Aspergillus niger*: Both ethanolic and aqueous extracts at concentration (200 µg/ml) showed no antifungal activity. Only ethanolic extract of *Prunus armeniaca* (L.) showed the antifungal activity against *Candida albican*.

**CONCLUSION**

The antibacterial studies on both ethanolic and aqueous extracts (400µg/ml) showed significant antibacterial activity against *Staphylococcus aureus*, *Bacillus subtilis* and *Proteus vulgaris* as compared to standard drug (Ciprofloxacin 30 µg/disc). Ethanolic extract showed more significant antibacterial activity as compared to aqueous extract.

The antifungal studies on ethanolic extract (200µg/ml) of the fruit showed significant effect against *Candida albican* as compared to standard drug (Amphotericin B 50 µg/disc). Ethanolic extract showed significant antifungal activity where as aqueous extract showed no activity.

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REFERENCES