Evaluation of Antibacterial Activity of Flowers of *Moringa Oleifera* Lam

Abhijeet D. Kumbhar\(^1\)*, Vamsikrishna G. K.\(^2\) and Surekha Khot\(^3\)

\(^{1-3}\) Department of Post Graduate studies in Dravyaguna, Shri Shivayogeeshwar Rural Ayurvedic Medical College & Hospital, Inchal, Tahsil Soundatti, Dist. Belgavi, MS, India

**ABSTRACT**

**Background:** *Moringa Oleifera Lam.* (*Shigru*) is a well-known drug in Ayurveda used for its Krimighna activity (ability to kill the pathogens). Acharya Charaka had mentioned *Shigru* in *Krimighna* \(^1\) Mahakashaya. Whereas, some nighantus had specifically mentioned *Krimighna* activity of flowers of *Moringa Oleifera Lam.* viz. *Kaiyadeva* \(^2\) Nighantu and *Shaligram* \(^3\) Nighantu. Therefore, powder of flowers (*Shigru Pushpa Churna*) is selected for evaluation of anti-bacterial activity on the strains which affects a large number of population.

**Methods:** *Shigru Pushpa churna* was tested for anti-bacterial activity at different concentrations viz., 5µl, 10µl, 25µl, 50µl and 75µl, by Disc Diffusion method for 2 strains of Gram positive and 2 strains of Gram negative bacteria each, with DMSO (Dimethyl Sulphoxide) a neutral solvent.

**Result:** *Shigru Pushpa* inhibits growth of *Staphylococcus aureus*, *Streptococcus mutans*, *Pseudomonas auringinosa* and *Escheria coli* at higher concentrations of 50µl and 75µl whereas it is resistant at 5µl, 10µl and 25µl. Zone of inhibition was 13mm for *Staphylococcus aureus*, 13mm for *Streptococcus mutans*, 12mm for *Pseudomonas auringinosa*, 20mm for *Escheria coli* and activity index were 0.86, 0.43, 0.48 and 0.50, respectively.

**Conclusion:** *Shigru Pushpa* possess good anti bacterial activity against *Staphylococcus aureus*, *Streptococcus mutans*, *Pseudomonas auringinosa* and *Escheria coli*.

**KEYWORDS**

*Shigru, Moringa oleifera Lam, Zone of Inhibition, Anti-bacterial, Activity Index, Bacteria*
INTRODUCTION

*Moring Oleifera Lam.* is slender and fast growing plant belonging to family moringaceae. Plant is indigenous in sub Himalayan tract. It is commonly cultivated throughout the country and grows almost throughout India\(^4\).

It has corky bark; soft, white and spongy wood. Leaves are about 30-75 cms long, tripinnate in structure with petiole sheathing at base. Pinnate are 4-6 in pairs in which uppermost pinnate are opposite to each other. Foliate glands are present between each pair of pinnate and pinnulae. Ultimate leaflets are opposite to each other and about 0.85 to 1.7cms long entirely obovate or elliptical in nature, membranous and pale from beneath\(^5\).

In *Ayurveda* plant is popularly known as *Shigru* (*Sanskrit*), Drum stick plant, Horse radish tree (*English*), *Sahijana* (*Hindi*), *Saint, Sajjina* (*Bengali*), *Murunga* (*Tamil*), *Munuga* (*telagu*), *Shevaga, Sagata* (*Marathi*).

The plant (Fig 1) contains 4-hydroxymellein, vanillin, moringine, moringinine, bayrenol, indole acetic acid, indoleacetonitrile, benzylisothiocynate, pterogospermine exhibits antibiotic activity.

It has hypotensive, antibacterial, antifungal, antiviral, depressant, hepatoprotective, anti-inflammatory, anti-cancer, antibiotic, stimulant, anti-tubercular, anti-fertility action. Leaves are anti-inflammatory, anodyne, anti-helmintic, ophthalmic rich in vitamin A and C\(^6\).

Therefore, plant is selected for antibacterial activity.

![Shigru Flowers](image1)

**Fig 1** Shigru Flowers

**Figure 1** Description:

Flowers are about 2.5 cms in diameter, strongly honey scented, linear lanceolate in nature with sepals reflexed. Petals are about 1.7-2.5 cms long, linear sapulated, white in colour with yellow dot near base.

MATERIALS & METHODS

**Plant Material:** Flowers of Shigru were collected from Inchal village, Soundatti Tahasil, Belgavi and were authenticated at Central Research Facility, Analytical Laboratory, Belgavi with authentification number CRF/79/2015.

**Preparation of Churna:** Flowers were dried in the shade for 7 days and churna is
prepared with help of grinder which passes through 120 mesh.

**Anti-bacterial activity:** The bacterial strains selected were
- Gram Positive
  - Staphylococcus aureus
  - Streptococcus mutans
- Gram Negative
  - Pseudomonas auringinosa
  - Escherichia coli

The pathogenic strains of above bacteria were selected and anti-bacterial study was performed at Microbiology Department, Nathajirao G. Halgekar Institute of Dental Sciences and Research Centre Belgaum.

**Revival of microbial cultures:** It was done by growing them in a flask in broth medium.

Nutrient broth medium, 20 ml was transferred to four 100 ml conical flasks one flask for each bacteria. The flasks were capped with cotton plug and autoclaved at 121°C for 20 minutes at 15 lb pressure per square inch. Dried & frozen bacteria were transferred to conical flasks with nutrient broth media, kept at 37°C to get cultures.

**Preparation of media and media plates:**

Brain heart infusion agar was taken for all pathogens. Agar, 38 gms was dissolved in 1 litre of distilled water. The sterilized media was poured into sterile petri dishes aseptically. Agar acts a solidifying agent, when solidified the cups (holes) of 8mm diameter were bored using cork borer.

After that solidifying plates were kept inverted at 37°C overnight for checking any contamination. Bacterial cultures were applied to discs with the help of cotton swab stick. Prepared plates were incubated at 37°C for 24 hours.

**Preparation of Test solution**

Test compound was dissolved in DMSO (dimethyl sulphoxide) each 2 ml to give following concentrations.

1) 10 mg test compound dissolved in 2 ml of DMSO to get 5 μl concentration
2) 20 mg test compound dissolved in 2 ml of DMSO to get 10 μl concentration
3) 50 mg test compound dissolved in 2 ml of DMSO to get 25 μl concentration
4) 100 mg test compound dissolved in 2 ml of DMSO to get 50 μl concentration
5) 150 mg test compound dissolved in 2 ml of DMSO to get 75 μl concentration

**Disc Diffusion method:** For evaluation of anti-bacterial activity Disc Diffusion method was adopted.

Test solutions in 5 different concentrations viz. 5μl, 10μl, 25μl, 50μl and 75μl were placed in cups using sterilized pipettes with control and negative groups.
Petri plates were kept in a refrigerator for 2 hours to allow uniform diffusion of the solution then taken out from refrigerator and incubated fort 48 hours at 37°C. After incubation period was over, plates were observed for zone of inhibition and measured using transparent scale and readings were taken.

**Group Design:**
Test group: 5µl, 10µl, 25µl, 50µl and 75µl

**RESULTS**

<table>
<thead>
<tr>
<th>Si. No.</th>
<th>Micro organism</th>
<th>Concentration of Flowers of Moringa Oleifera Lam. (Test Drug)</th>
<th>Ofloxacin (Standard Drug)</th>
<th>D/W (Negative Group)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>75 µl</td>
<td>50 µl</td>
<td>25 µl</td>
</tr>
<tr>
<td>1.</td>
<td>Staphylococcus aureus</td>
<td>13 mm</td>
<td>10 mm</td>
<td>R</td>
</tr>
<tr>
<td>2.</td>
<td>Streptococcus mutans</td>
<td>13 mm</td>
<td>12 mm</td>
<td>R</td>
</tr>
<tr>
<td>3.</td>
<td>Psuedomonas auriginosa</td>
<td>12 mm</td>
<td>10 mm</td>
<td>R</td>
</tr>
<tr>
<td>4.</td>
<td>Escheria coli</td>
<td>20 mm</td>
<td>15 mm</td>
<td>12 mm</td>
</tr>
</tbody>
</table>

Note - R – Resistant

**Table 1** Description:

The *Shigru Pushpa* shows zone of inhibition of 13 mm for 75 µl, 10 mm for 50 µl and become resistant for 25 µl, 10 µl, and 5 µl for Staphylococcus aureus.

The *Shigru Pushpa* shows zone of inhibition of 13 mm for 75 µl, 12 mm for 50 µl and become resistant for 25 µl, 10 µl, and 5 µl for Streptococcus mutans.

The *Shigru Pushpa* shows zone of inhibition of 12 mm for 75 µl, 10 mm for 50 µl and become resistant for 25 µl, 10 µl, and 5 µl for Psuedomonasauriginosa.

Concentrations of *Shigru Pushpa Churna* in DMSO.

Standard Group: 5% w/v ofloxacin

Negative Group: Distilled water

**Determination of activity index**

Activity index of crude plant was calculated as:

\[
\text{Activity Index} = \frac{\text{Zone of inhibition of test drug}}{\text{Zone of inhibition of standard drug}}.
\]

**Table 1** Table of Test drugs, Standard and Negative control group

The *Shigru Pushpa* shows zone of inhibition of 20 mm for 75 µl, 15 mm for 50 µl, and 12mm 25 µl, for become resistant for 25 µl, 10 µl, and 5 µl for Escherichia coli.

![Fig 2 Zone of Inhibition for *Staphylococcus aureus*](image-url)
The *Shigru Pushpa* shows zone of inhibition of 13 mm for 75 µl, 10 mm for 50 µl and become resistant for 25 µl, 10 µl, and 5 µl for *Staphylococcus aureus*.

**Figure 3** Description:
The *Shigru Pushpa* shows zone of inhibition of 13 mm for 75 µl, 12 mm for 50 µl and become resistant for 25 µl, 10 µl, and 5 µl for *Streptococcus mutans*.

**Figure 4** Description:
The *Shigru Pushpa* shows zone of inhibition of 12 mm for 75 µl, 10 mm for 50 µl and become resistant for 25 µl, 10 µl, and 5 µl for *Psuedomonas auringinosa*.

**Figure 5** Description:
The *Shigru Pushpa* shows zone of inhibition of 20 mm for 75 µl, 15 mm for 50 µl, and 12 mm 25 µl, for become resistant for 25 µl, 10 µl, and 5 µl for *Escherichia coli*.

**Graph 1** Graph of Test drugs, Standard and Negative control group

**Table 2** Description:
The Activity Index of *Shigru Pushpa* was 0.86 for *Staphylococcus aureus*, 0.43 for *Streptococcus mutans*, 0.48 for *Psuedomonas auringinosa* and 0.66 for *Escherichia coli*. 
Table 2 Table of Activity Index

<table>
<thead>
<tr>
<th>Si. No.</th>
<th>Micro organism</th>
<th>Shigru Pushpa zone of inhibition in mm at 75 μl</th>
<th>Ofloxacin zone of inhibition in mm</th>
<th>Activity Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Staphylococcus aureus</td>
<td>13 mm</td>
<td>15 mm</td>
<td>0.86</td>
</tr>
<tr>
<td>2.</td>
<td>Streptococcus mutans</td>
<td>13 mm</td>
<td>30 mm</td>
<td>0.43</td>
</tr>
<tr>
<td>3.</td>
<td>Psuedomonas auriginosa</td>
<td>12 mm</td>
<td>25 mm</td>
<td>0.48</td>
</tr>
<tr>
<td>4.</td>
<td>Escheria coli</td>
<td>15 mm</td>
<td>30 mm</td>
<td>0.66</td>
</tr>
</tbody>
</table>

**DISCUSSION**

The *Shigru Pushpa* shows zone of inhibition of 13 mm for 75 μl, 10 mm for 50 μl and become resistant for 25 μl, 10 μl, and 5 μl for *Staphylococcus aureus*.

The *Shigru Pushpa* shows zone of inhibition of 13 mm for 75 μl, 12 mm for 50 μl and become resistant for 25 μl, 10 μl, and 5 μl for *Streptococcus mutans*.

The *Shigru Pushpa* shows zone of inhibition of 12 mm for 75 μl, 10 mm for 50 μl and become resistant for 25 μl, 10 μl, and 5 μl for *Psuedomonas auriginosa*.

The *Shigru Pushpa* shows zone of inhibition of 20 mm for 75 μl, 15 mm for 50 μl, and 12mm 25 μl, for become resistant for 25 μl, 10 μl, and 5 μl for *Escherichia coli*.

The study shows higher zone of inhibition at 75 μl and the zone of inhibition lowers with the concentration and become resistant at 25 μl, 10 μl, and 5 μl of the test drug.

**CONCLUSION**

The difference in activity at different concentrations may be due to concentrations of phytoconstituents in the test drug sample. This indicates that the proper concentrations of phytoconstituents in other words the proper dose of the drug is essential for antibacterial activity, as the higher concentrations are giving more promising results. Higher (75 μl) concentration of test drug gives significantly good results as compared to 50 μl, 25 μl, 10 μl, and 5 μl concentration of the test drug. Out of four pathogens tested, all the four viz. *Staphylococcus aureus*, *Streptococcus mutans*, *Psuedomonas auriginosa* and *Escherichia coli* are inhibited by Flowers of *Moringa Oleifera Lam*. Activity index for *Staphylococcus aureus* (0.86) was significantly higher than *Streptococcus mutans*, *Psuedomonas auriginosa* and *Escherichia coli*. 
This study concludes that powder of Flowers of *Moringaoleifere Lam.* possess good anti bacterial effect.
REFERENCES


