Phytochemistry of some medicinal plants from Western Ghat region

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ABSTRACT

Medicinal plants have bioactive compounds which are used for curing of various human diseases. Phytochemicals have two categories i.e., primary and secondary constituents. Primary constituents have chlorophyll, proteins sugar and amino acids. Secondary constituents contain terpenoids and alkaloids. Medicinal plants have antifungal, antibacterial and anti-inflammation activities. The present study involves five different medicinal plants Acacia nilotica, Morus alba, Morus nigra, Momordica charantia, Luffa cylindrica locally available in Gaganbavada Taluka. The results of the phytochemical analysis of these medicinal plants showed that the terpenoids, phlobatannins, reducing sugar, flavonoids and alkaloids were found to be present in these mentioned medicinal plants. The phytochemical analysis of the plants is very important commercially and has great interest in pharmaceutical companies for the production of the new drugs for curing of various diseases. It is expected that the important phytochemical properties recognized by our study in the indigenous medicinal plants of Gaganbavada Talukawill be very useful in the curing of various diseases of this region.

KEYWORDS: Medicinal plants; Phytochemicals; Anti-fungal; Antibacterial; Anti-inflammation activities.

INTRODUCTION

The medicinal plants are useful for managing human diseases because of the presence of phytochemical constituents. Phytochemicals are naturally occurring in the medicinal plants, leaves, vegetables and roots that have defense mechanism and protect from various diseases. Phytochemicals are primary and secondary compounds. Chlorophyll, proteins and common sugars are included in primary constituents and secondary compounds contain terpenoid, alkaloids and phenolic compounds. Terpenoids exhibit various important pharmacological activities i.e., anti-inflammatory, anticancer, anti-malarial, inhibition of cholesterol synthesis, anti-viral and antibacterial activities. Terpenoids are very important in attracting useful mites and consume the herbivorous insects. Alkaloids are used as anaesthetic agents and are found in medicinal plants. The Momordica charantia belongs to the Cucurbitaceae family and it has common names such as bitter melon, karela and bitter gourd. More than thousand herbal products of Momordica charantia are used for treatment of diabetic patients and also helpful in lowering of glucose level in the blood. The bioactive constituents are present in Momordica charantia that is charantosides, momordin and goyaglycosides. It also includes terpenoid constituents such as momordin, momordenol, momordicin-28, momordicilin and momordol. Morus nigra is the botanical name of the mulberry and it belongs to the family Moraceae. Mulberries have shown various biological properties such as anti-inflammatory activities.

Acacia nilotica, it is the member of the Leguminosae family. The subfamily of the Acacia nilotica is Mimosoideae. Luffa cylindrica is the botanical name of the sponge gourds and belongs to Cucurbitaceae family. The fruits of this plant have flat seeds and black in colour which is enclosed by group of fibers. Medicinal and nutritional properties are the characteristics of Luffa cylindrical and seeds of this plant are used for curing of asthma, fever and sinusitis. Morus alba included in the Moraceae family. Their leaves and fruits are used for curing prematurely grey hair. Its root bark is used by humans for more than 4 thousand years.

The main objective of our research work was to analyze the presence or absence of different phytochemicals in the selected five medicinal plants from Gaganbavada Taluka used for healing and curing of various diseases.

MATERIALS AND METHODS

Plant materials

The present study included plant species which were Acacia nilotica, Morus alba, Morus nigra, Momordica charantia, and Luffa cylindrica.
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Chemicals
Fehling solution A and Fehling solution B, ethanol, distill water, aqueous HCl, methanol, chloroform, concentrated sulphuric acid, Ammonia solution, picric acid, Hexane.

Sample collection
Five medicinal plants were collected locally from the farm lands of Gaganbavada Taluka. The plants were used for the purpose of their phytochemical analysis. Fresh and tender leaves of selected plants were used for phytochemical analysis. Plant species selected during present investigation were given in Table 1.

Preparation of plant extract
The leaves of the selected plants were removed from the plants and then washed under running tap water to remove dust. The plant samples were then air dried for few days and the leaves were crushed into powder and stored in polythene bags for use. The plant powder was taken in a test tube and distilled water was added to it such that plant powder soaked in it and shaken well.

The solution then filtered with the help of filter paper and filtered extract of the selected plant samples were taken and used for further phytochemical analysis.

Test for phlobatannins
Plant powder sample was mixed with distill water in a test tube, then shake it well, and filtered to take plant extract. Then to each plant extract, 1% aqueous hydrochloric acid was added and each plant sample was then boiled with the help of Hot plate stirrer. Formation of red colored precipitate confirmed a positive result.

Test for reducing Sugar
An amount of 0.50 g of selected plant sample was added in 5 ml of distilled water. Then 1 ml of ethanol mixed in plant extract. After that we took 1 ml of Fehling solution A and 1 ml of Fehling solution B in a test tube, heated it to boiling and then poured it in the aqueous ethanol extract. When color reaction was observed, it shows a positive result.

Test for terpenoids
An amount of 0.8 g of selected plant sample was taken in a test tube, then poured 10 ml of methanol in it, shaken well and filtered to take 5 ml extract of plant sample. Then 2 ml of chloroform were mixed in extract of selected plant sample and 3 ml of sulphuric acid were added in selected sample extract. Formation of reddish brown color indicates the presence of terpenoids in the selected plants.

Test for flavonoids
For the confirmation of flavonoid in the selected plants, 0.5 g of each selected plant extract were added in a test tube and 10 ml of distill water, 5 ml of dilute ammonia solution were added to a portion of the aqueous filtrate of each plant extract followed by addition of 1 ml concentrated H2SO4. Indication of yellow color shows the presence of flavonoids in each extract.

Test for alkaloids
For the purpose of phytochemical analysis of the selected plants, 0.2 g of the selected plant samples were added in each test tube and 3 ml of hexane were mixed in it, shaken well and filtered. Then took 5 ml of 2% HCL and poured in a test tube having the mixture of plantextract and hexane. Heated the test tube having the mixture, filtered it and poured few drops of picric acid in a mixture. Formation of yellow color precipitate indicates the presence of alkaloids.

RESULTS
This study has revealed the presence of phytochemicals considered as active medicinal chemical constituents. Important medicinal phytochemicals such as terpenoids, reducing sugar, flavonoids, alkaloids and phlobatannins were present in the samples. The result of the phytochemical analysis shows that the seven plants are rich in at least one of alkaloids, flavonoids, terpenoids, reducing sugars and phlobatannins. The phytochemical screening and qualitative estimation of seven medicinal plants showed that the leaves were rich in phlobatannins, terpenoid, flavonoids, alkaloids and reducing sugar (Table 2). Phlobatannins are present in Momordica charantia. Reducing sugars and Terpenoids are present only in one plant out of 07 plants i.e., Acacia nilotica. Flavonoids are found in Morus alba, and Acacia nilotica. Alkaloids, flavonoids and reducing sugar are present in Acacia concinna. Terpenoid, flavonoids, alkaloids and phlobatannins were reported in Terminalia belerica. Epidemiologic studies recommend that coronary heart disease is opposed by dietary flavonoids. Alkaloids are present in Morus nigra as shown in Table 2. Plants havingalkaloids are used in medicines for reducing headache and fever. Theseare attributed for antibacterial and analgesic properties [20].

Table 1: List of medicinal plants, local name and their plants used

<table>
<thead>
<tr>
<th>S.No</th>
<th>Plant species</th>
<th>Local name</th>
<th>Part used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acacia nilotica</td>
<td>Ran babhal</td>
<td>Leaves</td>
</tr>
<tr>
<td>2</td>
<td>Luffa cylindrica</td>
<td>Ghosaval</td>
<td>Leaves</td>
</tr>
<tr>
<td>3</td>
<td>Morus alba</td>
<td>Tuti /White Mulberry</td>
<td>Leaves</td>
</tr>
<tr>
<td>4</td>
<td>Morus nigra</td>
<td>Tuti /Black Mulberry</td>
<td>Leaves</td>
</tr>
<tr>
<td>5</td>
<td>Momordica charantia</td>
<td>Karali</td>
<td>Leaves</td>
</tr>
<tr>
<td>6</td>
<td>Acacia concinna</td>
<td>Shikekai</td>
<td>Leaves</td>
</tr>
<tr>
<td>7</td>
<td>Terminalia belerica</td>
<td>Behada</td>
<td>Leaves</td>
</tr>
</tbody>
</table>
Table 2: Phytochemical analysis of medicinal plants from Gaganbavada Taluka.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Plant species</th>
<th>Phlobatannins</th>
<th>Reducing sugar</th>
<th>Terpenoid</th>
<th>Flavonoids</th>
<th>Alkaloids</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acacia nilotica</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Luffa cylindrica</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>3</td>
<td>Morus alba</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Morus nigra</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+ +</td>
</tr>
<tr>
<td>5</td>
<td>Momordica charantia</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>6</td>
<td>Acacia concinna</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+ +</td>
</tr>
<tr>
<td>7</td>
<td>Terminalia belerica</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+ +</td>
</tr>
</tbody>
</table>

+ = indicates presence of phytochemicals and, - = indicates absence of phytochemicals.

DISCUSSION:
The research work is carried by using seven medicinal plants from Gaganbavada Taluka. Various phytochemicals like alkaloids, reducing sugar, terpenoid, flavonoids and phlobatannins were studied. According to the Ayinde et al. and Okwu et al. Phlobatannins have been reported for its wound healing properties, these are anti-inflammatory and analgesic and antioxidant. According to Mahato and Sen terpenoids are reported to have anti-inflammatory, anti-viral, antimalarial, inhibition of cholesterol synthesis and anti-bacterial.

CONCLUSION
The selected seven medicinal plants are the source of the secondary metabolites i.e., alkaloids, flavonoids, terpenoids, phlobatannins and reducing sugars. Medicinal plants play a vital role in preventing various diseases. The antidiuretic, anti-inflammatory, antialgesic, anti-cancer, anti-viral, anti-malarial, anti-bacterial and anti-fungal activities of the medicinal plants are due to the presence of the above mentioned secondary metabolites. Medicinal plants are used for discovering and screening of the phytochemical constituents which are very helpful for the manufacturing of new drugs. The phytochemical analyses of the medicinal plants are also important and have commercial interest in both research institutes and pharmaceutical companies. Thus we hope that the important phytochemical properties identified by our study in the local plant of Gaganbavada Taluka will be helpful in the managing different diseases.

REFERENCES


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