INTRODUCTION
Herbal medicines have been known to man for centuries and they have commonly used plants to treat common communicable diseases, and some of these are traditional medicines. The therapeutic efficacy of many indigenous plants for several disorders has been described by practitioners of usual medicine (Nayan et al., 2011, Dogruoz et al., 2008). Antibiotics are one of the most important weapons in fighting bacterial infections and have seriously benefited the health related quality of human life since their introduction. The wide use of antibiotics in the treatment of bacterial infections has led to the coming out and spread of resistant strains (Dogruozet et al., 2008) Many of the plant materials used in traditional medicine are readily available in rural areas at relatively cheaper than modern medicine. Plants produce a diverse range of bioactive molecules, making them rich source of different types of medicines. Most of the drugs today are obtained from natural sources or semi synthetic derivatives of natural products and used in the traditional systems of medicine (Sukanya et al., 2009).

Increasing developments of drug resistance in human pathogens as well as the appearance of side effect of synthetic drugs need to develop new antimicrobial drugs from natural sources. The use of plant extracts and phytochemicals both with known antimicrobial properties are of great significance. In the past few years, a number of investigations have been conducted worldwide to prove antimicrobial activities from medicinal plants.

Cassia auriculata commonly known as Tanners Cassia, also known as “Avaram” in Tamil, is a shrub that belongs to the Caesalpiniaceae family (Thulasi and Amsavenit, 2012). It is of great importance to tanner and workers in iron. It is well known for its gift in Ayurveda as Avarai Panchaga Choornam and Kalpa Herbal tea. The Flowers of the plant are used in preparation of tea, which is prescribed in diabetes (Doshi et al., 2011). Every part of the plant is important in medicine for ulcers, leprosy and liver disease. The plant can also be used as an anti-diabetic, hypolipidemic and anti-oxidant (Tomokoet al., 2000). In the present investigation an attempt has been made to enrich the knowledge of antimicrobial activity of ethanolic extract of the C. auriculata.

Plant Description:
Cassia auriculata belonging to Caesalpiniaceae, Family is also known as Avaram tree. The leaves are alternate, stipulate, paripinnate compound, very numerous, closely placed, rachis 8.8-12.5 cm long, narrowly furrowed, slender, pubescent, with an erect linear gland between the leaflets of each pair, leaflets 16-24, very shortly stalked 2-2.5 cm long 1-1.3 cm broad, slightly overlapping, oval oblong, obtuse, at both ends, mucronate, glabrous or minutely downy and dull green.

Its flowers are irregular, bisexual, bright yellow and large (nearly 5 cm across), the pedicels glabrous and 2.5 cm long. The racemes are few-flowered, short, erect, crowded in axils of upper leaves so as to form a large terminal inflorescence (leaves except stipules are suppressed at the upper nodes). The 5 sepals are distinct, imbricate, glabrous, concave, membranous and unequal, with the two outer ones much larger than the inner ones. The petals also number 5, are free, imbricate, and crisped along the margin, bright yellow veined with orange.
MATERIALS AND METHODS

Collection of plant materials:
Fresh flowers of Cassia auriculata were collected from O.Koothur Village, Ariyalur district, Tamil Nadu, India, during the month of November and identified by Head, PG & Research Department of Botany, Periyar E.V.R. College, Trichy, Tamil Nadu.

Flower extraction:
2 kg Fresh flowers of Cassia auriculata were soaked with 90% ethanol at room temperature (25°C-30°C) after 72 hrs the ethanolic extract was filtered. This extract was concentrated in vacuum and the dry powder obtained was dissolved in ethanol to get required concentrations and were used for screening antimicrobial activities.

Antimicrobial Procedure

Screening of Antibacterial Activity

Bacteria tested:
Four bacterial strains viz., S. typhi, E. coli, E. faecalis and B. cereus were used throughout this investigation. All the bacterial cultures were obtained from Microbial Type Culture Collection (MTCC), Institute of Microbial Technology, Chandigarh, India. The young bacterial broth cultures were prepared before the screening procedure.

Preparation of inoculums:
Stock cultures were maintained at 4°C on slopes of nutrient agar. Active cultures of experiment were prepared by transferring a loop full of cells from the stock cultures to test tube of Muller-Hinton Broth (MHB) that was incubated without agitation for 24 hrs at 37°C. The cultures were diluted with fresh Muller-Hinton broth to achieve optical densities corresponding to 2.0x10^8 colony forming units (CFU/ml).

Antibacterial susceptibility test:
The disc diffusion methods (Bauer et al. (Am. J. Clin. Pathol. 45:493-496, 1966; National Committee for Clinical Laboratory Standards, Performance standards for antimicrobial disc susceptibility tests, approved standard ASM-2, 2nd ed., 197)) was used to screen the antibacterial activity. In-vitro antibacterial activity was screened by using Muller Hinton Agar (MHA) obtained from Himedia (Mumbai). The MHA plates were prepared by pouring 15 ml of molten media into sterile petriplates. The plates were allowed to solidify for 5 minutes and 0.1% inoculum suspension was swabbed uniformly and the inoculums were allowed to dry for 5 minutes. The extracts of concentration 10mg/ml, 20mg/ml, 30mg/ml, 40mg/ml were loaded on 6 mm sterile disc. The loaded disc were placed on the surface of medium and the extract was allowed to diffuse for 5 minutes and the plates were kept for incubation at 37°C for 24 hrs. At the end of incubation, inhibition zones formed around the disc were measured with transparent ruler in millimeter. Standard antibiotic chloromphenicol of concentration 1mg/ml was used as positive control.

Screening of antifungal activity

Culture Media

The media used for antifungal test was Sabouraud’s dextrose agar / broth of Hi media Pvt. Bombay, India.

Inoculum

The fungal strains were inoculated separately in Sabouraud’s dextrose broth for 6 h and the suspensions were checked to provide approximately 105 CFU/ml.

Determination of antifungal activity

The agar well diffusion method (Perez, 1993) was modified. Sabouraud’s dextrose agar (SDA) was used for fungal cultures. The culture medium was inoculated with the fungal strains separately suspended in Sabouraud’s dextrose broth. A total of 8 mm diameter wells were punched into the agar and filled with plant extracts and solvent blanks (hydro alcohol, and hexane). Standard antibiotic (Fucanazole, concentration 1 mg/ml) was used as positive control and fungal plates were incubated at 37°C for 72 h. The diameters of zone of inhibition observed were measured.

RESULTS AND DISCUSSION

Table 1: Antibacterial activity of ethanolic extract of Cassia auriculata flowers in different strains

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name Of Organisms</th>
<th>Zone of inhibition (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Solvent Control 10</td>
</tr>
<tr>
<td>1.</td>
<td>S. typhi</td>
<td>22</td>
</tr>
<tr>
<td>2.</td>
<td>E. coli</td>
<td>19</td>
</tr>
<tr>
<td>3.</td>
<td>E. faecalis</td>
<td>23</td>
</tr>
<tr>
<td>4.</td>
<td>B. cereus</td>
<td>24</td>
</tr>
</tbody>
</table>
Figure 2: Graphical representation of anti bacterial activity of ethanolic extract of Cassia auriculata flowers. (Standard: Chloromphenicol, concentration 1 mg/ml).

Figure 3: Inhibition of anti fungal growth by ethanolic extract of Cassia auriculata flowers by Disc diffusion method.

Table: 2. Anti fungal activity of ethanolic extract of Cassia auriculata flowers in different strains

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name Of Organisms</th>
<th>Zone of inhibition(mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Solvent Control</td>
</tr>
<tr>
<td>1.</td>
<td>C.lunata</td>
<td>24</td>
</tr>
<tr>
<td>2.</td>
<td>C.albicans</td>
<td>20</td>
</tr>
</tbody>
</table>

Figure 4: Graphical representation of anti fungal activity of ethanolic extract of Cassia auriculata flowers. (Standard: Fucanazole, concentration 1 mg/ml).
In the present study, ethanolic extract of Cassia auriculata flowers exhibited significant antimicrobial activity when compared with standard drug. It is evident from the data presented in Table I that the ethanolic extract of flowers possesses antibacterial activity. The disc diffusion method result showed the zone of inhibition for 10 mg/ml as 0 mm, 0 mm, 0 mm and 0 mm, for 20 mg/ml as 8 mm, 7 mm, 0 mm and 8 mm, for 30 mg/ml showing 17 mm, 15 mm, 17 mm and 19 mm, for 40 mg/ml as 25 mm, 19 mm, 24 mm and 25 mm, for ethanolic extract of flowers against S. typhi, E. coli, E. faecalis and B. cereus respectively when compared with standard drug chloromphenicol showing 22 mm, 19 mm, 23 mm and 24 mm zone of inhibition respectively. It is evident from the data presented in Table II that the ethanolic extract of flowers possesses antifungal activity. The disc diffusion method result showed the zone of inhibition for 10 mg/ml as 0 mm and 0 mm, for 20 mg/ml as 9 mm and 0 mm, for 30 mg/ml as 13 mm and 18 mm, for 40 mg/ml as 22 mm and 24 mm for ethanolic extract of flowers of Cassia auriculata against C. lunata and C. albicans respectively when compared with standard drug Fucanazole showing 24 mm and 20 mm of inhibition respectively. The result indicates that all the test extracts show good inhibitory activity against all these bacterial and fungal strains. The pharmacognostical studies on this plant give an idea about identification, standardization and monograph of the plant. It is also important in long term study of plant to evaluate the medicinal action of this plant.

CONCLUSION

It is concluded based on the findings of the present study that the C. auriculata shows higher antibacterial and antifungal activity against bacterial pathogens such as S. typhi, E. coli, E. faecalis B. cereus and against fungal pathogens C. lunata and C. albicans. The present study justifies the claimed uses of flowers parts of the C. auriculata in the traditional system of medicine to treat various infectious disease caused by the microbes. Flower extract can be used for the treatment of various fungal infection and microbial infection. Further detailed analysis of this sample is required to identify the presence of bioactive compounds responsible for antibacterial and antifungal activities.

CONFLICT OF INTEREST

Authors declare no Conflict of Interest.

REFERENCES


HOW TO CITE THIS ARTICLE