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# ANTIMICROBIAL ACTIVITY AND PRELIMINARY PHYTOCHEMICAL SCREENING OF METHANOLIC LEAF EXTRACT OF *SENNA TORA*

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**Abstract:**

***Background:*** *Senna tora is a medicinal plant traditionally used in several indigenous systems of medicine. The present study evaluated the preliminary phytochemical profile and in vitro antimicrobial activity of a leaf extract of Senna tora.*

***Methods:*** *Leaves were collected from a local field in Gulbarga, Karnataka, authenticated, shade-dried, powdered and extracted by Soxhlet extraction using methanol. The concentrated extract was subjected to preliminary phytochemical screening. Antimicrobial activity was assessed by the agar well diffusion method against Escherichia coli, Staphylococcus aureus, Aspergillus niger and Aspergillus flavus at 25, 50, 75 and 100 µg/mL, with measurements performed in triplicate.*

***Results:*** *The methanolic extract showed a yield of 1.44% w/w and was described as a semi-solid dark-green extract. Preliminary screening indicated the presence of carbohydrates, proteins, alkaloids, tannins, flavonoids and glycosides, while phenolic compounds and steroids were reported absent. For E. coli, mean inhibition zones for the methanolic extract increased from 3.8 mm at 25 µg/mL to 17.1 mm at 100 µg/mL; for S. aureus, from 3.7 mm to 16.9 mm. For A. niger, the corresponding values were 3.3–16.5 mm, and for A. flavus, 3.9–17.2 mm.*

***Conclusion:*** *The findings reported in the source study indicate concentration-dependent antimicrobial activity of the methanolic leaf extract of Senna tora against the tested organisms. Further studies involving standardized susceptibility testing, MIC/MBC or MFC determination, isolation of active constituents, toxicity assessment and mechanistic evaluation are required before therapeutic conclusions can be drawn.*

*Keywords: Senna tora, Methanolic extract, Phytochemical screening, Antimicrobial activity and Agar well diffusion.*

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## 1. INTRODUCTION:

Medicinal plants are important sources of biologically active secondary metabolites and have historically contributed to traditional healthcare. The search for plant-derived antimicrobial agents has gained importance in the context of increasing concern regarding antimicrobial resistance and the limitations associated with some conventional agents. Senna tora commonly known as Chakramarda or sickle pod, is an annual or short-lived herb of the family Fabaceae and is widely distributed in tropical and subtropical regions, including India. Different parts of the plant, particularly leaves and seeds, have been traditionally used for skin disorders, digestive complaints and other ailments. The plant has been reported to contain anthraquinones, flavonoids, tannins, phenolic constituents, glycosides, steroids and other metabolites, and previous literature has described antimicrobial, antioxidant, anti-inflammatory, anthelmintic and other pharmacological activities. The present study was undertaken to examine the phytochemical constituents of Senna tora leaves and to evaluate the in vitro antimicrobial activity of their methanolic extract.

## 2. MATERIALS AND METHODS:

### 2.1 Plant material and authentication

Senna tora was collected from a local field in Gulbarga, Karnataka, India. The material was washed with tap water to remove dust and soil, shade-dried, powdered and passed through sieve No. 40. The plant specimen was authenticated by Dr. Rasika Kapale, Head of the Department of Botany, VG Women's Degree College, Gulbarga, Karnataka, India.

### 2.2 Preparation of extract

Soxhlet extraction was used. Approximately 500 g of dried Senna tora plant material was extracted with methanol. The extract was filtered and concentrated using a rotary vacuum evaporator at 70–80 °C. The reported extract was semi-solid and dark green.

### 2.3 Preliminary phytochemical screening

The extract was screened using reported qualitative procedures for carbohydrates, proteins, alkaloids, tannins, flavonoids, steroids and glycosides. The source document also describes individual tests including Molisch's, iodine, Fehling's, Benedict's, Barfoed's, Seliwanoff's and Bial's tests for carbohydrates; Mayer's, Dragendorff's and Wagner's tests for alkaloids; gelatin, phenazone, goldbeater's skin and match-stick tests for tannins; and standard qualitative reactions for proteins, flavonoids, steroids and glycosides.

### 2.4 Antimicrobial assay

Antimicrobial activity was evaluated by the agar well diffusion method. Nutrient agar was used for bacterial assays and potato dextrose agar for fungal assays. The media were sterilized by autoclaving at 121 °C for 20 min. Plates were inoculated with cultures, and wells of approximately 10 mm diameter were prepared. Plant extract solutions were prepared at 1, 2, 3 and 4 mg/mL in ethanol and water according to the methods section; however, the results table reports concentrations of 25, 50, 75 and 100 µg/mL. Approximately 100 µL of test solution was added to the wells. Bacterial plates were incubated at 37 °C for 18–24 h and fungal plates at 28 °C for 48 h. Zones of inhibition were measured in millimeters. The experiment was performed in triplicate and repeated three times according to the source document.

## 3. RESULTS:

### 3.1 Extract yield

| Extract | Condition | Nature | Colour | Yield (w/w) |
|---|---|---|---|---|
| Methanol | 70–80 °C | Semi-solid | Dark green | 1.44% |

The reported methanolic extract yield was 7.2 g from the processed plant material, corresponding to 1.44% w/w.

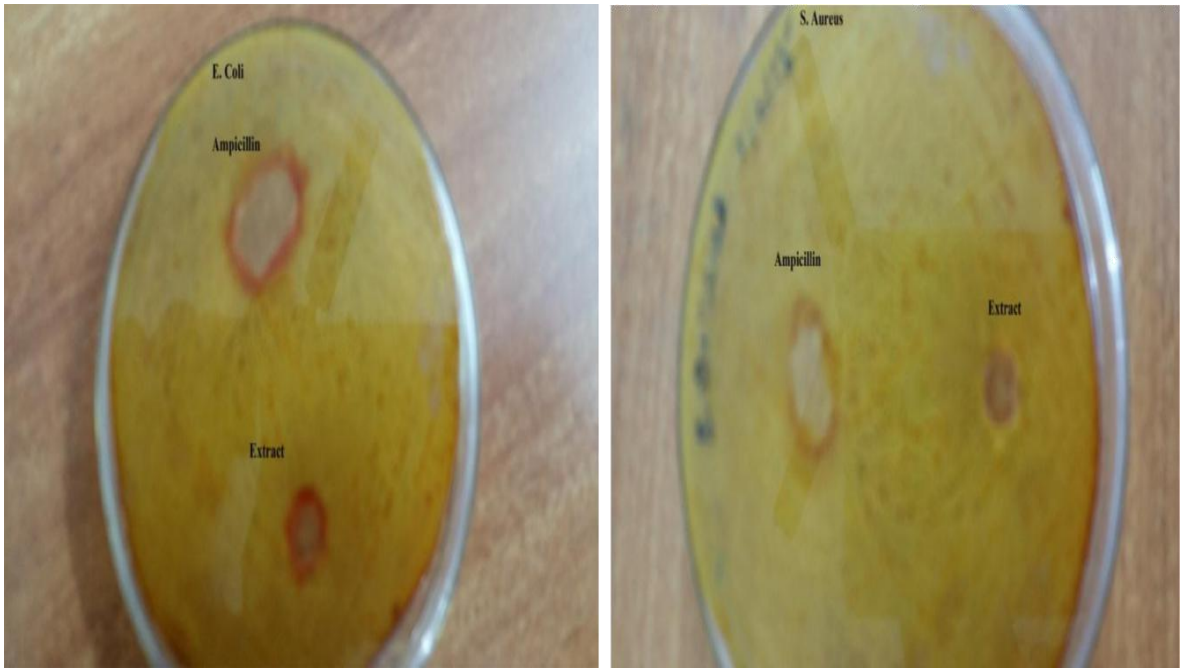
### 3.2 Preliminary phytochemical screening

| Phytochemical constituent | Reported response | Interpretation |
|---|---|---|
| Carbohydrates | + | Present |
| Proteins | ++ | More clarity |
| Alkaloids | + | Present |
| Phenolic compounds | – | Absent |
| Tannins | +++ | Better response |
| Steroids | – | Absent |
| Flavonoids | +++ | Better response |
| Glycosides | + | Present |

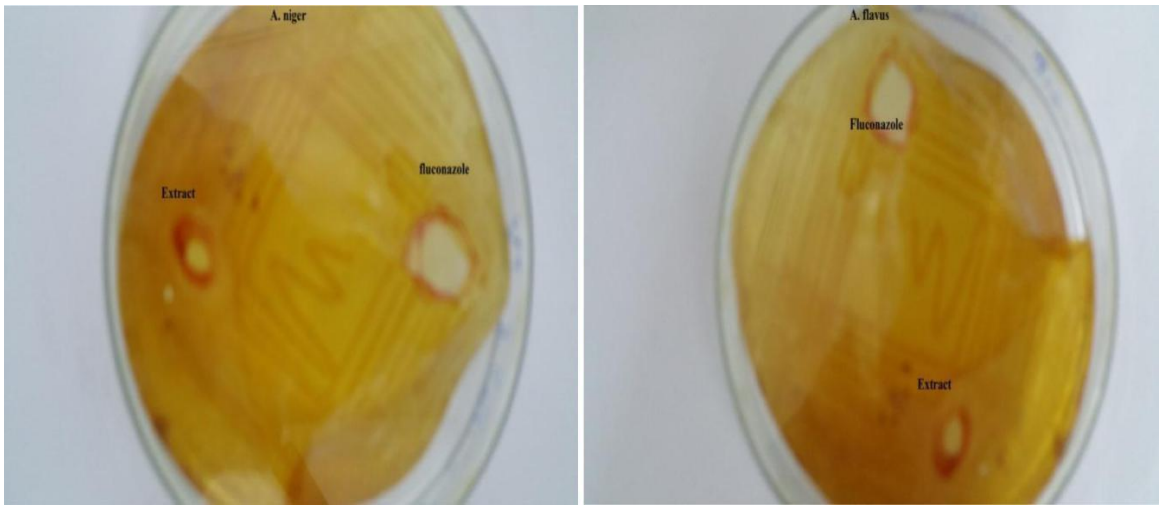
### 3.3 Antimicrobial activity

| Organism | Conc. (µg/mL) | Standard mean (mm) | Standard SD | Methanol mean (mm) | Methanol SD |
|---|---|---|---|---|---|
| E. coli | 25 | 4.0 | 0.2 | 3.8 | 0.2 |
| E. coli | 50 | 9.8 | 0.4 | 9.5 | 0.4 |
| E. coli | 75 | 12.5 | 0.3 | 12.2 | 0.3 |
| E. coli | 100 | 17.4 | 0.2 | 17.1 | 0.2 |
| S. aureus | 25 | 4.0 | 0.3 | 3.7 | 0.3 |
| S. aureus | 50 | 10.2 | 0.3 | 9.9 | 0.3 |
| S. aureus | 75 | 12.9 | 0.2 | 12.6 | 0.2 |
| S. aureus | 100 | 17.2 | 0.0 | 16.9 | 0.0 |
| A. niger | 25 | 3.6 | 0.1 | 3.3 | 0.1 |
| A. niger | 50 | 8.3 | 0.1 | 8.0 | 0.1 |
| A. niger | 75 | 12.5 | 0.3 | 12.2 | 0.3 |
| A. niger | 100 | 16.8 | 0.3 | 16.5 | 0.3 |
| A. flavus | 25 | 4.2 | 0.3 | 3.9 | 0.3 |
| A. flavus | 50 | 8.8 | 0.3 | 8.5 | 0.3 |
| A. flavus | 75 | 13.9 | 0.1 | 13.6 | 0.1 |
| A. flavus | 100 | 17.5 | 0.1 | 17.2 | 0.1 |

Across all four tested organisms, the reported mean inhibition zone increased with increasing concentration from 25 to 100 µg/mL. At 100 µg/mL, the methanolic extract produced mean zones of 17.1 mm against E. coli, 16.9 mm against S. aureus, 16.5 mm against A. niger and 17.2 mm against A. flavus.




Inoculum of 24hrs E. coli and S. Aureus growth culture A and B respectively




Inoculum of 48hrs A. niger and A. flavus growth culture C and D respectively.

## 4. DISCUSSION:

The source study reports that the methanolic leaf extract of S. tora contains several classes of phytoconstituents, with particularly strong qualitative responses reported for tannins and flavonoids. The antimicrobial assay showed increasing inhibition zones with increasing extract concentration for all organisms tested. The reported activity may be associated with the combined effects of secondary metabolites present in the extract; however, the present dataset does not establish which individual constituents are responsible for the observed activity.

The study reported activity against both Gram-positive and Gram-negative bacteria as well as the two fungal species tested. The numerical results show broadly similar inhibition-zone magnitudes among the organisms at the highest tested concentration. Because the source document does not report statistical hypothesis testing, MIC/MBC/MFC values, detailed strain identifiers, or full quality-control parameters, the findings should be interpreted as preliminary in vitro observations rather than evidence of clinical efficacy.

## 5. CONCLUSION:

The source study indicates that methanolic leaf extract of Senna tora exhibits concentration-dependent in vitro antimicrobial activity against Escherichia coli, Staphylococcus aureus, Aspergillus niger and Aspergillus flavus. The extract also showed positive qualitative reactions for carbohydrates, proteins, alkaloids, tannins, flavonoids and glycosides. Further work should include standardized antimicrobial susceptibility testing, MIC and MBC/MFC determination, bioassay-guided fractionation, identification and structural characterization of active constituents, and appropriate toxicity studies.

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