Research Article

Preliminary phytochemical analysis of the various leaf extracts of *Mimusops elengi* L.

Venkitachalapathi Kalaiselvi 1, *, Thermadum Vareed Binu1, Singanallur Ramu Radha1

1Department of Botany, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore - 641 043, Tamil Nadu, India

* Corresponding author: Venkitachalapathi Kalaiselvi; E-mail: binuabin2011@gmail.com; Tel.: +91 9496677218

Received 6 August 2015; Revised 21 September 2015; Accepted 29 September 2015; Published 2 January 2016

Abstract

The usage of medicinal plants in the system of medicine, i.e. Ayurveda, Siddha and Unani is well known. Nearly 3000 plants are officially recognized by India for their medicinal value and over 6000 plants are used in folk, herbal and traditional medicine system in India. Phytochemicals, the compounds present in plants are valuable source of food and medicine. Hence, the present investigation was undertaken with the main objective of screening the plant, *Mimusops elengi* L. (Sapotaceae) for its phytochemicals. The different leaf extracts of petroleum ether, chloroform and distilled water of *Mimusops elengi* L. were subjected to qualitative analysis for the identification of various primary and secondary metabolites. Powdered dried leaf sample was successively extracted with petroleum ether, chloroform and distilled water by using soxhlet apparatus until the decolourisation of the solvents. The presence of alkaloids, flavonoids, terpenoids, steroids, tannins, saponins, phenols, carbohydrates, proteins and aminoacid were confirmed in various extracts of leaf. Fixed oils and fat were present in both chloroform and aqueous extracts, whereas tannins were present only in petroleum ether extract.

Keywords: *Mimusops elengi* L, Soxhlet apparatus, Phytochemicals, Leaf extracts.

1. Introduction

Nature has been a source of medicinal agents since time immemorial. The importance of herbs in the management of human ailments cannot be overemphasized. It is clear, that the plant kingdom harbours an inexhaustible source of active ingredients, in India is one among the largest producers of medicinal herbs. The usage of medicinal plants in the system of medicine, i.e. Ayurveda, Siddha and Unani is well known. Nearly 3000 plants are officially recognized by India for their medicinal value and over 6000 plants are used in folk, herbal and traditional medicine system in India (Prakash et al., 2014). The important bioactive components in plants are usually the secondary metabolites such as alkaloids, flavonoids, tannins and other phenolic compounds. Phytochemicals are basically divided into two groups that are primary and secondary metabolites according to their functions in plant metabolism (Gopinath et al., 2012). These plants can be exploited to find out the effective alternative to synthetic drugs which
preliminary phytochemical studies (Biswal et al., 2011; Antonisamy et al., 2015; Balamurugan 2015; Barathi and Agastian 2015; Rathi et al., 2015; Nandhini and Stella Bai 2015).

Hence the present investigation was undertaken with the main objective of screening the leaf of the plant, *Mimusops elengi* L. (Sapotaceae) for its phytochemical contents. An investigation was carried out to analyze the phytochemical contents of leaves of *Mimusops elengi* L.

2. Materials and methods

2.1. Collection of plant sample

Healthy and disease free leaves of *Mimusops elengi* L. were collected from Avinashilingam University Campus during the months of August – September (2014). The plant material was identified and authenticated by the Department of Botany, Avinashilingam University, Coimbatore-43, Tamilnadu, India. The leaves were cleaned, dried in the shade and pulverized in a mechanical grinder, passed through a 40 mesh sieve and stored in an air tight container. Powdered dried samples (30 g) were successively extracted with petroleum ether (300 mL), chloroform (300 mL) and distilled water (300 mL) by using soxhlet apparatus until the decolourisation of the solvents.

2.2. Preliminary phytochemical analysis

The different leaf extracts of petroleum ether, chloroform and distilled water of *Mimusops elengi* L. were subjected to qualitative analysis for the identification of various primary and secondary metabolites.

2.3. Qualitative estimation

2.3.1. Test for alkaloids

One mili liter of Mayer’s reagent was added with 1 mL of the extract. The formation of white precipitate was taken as a positive result for the presence of alkaloids.

2.3.2. Test for flavonoids

One mili liter of neutral ferric chloride was added with 1 mL of extract. Appearance of brown colour indicates the presence of flavonoids.

2.3.3. Test for terpenoids

One mili liter ml of extract was treated with 1 mL of chloroform and 1 mL of concentrated sulphuric acid was added to form a layer. A reddish brown colour indicates the presence of terpenoids.

2.3.4. Test for steroids

One mili liter of chloroform was mixed with 1 mL of extract and then ten drops of acetic anhydride and five drops of concentrated sulphuric acid were added and mixed. The formation of dark red colour or dark pink colour indicates the presence of steroids.
2.3.5. **Test for tannins**

Five mili liter of extract was added to few drops of 1% lead acetate. A yellow precipitate indicated the presence of tannins.

2.3.6. **Test for saponins**

Two mili liter of the extract with 20 mL of distilled water was agitated in a graduated cylinder for 15 min. The formation of 1 cm layer of foam indicated the presence of saponins.

2.3.7. **Test for phenols**

About 1 mL of lead acetate solution was added with 1 mL of the extract. A brown colour precipitate is observed, which showed the presence of phenolic compounds.

2.3.8. **Test for carbohydrate**

Three to five drops of Molisch reagent was added with 1 mL of the extract and then 1 mL of concentrated sulphuric acid was added carefully through the side of the test tube. The mixture was then allowed to stand for two minutes and diluted with 5 mL of distilled water. Development of red or dull violet ring at the junction of the liquids, which showed the presence of carbohydrates.

2.3.9. **Test for proteins**

One mili liter of ninhydrin was dissolved in 1 mL of acetone and then small amount of extract was added with ninhydrin. The formation of purple colour revealed the presence of protein.

2.3.10. **Test for fixed oil and fat**

A few drops of Sudan III solution was treated with 1 mL of extract. A shining orange colour showed the presence of fixed oil and fat.

3. **Results and discussion**

Man’s acquaintance with the medicinal properties of plants is of great antiquity. Even the higher mammals are said to be aware of the curative aspects of plant kingdom. Plants have been used, in a number of systems of medicines, in our country as well as in other countries. India is well known as the ‘Emporium of Medicinal Plants’ (Ghosh 2011).

3.1. **Preliminary phytochemical screening**

Phytochemicals are certain non-nutritive plant chemicals which have some disease preventive properties. They are not required by the human body for life sustenance, but they offer protection against pathogens.
There are different ways in which a phytochemical can work. It can act as an antioxidant and protect cells against free radical damage, eg. polyphenols, carotenoids etc. It can stimulate certain enzymes thereby reduce risk for breast cancer, eg. terpenes (Mathew et al., 2012).

Preliminary phytochemical studies are helpful in finding out chemical constituents in the plant material that may well lead to their quantitative estimation. Recently much attention has been directed towards extracts and biologically active compounds isolated from popular plant species. The curative properties of medicinal plants are mainly due to the presence of various complex chemical substances of different compositions which occur as secondary metabolites (Arya and Patni 2013).

For the preliminary phytochemical analysis, leaf extracts (petroleum ether, chloroform and water) of *Mimusops elengi* L. were taken. In the present study, a phytochemical screening was carried out to detect the active constituents such as alkaloids, flavonoids, terpenoids, steroids, tannins, saponins, phenols, carbohydrates, proteins and aminoacid, fixed oil and fat were recorded in Table 1. 

Alkaloid was present in both petroleum ether and chloroform extracts. Flavonoids, terpenoids, saponins and phenols were present only in chloroform extract. Steroid was present in both petroleum ether and aqueous extracts. Tannin was present only in petroleum ether extract. Carbohydrates, protein and amino acid were present in all the extracts. Fixed oil and fat were present in both chloroform and aqueous extracts.

<table>
<thead>
<tr>
<th>Phytoconstituents</th>
<th>Extracts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Petroleum ether</td>
</tr>
<tr>
<td>Alkaloids</td>
<td>+</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>-</td>
</tr>
<tr>
<td>Terpenoids</td>
<td>-</td>
</tr>
<tr>
<td>Steroids</td>
<td>+</td>
</tr>
<tr>
<td>Tannins</td>
<td>+</td>
</tr>
<tr>
<td>Saponins</td>
<td>-</td>
</tr>
<tr>
<td>Phenols</td>
<td>-</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>+</td>
</tr>
<tr>
<td>Proteins and aminoacid</td>
<td>+</td>
</tr>
<tr>
<td>Fixed oil and fat</td>
<td>-</td>
</tr>
</tbody>
</table>

The results indicated that the chloroform extract showed maximum results compared to the other two solvents. The results of the present study coincides with that of Das et al. (2009) who conducted the phytochemical investigation of aqueous and methanolic extracts of two medicinal plants (*Spathodea campanulata* P. and *Tridax procumbens* L). The phytochemical screening revealed the presence of alkaloids, tannin, saponin, steroids, terpenoid and falvonoids. Kandalkar et al. (2009) studied the phytochemical analysis on leaves of *Euphorbia hirta* L. The results showed the presence of alkaloids, steroids, carbohydrates and flavonoids.

Phytochemical investigation of antidiabetic plant *scoparia dulcis* L. (Scrophulariaceae) grown in Nigeria, revealed the presence of carbohydrates, flavonoids, saponins, tannins, alkaloids, sterios and terpenes (Okhale et al., 2010). Pathak et al. (2011) investigated the phytochemical screening of dried fruit powder of *Coriandrum sativum* L. and revealed the presence of carbohydrates, glycoside, protein, amino acid and terpenoids. Methanolic extracts of *C. sativum* showed presence of linalool, a-pinene, cymene and terpinone etc. compounds. Ashish et al. (2011) conducted the phytochemical screening of root and leaves of *Leonotis nepetaefolia* (L.) R. Br. This study suggested the presence of alkaloids in leaves and terpenoids along with other phytoconstituents in leaves and root.
Netala et al. (2014) conducted the phytochemical studies on three species of *Portulaca* such as *Portulaca grandiflora, Portulaca oleracea, Portulaca quadridida*. The qualitative phytochemical screening revealed the presence of alkaloids, carbohydrates, saponins, steroids and triterpenoids. Agarwal et al. (2015) investigated the phytochemicals on seeds of a tropical plant, *Syzygium cumini* L. from Jodhpur district, Rajasthan, North West India. The result of this investigation revealed that the methanol extract of the seeds of *S.cumini* showed the presence of alkaloids, amino acids, flavonoids, glycosides, phytosterols, saponins, steroids, tannins and triterpenoids. Further, methanol extract of the seeds showed the absence of anthraquinones.

4. Conclusions

The results of leaf analysis gave a contribution to the world of traditional medicines. The presence of alkaloids, flavonoids, terpenoids, steroids, tannins, saponins, phenols, carbohydrates, proteins and aminoacid were confirmed in various extracts of leaf. Fixed oils and fat were present in both chloroform and aqueous extracts, whereas tannins were present only in petroleum ether extract.

**Conflict of interest statement**

We declare that we have no conflict of interest.

**References**


