Evaluation of phytochemical constituents and biological screening of Ficus hispida leaves in Chandrapur forest region

Pravin Suresh Jogi
Department of chemistry, Janata Mahavidyalaya, Chandrapur-442401, Maharashtra (India).
E-mails: Jogipravin@yahoo.com

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Abstract

Ficus hispida commonly found in Tropical and Subtropical regions of India, used for variety of purpose in traditional medicine. The usefulness of this plant is described in many folk books including Ayurveda and is scientifically evidenced, and different biologically active phytoconstituents were isolated from plant. But no reports are available on phytochemical and biological studies of this plant in chandrapur forest region. Present paper deals with the phytochemical and biological screening of leaves of Ficus hispida in chandrapur forest region. Medicinal Plant Ficus hispida from Chandrapur district forest (MS) India was collected. Shade dried Plant leaves powdered were extracted with different solvents such as Methanol, Ethyl acetate, Chloroform, Hexane and Aqueous. Phytochemical screening of this plants was performed for Alkaloid, Terpenoid, Tannin, Phenolic compound, Carbohydrates, Saponin, Anthraquinone, Glycoside and Flavonoids. Various extracts of this plant were examined using agar disk diffusion method against Gram positive, Gram negative and fungus microorganism. In future this plant can be subjected to the isolation of major constituent’s antimicrobials and to further pharmacological evaluation.

Key Word: Medicinal plants, Phytochemical, antimicrobial activity, Ficus hispida.

1. Introduction:
Chandrapur forest region in (MS) India possesses vast array of plants. This forest found to contain vast number of medicinal plants and local people are utilizing these medicinal plants since year ago. Plants are nature’s “chemical factories” providing richest source of organic chemical on the earth. Most of the medicinal plants from this forest are used in traditional medicine to cure various sicknesses and diseases. The indigenous system of medicine namely Ayurveda, Unani and Siddha have been in existence in several centuries. These systems of medicine cater to the need of nearly seventy percent of our population residing in the villages. In Homeopathy system, 70% of the medicines are prepared from plants. Nature has bestowed on us a very rich botanical wealth and large number of diverse type of plants grow wild in different part of country. India is a country rich in indigenous herbal resources which grow on their varied topography and under changing agro climate condition permitting the growth of almost 20,000 plants are of medicinal value [1]. In Indian scenario, it has been recognized that 25, 00 plants have been found to be have medicinal value out of 17,000 plants [2]. The world is looking toward India for new drugs to manage various challenging diseases because of its rich biodiversity of medicinal plants and abundance of traditional knowledge such as Sibbha, Ayurveda etc., to cure different diseases [3-5]. The pland Ficus hispida is found to use traditionally for the prevention of disease. A mixture of honey and the juice of these fruit is a good antihemorrhagic [12] but the barks and leaves are used as an anti diarrhoeal [13], Antidiabetic[14] and as cardioprotective[15] activity. The present study was therefore undertaken to investigate the pharmacognostical characters, and phytochemical analysis of the plant.

2. Materials and Method:
2.1. Plants Collection: The present work was carried out at Department of chemistry, J.M.V. Chandrapur. R.T.M. Nagpur University. The plant named Ficus hispida was collected from Chandrapur forest region. Their botanical identity of plant was determined and authenticated from literature available in Department of Botany, J.M.V. Chandrapur. The leaves of Ficus hispida was thoroughly washed with water and dried under shade for about ten days. The dried plant sample was ground well into a fine powder in a mixture grinder. The powder was stored in a air sealed polyethylene bag at room temperature before extraction.

2. 2. Preparation of extracts: The microorganism used in the study: Gram-negative E-coli, Gram-positive S-aurous and Nizer fungus Aspergillus were obtained from stock
cultural techniques in the Department of Microbiology, J.M.V. Chandrapur.

2. 3. Antimicrobial screening of extracts: Susceptibility test were carried out. The modified agar well diffusion method [6, 7] to test the antimicrobial activity of the extracts. The medium employed was diagnostic sensitivity agar.

The culture were prepared in triplicate and incubated at 37°C for 24 to 72 h. 0.2 ml of the broth culture of the test organism was put in a sterile Petri-dish and 18 ml of sterile molten diagnostic sensitivity agar, was added. Well were bored into the medium using 0.1 ml of the extracts. Streptomycin and Chloramphenicol were used as the standard antimicrobial agents at a concentration of 10 mcg/disk, 30 mcg/disk respectively. The plates were kept in sterilized inoculation chamber for 2 h to facilitate diffusion of the antimicrobial agents into the medium. The plates were then incubated at 37°C for 24 h and the diameter of zone of inhibition of microbial growth were measured in the plates in millimeters.

2. 4. Phytochemical Analysis:
The extracts were analyzed for the presence of Alkaloids, Terpenoids, Tannine, Saponin, Flavonoid, Phlobatannin, Anthraquionone, Reducing Sugar, Glycoside and Cardiac glycoside[8 to 11] as per literature available.

2. 4. 1. Alkaloid: About 0.2 g of the extracts was warmed with 2% H2SO4 for two minutes. It was filtered and few drop of Dragencloff’s reagent were added. Orange red precipitated indicates the presence of alkaloids.

2. 4. 2. Tannine: Small quantity of extracts was mixed with water and heated on water bath. The mixture was filtered and ferric chloride was added to the filtrate. A dark green solution indicates the presence of tannins.

2. 4. 3. Anthraquinones: About 0.5 g of the extracts was boiled with 10% HCl for few minutes in a water bath. It was filtered and allow to cool. Equal volume of CHCl3 was added to the filtrated. Few drop of 10% NH4 were added to the mixture and heat. Formation of rose-pink colour indicates the presence of anthraquinones.

2. 4. 4. Glycoside: The extracts was hydrolyzed with HCl solution and neutralized with NaOH solution. A few drop of Fehling’s solution A and B were added. Red precipitate indicates the presence of glycoside.

2. 4. 5. Reducing Sugars: The extracts was shaken with distilled water and filtered. The filtrate was boiled with drop of Fehling’s solution for minutes. An orange red precipitate indicates presence of reducing sugar.

2. 4. 6. Saponin: About 0.2 g of the extract was shaken with 5 ml of distilled water and then heated to boil. Frothing (appearance of creamy miss of small bubbles) shows the presence of saponins.

2. 4. 7. Flavonoids: Extracts of about 0.2 g was dissolved in diluted NaOH and HCl was added. A yellow solution that turns colorless indicates the presence of flavonoids.

2. 4. 8. Phlobatannins: The extracts (0.5 g) was dissolved in distilled water and filtered. The filtrate was boiled with 2%HCl solution. Red precipitated show the presence of Phlobatannins.

2. 4. 9. Terpenoids (Salkowski test): 0.2 g of extracts was mixed with 2 ml Chloroform (CHCl3) and concentrated H2SO4 (3 ml) was carefully added to form a layer. A reddish brown colorations of the interface was formed to indicate positive results for the presence of terpenoids.

2.5. Result: Phytochemical screening of hexane, chloroform, ethyl acetate and water extracts of Ficus hispida is shown in table 1. The susceptibility of test microorganism to the crude extracts of Pergularia daemia (utarni climber leaves) is shown in table 2.

Table 1 Phytochemical analysis of variou extract of Ficus hispida

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Constituents</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alkaloid</td>
<td>Present</td>
</tr>
<tr>
<td>2</td>
<td>Tannine</td>
<td>Present</td>
</tr>
<tr>
<td>3</td>
<td>Anthraquiones</td>
<td>Absent</td>
</tr>
<tr>
<td>4</td>
<td>Glycoside</td>
<td>Present</td>
</tr>
<tr>
<td>5</td>
<td>Reducing Sugars</td>
<td>Absent</td>
</tr>
<tr>
<td>6</td>
<td>Saponin</td>
<td>Present</td>
</tr>
<tr>
<td>7</td>
<td>Flavonoids</td>
<td>Present</td>
</tr>
<tr>
<td>8</td>
<td>Phlobatannins</td>
<td>Absent</td>
</tr>
<tr>
<td>9</td>
<td>Terpenoids</td>
<td>Present</td>
</tr>
</tbody>
</table>

Table-2. Antimicrobial activity of various extracts of plant Ficus hispida.

<table>
<thead>
<tr>
<th>Extracts</th>
<th>Microorganism</th>
<th>Gram + (S aureus)</th>
<th>Gram – (E coli)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water extract</td>
<td>+++,++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Chloroform extract</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Ethyl acetate extract</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Methanol extract</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Hexane extract</td>
<td>++</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Streptomycin</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Chloramphenico</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
</tbody>
</table>

Key to symbols: - = Inactive (inhibition zone < 5 mm); + = slightly active (inhibition zone 5-10 mm); ++ = moderately active (inhibition zone 10-15 mm); +++ = highly active (inhibition zone >15 mm)

2. 6. Discussion: The qualitative analysis of extracts from leaf of Pergularia daemia showed the presence of phytochemical constituents such as alkaloid, terpenoid, tannin, saponin, reducing sugar, cardiac glycoside, glycoside and phlobatannin. The results are summarized in table 1 and 2. The above results indicates that, the leaves of plant investigated are rich in alkaloid, terpenoid, reducing sugar, glycoside, flavonoids, saponins, tannins and also showed the presence of phlobatannin. Chloroform extracts and ethyl acetate extracts showed the presence of cardiac glycoside. All extracts have showed absence of anthraquinone. Extracts of leaf were tested against Gram positive S-aurosus and gram negative E.coli. Extracts also tested for antifungal activity against Aspergillus Niger and showed the inhibition of growth. Water, Ethyl acetate and Methanol were found to be highly sensitive against Gram positive SS-aurosus and gram negative Ecoli (with zone of inhibition above 13 mm means highly sensitive). Ethyl acetate extract was showed more antimicrobial activity than standard antibiotics streptomycin and chloramphenicol. The inhibitory activity of these extracts confirmed the potential use of the plant in the treatments of microbial induced ailments.

The plant studied here can be seen as a potential source of useful drugs. Further studies are going on this plant in order to isolate, identify, characteristics and elucidate the structure of bioactive compounds.

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References

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