Antimicrobial Evaluation of *Caesalpinia decapetala*

Sharma V¹, Lobo R², Singh G³, Chanana V⁴, Kalsi V¹, Suttee A¹*

¹Pharmacognosy and phytochemistry Dept. School of Pharmaceutical Sciences, Lovely professional University, Punjab, India.
²Manipal College of Pharmaceutical Sciences, Manipal University, Manipal
³UIPS, Panjab University, Chandigarh
⁴University of Wisconsin, Madison Madison, WI 53705, USA

Received: 15th Jul, 17; Revised 20th Nov, 17, Accepted: 24th Nov, 17; Available Online:25 th Dec, 17

ABSTRACT

Objective: The present work is an attempt to assess the in vitro antimicrobial activity of the leaves of *Caesalpinia decapetala* (Roth) fabaceae family collected from forest area of Tamilnadu, India. Methods: The crude drug was successively extracted by Soxhlet assembly using Petroleum ether, dichloromethane, ethyl acetate and methanol as solvents. Preliminary phytochemical screening of different extracts was carried out using several colour and precipitative chemical reagents as per described methods. Antimicrobial activity of the extracts was evaluated against fungal strains (*Aspergillus fumigatus* and *Candida albicans*), Gram +ve bacteria (*Staphylococcus aureus* and *Streptococcus pyogenes*) and Gram –ve bacteria (*Escherichia coli* and *Pseudomonas aeruginosa*) using agar wells dilution method. Nutrient agar medium at 37°C and sabouraud dextrose e agar medium at 28 °C were used in antimicrobial activity evaluation and antifungal activity evaluation respectively. Results: Preliminary phytochemical screening of *C. decapetala* leaves showed the presence of alkaloids, glycosides, phenols, phytosterols, saponins and flavonoids crude drug. *C. decapetala* leaf extracts exhibited marked dose dependent antibacterial activity in vitro against tested bacteria. Methanolic extract was found to be more potent particularly against *Staphylococcus aureus* (Gram +ve bacteria) and *staphylococcus aeruginosa* (Gram -ve bacteria). Conclusion: Various phytochemicals were found to be present in *C. decapetala* leaves. Methanolic extract of *C. decapetala* leaves exhibited better antimicrobial activity in vitro and can be used as a good therapeutic approach for infectious disease management and therapy. Further studies on isolation of phyto-constituents and both in vitro and in vivo evaluation of pharmacological activities of isolated bioactive constituents of the crude drug are recommended as future works.

Keywords: *C. decapetala*, Fabaceae, phytochemical screening, antibacterial, agar well method.

INTRODUCTION

The plant-determined medicines have been utilized since antiquated circumstances and considered as a feature of our wellbeing cures. The propensity of utilizing natural products for the treatment of genuine life-debilitating ailments has been increasing¹⁻³. It is expressed that natural products are effectively biodegradable, have slightest natural dangers, speak to least reactions and are accessible at moderate costs. Albeit the majority of therapeutic exercises of the plants have been all around archived, the others are yet to be verified⁶.

*Caesalpinia decapetala* is generally known as Roth⁷. It is a pantropical sort which has a place with the group of *Caesalpiniaeae* having 120-150 types of trees, bushes, and lianas⁷. The class comprises of a few individuals from animal categories that are utilized generally for the treatment of irritation, hepatotoxicity and also diabetes⁸.⁹. C. decapetala is broadly spread in subcontinent areas. It is prickly climber up to 25 m in stature and its leaves are 11-37.5 cm long. Blossoms are yellow in shading and 1.2-1.8 cm long. Its branches are bushy with snared or straight prickles. Customarily, *C. decapetala* has had numerous restorative properties. A shower with decoction of *C. decapetala* is important for the treatment of jaundice¹⁰. Leaves are utilized for the treatment of consumes, biliousness and stomach issue. Leaves and roots are likewise utilized as a laxative and emmenagogue. Different employments of *C. decapetala* are as diuretic, tonic, against pyretic and carminative¹¹. The counter oxidant, anti-tumor and against richness exercises of *C.decapetala* have been reported¹²⁻¹³. Experimental review on gallic corrosive segregated from the *C. decapetala* is in charge of the antitumor and cancer prevention agent activities¹³. The leaves of *C. decapetala* contain a few dynamic constituents including cassane diterpenoid, squalene, caesaldecan, saphulenol, lupeol, resveratrol, quercetin, stigmasterol and astragalin¹⁴. Presence of phenolic mixes in *C. decapetala* makes this plant significant, yet constrained logical writing is accessible online to demonstrate its conventional utilization. Albeit different reviews have been led on *C. decapetala* to assess its belongings in the treatment of different maladies, no adequate logical writing is accessible online.

*Author for Correspondence: ashish7sattee@gmail.com*
Table 1: Minimum inhibitory concentrations of Ethyl acetate and methanolic extract against bacteria and fungi.

<table>
<thead>
<tr>
<th>Test organism</th>
<th>Concentration mg ml⁻¹</th>
<th>(Ethyl acetate extract)</th>
<th>(Methanolic extract)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>streptococcus pyogenes</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>staphylococcus aeruginosa</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Candida albicans</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Aspergillus fumigatus</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The coarsely dried plant material (500g) was successively extracted with petroleum ether (2000ml) at 60°C for 12 hours using Soxhlets apparatus and then the plant material was dried at room temperature. The dried plant materials were extracted with D.C.M (2000ml) at 40°C for 12 hours and then dried at room temperature. Again the same process was repeated with Ethyl acetate at 77°C, was dried at room temperature. Finally, extraction was performed with polar methanol at 78°C and dried. 

**Antibacterial activity**

This activity was carried out by agar well diffusion method. According to this method, 0.1 ml of diluted inoculums (10⁶ CFU ml⁻¹) of test organism was thoroughly mixed with 20 ml of molten sterile tryptic soya agar and poured into pre-sterilize Petri dishes under sterile condition. All plates were left to set at 4°C for 30-40 minutes. Holes of 6 mm diameter were made in the center of each seeded plates. Holes were then filled aseptically with 0.1 ml of test solution (various extract in various conc.) reference standard and negative control (i.e., solvent only) respectively and marked accordingly. All plates were then incubated at 37 ±1°C for 24h and zone of inhibition exhibited by the different extracts in various concentration measured and recorded accordingly. All plates were run in triplicates.

**Antifungal Activity**

This activity was determined by agar tube dilution method. Test tubes having sterile sabouraud dextrose agar were inoculated with test solution of different concentration and kept in slanting position at room temperature for solidification. Test fungal cultures were inoculated on slant incubated at 25°C for 7 days and growth inhibition were observed after 7 days incubation period. Nystatin was used as standard antifungal drug.

**Statistical analysis**

Data are expressed as mean ± standard errors of the mean. All statistical tests (e.g mean, SD and correlation) were computed by MS excel- 2013. The value less than 0.5% is considered as significant.

**RESULTS AND DISCUSSION**
In the present study, methanolic extract of leaves of *C. decapetala* were tested against some pathogenic bacteria and fungi. The antibacterial activity of extract was quantitatively assessed by the presence or absence of inhibition zone and diameter, respectively (Figure 1 and Figure 2). *C. decapetala* extract showed activity against various organisms at 100mg ml\(^{-1}\) concentration while at 50mg ml\(^{-1}\) and 25mg ml\(^{-1}\) concentrations showed no activity respectively. All these concentrations showed significant difference (p> 0.05) at 100mg ml\(^{-1}\) concentration. In gram +ve organisms, extract showed the dose dependent activity (25, 50 and 100mg ml\(^{-1}\)) comparable to standard antibiotic ofloxacin. Among fungi none showed significant activity at highest concentration 100mg ml\(^{-1}\).

**CONCLUSION**

It may be concluded safely that ethanol extract of *C. decapetala* have the most active antibacterial components than antifungal and can be a good source of chemical compound.

**CONFLICT OF INTEREST STATEMENT**

We declare that we have no conflict of interest.

**ACKNOWLEDGMENTS**

The authors would like to acknowledge Lovely Professional University (Punjab) India, for providing chemicals, laboratory facilities and moral support to carry out this research.

**REFERENCES**

3. Hussain L, Ikram J, Rehman K, Tariq M, Ibrahim M, Akash MSH. Hepatoprotective effects of malva...