

EVALUATION OF PRELIMINARY ANTIBACTERIAL ACTIVITY AND UV-SPECTROSCOPIC ANALYSIS OF *MICHELIA CHAMPACA* (L.)**T. Lavanya and T. Ananthi***

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ABSTRACT

The aim of the present study was undertaken to appraise the UV-VIS analysis and antibacterial activity of flowers of *Michelia champaca*. The phytochemical analysis revealed the presence of carbohydrate, alkaloids, terpenoids, flavonoids, tannins, steroids and phenols. The UV-VIS profile of flower extract showed the peaks at 281.1 nm and 215.6 nm with the absorption of 2.397 and 4.040. The antibacterial activity of flower extract against gram positive (*Staphylococcus aureus* and *Bacillus subtilis*) and gram negative bacteria (*E.coli*) were tested by using disc diffusion method. Ampicilin was used as standard. The results obtained shows that the extract expressed remarkable antibacterial activity with zone of inhibition ranging from 9 to 19 mm. Maximum inhibition zone was recorded with *Bacillus subtilis* (19.6 mm) while minimum inhibition zone was recorded for *E.coli* (9.37mm). The antibacterial activity increased linearly with increase in concentration of the extract. The antibacterial activity of *Michelia champaca* was due to the presence of various bioactive constituents present in the flower extract. The results provide a support for the use of this plant in traditional medicine and it is a potential antiseptic source for prevention and treatment of bacterial infections.

KEYWORDS: *Michelia champaca*, UV-Visible, ampicilin, antibacterial activity.**INTRODUCTION**

Medicinal plants played an important role in the treatment of diseases and health disorder for thousands of years.^[1] World Health Organization (WHO) estimated that 80% of developing countries use medicinal plants for sustainable health and vitality.^[2] Low pricing absence of side effects, alternate solutions for diseases and therapies among peoples.^[3]

Human beings have used plants for the treatment of diverse ailments for thousands of years.^[4-5] According to the world Health Organization, most populations still rely on traditional medicines for their psychological and populations still rely on traditional medicines for their psychological and physical health requirements.^[6] Since they cannot afford the products of western pharmaceutical industries^[7] together with their side effects and lack of health care facilities.^[8] Rural areas of many developing countries still rely on traditional medicine for their primary health care and have needs and have found a place in day-to-day life. These medicines are relatively safer and cheaper than synthetic or modern medicine.^[9-12] People living in rural areas from their personal experience know that these traditional remedies are valuable source of nature products to maintain human health, but they may not understand the science behind these medicines, but knew

that some medicinal plants are highly effective only when used at therapeutic dose.^[13-14]

The plant *Michelia champaca* (Sampige) is widely used in both Ayurveda and Homeopathic medicine. It belongs to the family Magnoliaceae. Root and bark are purgative, emmenagogue and are useful in the treatment of inflammation, constipation and dysmenorrhea. The stem bark is astringent, febrifuge used in gastritis, fever and cough. Flower and lower buds, fruits are useful in ulcers, skin disease wounds.^[15]

MATERIALS AND METHODS**Collection and Identification of Plant Materials**

The fresh flowers of *Michelia champaca* Linn were collected from Mannargudi, Thiruvarur district, Tamilnadu, India. The collected material was cleaned, shade dried and coarsely powdered. The plant material was powdered and used for further studies.

Preparation of extract

The flowers were chopped into small pieces, shade-dried and coarsely powdered by using a pulverizer. The coarse powders were then subjected to successive extraction with methanol by Soxhlet method.^[16] The extracts were then collected and distilled off on a water bath at

atmospheric pressure and the last trace of the solvents were removed in vacuo and stored at 4°C.

Preliminary Phytochemical screening

Phytochemical analysis of the extract was conducted by the standard procedure.^[17] By this analysis, the presence of several phytochemical like alkaloids, flavonoids, tannins, saponins, esters, resins, sugars and glycosides were tested.

Spectroscopic analysis

To detect the UV-VIS spectrum profile of the flower extracts of *Michelia champaca* were scanned in the wavelength ranging from 200-800nm by using UV spectrophotometer and the characteristic peaks were detected.

Collection of test microorganisms

The Bacterial strains of *Escherichia coli*, *Staphylococcus aureus* and *Bacillus subtilis* were obtained from Microbial Type culture Collection Centre (MTCC), Chandigarh.

Disc Preparation

The 6mm (diameter) discs were prepared from Whatman No. 1 filter paper. The discs were sterilized by autoclave at 121°C. After the sterilization the moisture discs were dried on hot air oven at 50°C. Then solvent extract discs and control discs were prepared.

Disc Diffusion Method

Antibacterial activity test was carried out following the modification of the method originally described.^[18]

Muller Hinton agar was prepared and autoclaved at 15 lbs pressure for 20 minutes and cooled to 45°C. The cooled media was poured on to sterile petriplates and allowed for solidification. The plates with media were seeded with the respective microbial suspension using sterile swab. The solvent extract prepared discs individually were placed on the each petriplates and also placed control and standard Ampicilin (10 µg) for Bacteria. The plates were incubated at 37°C for 24 hrs. After incubation period, the diameter of the zone formed around the paper disc were measured and expressed in mm.

Measurement of zone of inhibition

The antibacterial potential of test compounds was determined on the basis of mean diameter of zone of inhibition around the disc in millimeters. The zones of inhibition of the tested microorganism by the extracts were measured using a millimeter scale. All the treatments were done in triplicate.

Statistical Analysis

Results are expressed as mean ± S.D.

RESULTS AND DISCUSSION

Preliminary phytochemical screening

The preliminary phytochemical screening of methanolic extract showed the presence of alkaloids, carbohydrate, terpenoids, flavonoids, tannins, Steroids, phenols and absence of protein, amino acids are presented in **Table 1**.

Table 1: Phytochemical screening of flower extract of *Michelia champaca*

S. No	Phytochemicals	Flower extract in <i>Michelia champaca</i>
1	Carbohydrates	+
2	Alkaloids	+
3	Terpenoids	+
4	Flavonoids	+
5	Tannins	+
6	Steroids	+
7	Protein	-
8	Amino acids	-
9	Phenols	+

UV-VIS Spectrophotometry Analysis

The UV-VIS profile of plant extract was taken at the 200 to 1100 nm wavelength due to the sharpness of the peaks and proper baseline. The profile showed the peaks at 215.6 nm, and 281.1 nm with the absorption 4.040 and 2.397 respectively (**Table 2 and Figure 2**).

Hence, the crude extracts subjected to UV-VIS analysis is used for the identification of chemical constituent's presents in *Michelia champaca*. In addition, UV –VIS is proved to be a reliable and sensitive method for bio molecular composition.

Table 2: UV-VIS peak values of extracts of *Michelia champaca* flowers

S.NO	Wavelength (nm)	Absorption
1	215.6	4.040
2	281.1	2.397

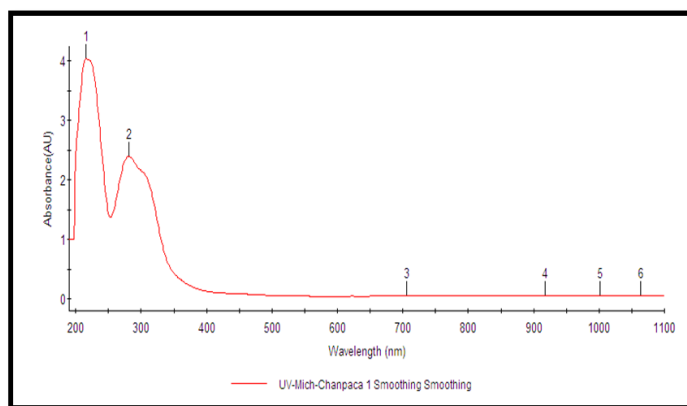


Figure 2: Ultraviolet –Visible spectrum of extract of *Michelia champaca*

In addition, UV-VIS and FT-IR spectroscopy is proved to be a reliable and sensitive method. The crude extracts subjected to UV-VIS and FT-IR analysis is used for the identification of chemical constituent present in *Acorus calamus* for detection. Previous reports have shown that the *Acorus calamus* is rich in diverse terpenoids of bio molecular composition^[19] generally regarded as its characteristic chemical constituents. However, during our systematic chemical investigation on *Acorus calamus*, none of flavonoids components was isolated, instead the present investigation is a part of research work being carried out on the flavonoid present in this plant consequently the IR spectra of this plant extract shows the presence of OH group and UV-VIS spectrum of this plant extracts has absorption bands at 304 and 237 nm. These absorption bands characteristic for flavonoids and its derivatives. The flavonoids spectra typically consist of two absorption maxima in the ranges 230-285 nm (band1) and 300-350 nm (band 11). The precise

position and relative intensities of these maxing give valuable information on the nature of the flavonoids.^[20]

Anti bacterial assay

In vitro antibacterial activity of the methanolic flower extract of *Michelia champaca* was screened individually by the presence or absence of zone of inhibition. **Table 3** represents the antibacterial activity of flower extract of *Michelia champaca* against gram-positive bacteria (*S.aureus* & *B. subtilis*) and gram negative bacteria (*E.coli*). The minimum concentration value for the bacterial strain ranged from 9.0 to 19 μ g/ml. The highest activity was noted against *B. Subtilis* (19.6 \pm 0.47) followed by *Staphylococcus aureus* (15.0 \pm 0.82) and *E.coli* (11.0 \pm 0.37) at a concentration of 100 μ g/ml than compared with other two concentrations (25 and 50 μ g/ml.) Maximum inhibition (24.12 \pm 2.94) was found for the positive control, ampicillin. The antibacterial activities of the extracts increased linearly with increase in concentration of extracts (**Plate I**).

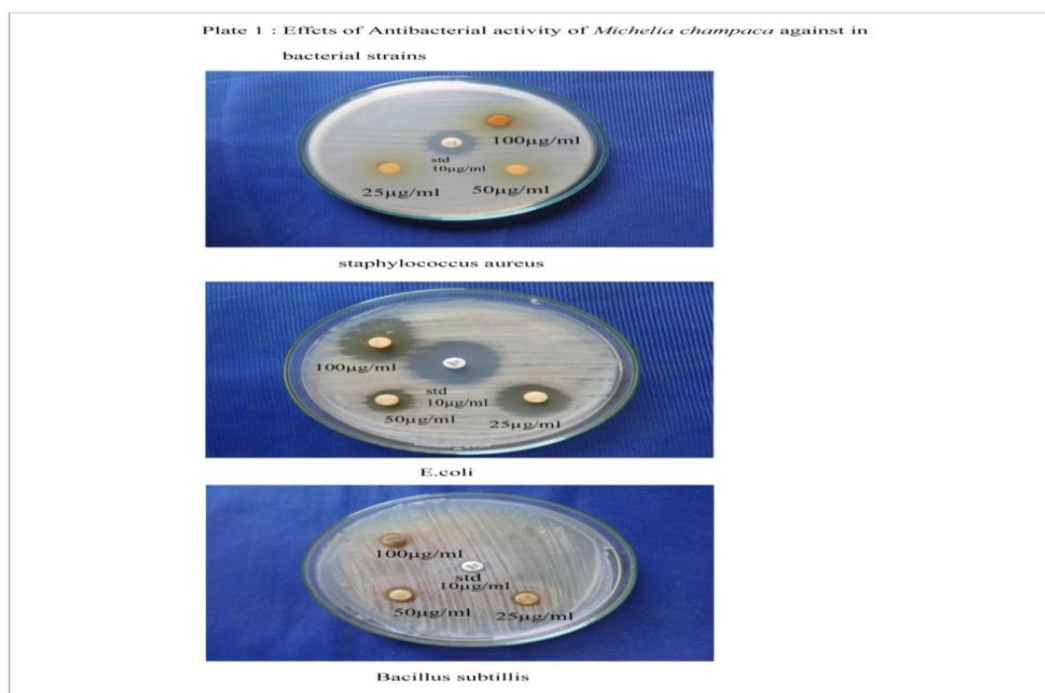


Table 3: Antibacterial activity of methanol flower extract of *Michelia champaca* against Bacterial strain

S. No	Bacterial Strain	Zone of inhibition (mm)			
		Reference drug (ampicilin) (10µg/ml)	Methanol flower extract of <i>Michelia champaca</i> (µg/ml)		
			25 (µg/ml)	50 (µg/ml)	100 (µg/ml)
1.	<i>Staphylococcus aureus</i>	10.66 ± 0.47	12.33 ± 0.47	13.33 ± 1.24	15 ± 0.82
2.	<i>E.coli</i>	14.0 ± 3.56	9.0 ± 0.83	9.33 ± 0.94	11.0 ± 0.37
3.	<i>Bacillus subtilus</i>	24 ± 2.94	12 ± 0.82	18 ± 3.55	19.6 ± 0.47

Values are Mean ± SD of the three triplicates.

Plants from the starter important source of useful structures for the development of new chemotherapeutic agents. The first step towards this goal is the *in-vitro* antibacterial activity. Many reports have been available on the antiviral, antibacterial, antifungal, antihelminthic, antimolluscal and anti-inflammatory properties of plants.^[21] The antibacterial activity of *Taraxacum officinale* against *A.hydrophila*, *S. typhi*, *S.aureus*, *B. cereus* and *E. coli* the zone of inhibitions were ranged from 14.18 mm investigated.^[22] Some researcher had opined that the effect showed by plant extracts may be of the present secondary metabolites.^[23] The antibacterial activity of *Taraxacum officinale* against *Staphylococcus aureus*, *Proteus mirabilis* and *E. coli* zone of inhibition range between 4-10mm.^[24] Dorgan, 2010 stated that due to these observations, it helped in identifying the active principle responsible for such activities and in the evolving drugs for the therapeutic use in human being.

Plants contain various types of bioactive molecules which are under the targets of extensive research worldwide.^[25] In the present work, 70% ethanol extract of *M. stenopetala*, *T. serrulatus* and *T. brownie* were subjected to antimicrobial study against *B. cereus*, *E. coli* O15:H7, *Salmonella* spp. and *S. aureus*. The result of this study shows that the crude extracts of *T.serrulatus* showed concentration dependent inhibition against *B. cereus*, *S. aureus* and *E.coli* O15:H7. At the lowest test concentration (12.5 mg/ml), its potency was comparable to that of standard antibiotics ceftriaxone and tetracycline; and even better than the standard antibiotics at relatively higher concentrations (25 and 50 mg/ml).The antimicrobial activity of *T.serrulatus* found during the current investigation were in agreement with the findings of earlier researchers who determined the antimicrobial activity of aerial parts of related *Thymusspp.* Against a wide range of microorganisms.^[26-27] In addition, our study results show that *T. serrulatus* did not have activity against *Salmonella* spp. However, some other *Thymus* spp. (*Thymus lanceolate*) showed inhibitory effect on *Salmonella* spp.^[28] The discrepancy may be due to variation in plant parts used, effect of climate, extraction method, and composition of extracted products.

Antimicrobial properties of medicinal plants are being increasingly reported from different parts of the world. The World Health Organization estimates that plant extract or their active constituents are used as folk

medicine in traditional therapies of 80% of the world's population. In the present work, the extracts obtained from *Cassia fistula* show strong activity against most of the tested bacterial and fungal strains. The results were compared with standard antibiotic drugs. In this screening work, extracts of *Cassia fistula* were found to be not inactive against any organism, such as Gram-positive, Gram-negative, and fungal strains were resistant to all the extracts of *Cassia fistula*.^[29]

CONCLUSION

From the above results it is concluded that both *Michelia champaca* have great potential use as phyto-medicine as they have antibacterial activity. So this plant can be used to discover bioactive natural products that may serve as feeds for the development of new pharmaceuticals compounds.

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