COMPARATIVE STUDIES ON PHYTOCHEMICAL ANALYSIS OF BASELLA ALBA (L.) VARIETIES

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ABSTRACT

Phytochemical natural bioactive components with wide ranging benefits to human health. The presence study has provided some comparative phytochemical constituents of two varieties of Basella alba (Green and reddish purple). Flavonoids, tannins and saponins were present in both chloroform and petroleum ether extract of green Basella alba along with sterols present in the reddish purple Basella alba. The two varieties of Basella alba are good source of phytochemicals are vary in degree. Phytochemical analysis of medicinal plants are also important in pharmaceutical industry manufacturing for treatment of various diseases.

KEYWORDS: Phytochemical, Basella, saponins.

INTRODUCTION

In nature, there are many underutilized greens of promising nutritive value, when can nourish the ever increasing human population. They have remained underutilized due to lack of awareness and popularization of technologies for utilization (Sheela 2004). People diet offers a greater and more diverse group of plant bioactive than do drugs, and they often do not realize that many drugs are derived from the compounds originally discovered in plant foods. They play an important part in maintaining general good health owing to the presence of nutritional and phytochemical property. Medicinal plants contain numerous biologically active compounds such as carbohydrates, proteins, enzymes, fats, oil, minerals, vitamins, alkaloids, quinones, flavonoids, carotenoids, sterols, simple phenolic glycosides, tannins, saponins, polyphenols etc. The phytochemical analysis of the plants is very important.
commercially and has a great interest in pharmaceutical companies for the production of new drugs for curing of various diseases.

*Basella alba* (Indian spinach or poi leaves) was described as a highly succulent vegetable similar to water leaves (Harry 2000) belongs to the family Basellaceae. The plant has been reported for its antifungal, anticonvulsant, analgesic, anti-inflammatory, androgenic activities and for the treatment of anemia. The leaves of *B. alba* are traditionally used in Ayurveda system of medicine to bring sound refreshing sleep when it is applied on head about half an hour before bathing (Anandarajagopal et al., 2011). A paste of the root is applied to swellings and is also used as a rubefacient. Sap is applied to acne eruptions to reduce inflammation. Decoction of leaves used for its mild laxative effects. Pulped leaves applied to boils and ulcers to hasten suppuration. Sugared juice of leaves is useful for catarrhal affliction. Leaf juice mixed with butter, is smoothing and cooling when applied to burns and scalds. In Ayurveda it is used for hemorrhages, skin diseases, sexual weakness, ulcers, laxative in children and pregnant women. The plant is febrifuge, its juice is a safe aperients for pregnant women and a decotion has been used to alleviate labour. It is also an astringent and the cooked roots are used in the treatment of diarrhea. The leaf juice is a demulcent, used in cases of dysentery. This plant serves as a Thai traditional vegetable.

*Basella alba* is administered orally for the treatment of anal prolapsed or hernia. Ground leaves of *Basella alba* are rubbed on the human hand to introduce the whole preparation into the animal vagina every morning for the treatment of sterility (Chifundera 1998). *Basella alba* has been used for the treatment of anemia in women, coughs, cold (leaf with stem), cold related infections (Rahmatullah et al., 2010). Leaves are used in constipation, poultice for sores, urticarial and gonorrhea. The mucilaginous liquid obtained from the leaves and tender stalks of plants is popular remedy for headaches (Jadhav et al., 2011). There are two varieties of *Basella alba* they are green and reddish purple. In recent years, there has been an increasing interest by researchers in the use of naturally occurring biologically active compounds of medicinal value. The present study to analysis the phytochemical constituents of *Basella alba* varieties.
MATERIALS AND METHOD

Collection of Plant Materials

*Basella alba* varieties were collected locally from the Coimbatore area (Tamilnadu). The plants were used for the purpose of their phytochemical analysis. The varieties were differentiated in green and reddish purple colours.

Chemicals

Fehling solution A and Fehling solution B, Mayer solution, Lead acetate, Ferric chloride solution, Ninhydrin solution, Million’s reagent, Sodium hydroxide, Ethanol, Distilled water, Aqueous Hydrochloric acid, Choroform, Concentrated sulphuric acid and ammonia solution.

Preparation of Plant Extract

The leaves and stem of the *Basella alba* varieties were removed and washed under running tap water to remove dust. The plant samples were then air dried for few days and the leaves and stem were crushed into powder and stored in polythene bags for use.

Extraction

A small scale extraction was carried out in view of preliminary bio analysis. The dried pulverized plant material (15gm) was extracted with water and methanol at room temperature; the chloroform and petroleum ether was decanted after 24 hours and the extraction repeated three times. The pooled extracts were filtered and then concentrated under vacuum using a rotary evaporator at 40°C.

Test for Alkaloids

Small quantities of various extracts were separately treated with few drops of dilute hydrochloric acid and filtered. The filtrates were used for the following tests.

1. Mayer’s reagent- Cream precipitate
2. Dragendorffs reagent- Orange brown precipitate
3. Hager’s reagent- Yellow precipitate
4. Wagner’s reagent- Reddish brown precipitate

Test for Flavonoids

1. Small quantities of various extracts were dissolved separately in aqueous sodium hydroxide. Appearance of yellow colour indicates the presence of flavonoids.
2. To the small portion of each extract, concentrated sulphuric acid was added. Yellow orange colour was obtained shows the presence of flavonoids.

**Test for Sterols**
Small quantities of various extracts were dissolved in 5ml of chloroform separately. Then this chloroform solution was subjected to the following tests to detect the presence of sterols.

**Salkowski Test**
To 1ml of above prepared chloroform solution, few drops of concentrated sulphuric acid was added. Brown colour produced shows the presence of sterols.

**Test for Tannins**
Small quantities of the various extracts were taken separately in water and test for the presence of tannins was carried out with the following reagents.
1. 1.5% Ferric chloride solution- Violet colour
2. 2.1% solution of gelatin containing 10% sodium chloride- White precipitate
3. 3.10% lead acetate solution- White precipitate

**Borntrager’s Test**
Hydrolysate was treated with chloroform and the chloroform layer was separated. To this equal volume of dilute ammonia solution was added. Ammonia layer acquires pink colour shows the presence of glycosides.

**Test for Fixed Oils and Fats**

**Saponification Test**
Few drops of 0.5M alcoholic potassium hydroxide was added to small quantities of various extracts along with a drop of phenolphthalein. The mixture was heated on a water bath for 1-2 hours. Formation of soap indicates the presence of fixed oils and fats.

**Filter Paper Test**
Small quantities of various extracts were pressed separately between the filter papers. Appearance of oils stain on the paper indicated the presence of fixed oils.

**Test for Saponins**
The extracts were diluted with 20ml of distilled water and it was agitated in a measuring cylinder for 15minutes. The formation of 1cm layer of foam shows the presence of saponins.
Test for Gum and Mucilage
A small quantity of various extracts were added separately to 25ml of absolute alcohol with constant stirring and filtered. The precipitate was dried in air examined for its swelling properties. No swelling was observed indicates the absence of gums and mucilage.

Test for Carbohydrates
A small quantity of various extracts were dissolved separately in 4ml of distilled water and filtered. The filtrate was subjected to the following tests to detect the presence of carbohydrates.

Molisch’s Test
The filtrate was treated with 2-3 drops of 1% alcoholic alpha napthol and 2ml of concentrated sulphuric acid was added along the sides of the test tube. Appearance of brown ring at the junction of two liquids shows the presence of carbohydrates.

Fehling’s Test
The filtrate was treated with each 1ml of Fehling’s solution A and B and heated on a water bath. A reddish precipitate was obtained shows the presence of carbohydrates.

Test for Proteins and Free Amino Acids
Small quantities of various extracts were dissolved in few ml of water and then they were subjected to the following tests.

Biuret Test
To the above prepared extracts equal volume of 5% sodium hydroxide and 1% copper sulphate solution were added. Violet colour produced shows the presence of proteins and free aminoacids.

Ninhydrine Test
The extracts were treated with Ninhydrine reagent. Purple colour produced shows the presence of proteins and free aminoacids.

RESULT AND DISCUSSION
Green Basella alba have green colour in leaf and stem. It contain blackish purple fruits. Reddish purple Basella alba varieties have a greenish purple leaf colour and reddish purple stem colour. It have blackish purple fruits (Table 1, Plate 1).
The presence of flavonoids in methanol leaf extract of green and reddish purple *Basella alba*. Sterols are present in reddish purple *Basella alba*. Tannins are present in reddish purple *Basella alba* and methanol extract of green *Basella alba*. Saponins are present in green *Basella alba* and methanol leaf extract of reddish purple *Basella alba*. The green and reddish purple *Basella alba* leaves contain flavonoids, tannins and saponins but sterols present only in reddish purple *Basella alba* (Table 2, Plate 3).

Flavonoids are present in green and reddish purple *Basella alba* stem varieties. Sterols are present in reddish purple stem *Basella alba*. Tannins are present in reddish purple *Basella alba* stem and also it present in methanol stem extract of green *Basella alba* stem. Saponins are present in methanol extract of green and reddish purple *Basella alba* stem varieties (Table 3). In green *Basella alba* stems contain flavonoids, tannins and saponins and the reddish purple *Basella alba* contains flavonoids, sterols, tannins.

*Basella alba* has been used from a long time back for the treatment of many diseases like dysentery, diarrhea, anemia, cancer etc. it has also been utilized for different kinds of healing activities. Various kinds of extract like aqueous extract, methanolic extract, petroleum extract, chloroform extract has been prepared from different parts of the plant has been utilized in the treatment of many diseases since time immortal all over the world. Phytochemicals are non nutritive plant chemicals that have protective or disease preventive properties, they are found generally in plants. The findings in this study agree with earlier study which also found that not all phytochemicals are present in all plant parts and that those present differ according to the type of the extracting solvent used (Tijjani *et al*., 2009; Ayinde *et al*., 2007). Phytochemical screening in table 2 and 3 showed that the green and reddish purple *Basella alba* leaves contain flavonoids, tannins and saponins but sterols present only in reddish purple *Basella alba*. In green *Basella alba* stems contain flavonoids, tannins and saponins and the reddish purple *Basella alba* contains flavonoids, sterols, tannins.

Flavonoids are widely distributed in plants fulfilling many functions. They have been shown to have anti-fungal activity in vitro (Galeotti *et al*., 2008). The potent antioxidant activity of flavonoids reveals their ability to scavenge hydroxyl radicals, superoxide anions and lipid peroxy radicals, this may be the most important function of flavonoids (Alan and Miller, 1996) and also induce mechanisms that may kill cancer cells and inhibit tumor invasion (Williams *et al*., 2004).
The presence of saponins to possess both beneficial (cholesterol lowering) and deleterious (cytotoxic; permeabilization of the intestine) properties (Price et al., 1987, Oakenful and Sidhu, 1989). Although some saponins have been shown to be highly toxic under experimental conditions, acute poisoning is relatively rare both in animals and man (Osagie, 1988). Studies have illustrated the beneficial effects on blood cholesterol levels, cancer, bone health and stimulation of the immune system. Due to its ability to form froth, soap is being produced locally from it for bathing.

Tannins are polyphenols that are obtained from leaves and stem green and dark pink *Basella alba*. Saponins and tannins exhibit cytotoxic effect both inhibition making tumor inhibiting agent. Tannins can also be effective in curbing hemorrhages as well as restrict bare swellings. While tannins are proved haemostatic, they are also beneficial when applied on mucosal coating in mouth. Hence, herbs possessing tannins are widely used as mouthwashes, eyewashes, snuff and even as vaginal douches and also treat rectal disorders. When applied internally, tannins affect the walls of the stomach and other digestive parts. They sour the mucus secretions and contract or squeeze the membranes in such a manner that secretions from the cells are restricted. Long term and excessive use of herbs and vegetables containing high concentrations of tannins is not recommended (Reed 1995).

Steroids present in reddish purple *Basella alba* is of great importance has they are interest in pharmacy due to their relationship with such compounds has sex hormones. Steroids increase protein synthesis, promoting growth of muscles and bones. They reduce the recovery time needed between training sessions and enable athletes to train more intensively for longer periods.

**BASELLA ALBA (L.) VARIETIES**

**Green Basella alba (L.)**
Reddish Purple *Basella alba* (L.)

<table>
<thead>
<tr>
<th>BASELLA ALBA VARIETIES</th>
<th>LEAF COLOUR</th>
<th>STEM COLOUR</th>
<th>FRUIT COLOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Blackish purple</td>
</tr>
<tr>
<td>Reddish purple</td>
<td>Greenish purple</td>
<td>Reddish purple</td>
<td>Blackish purple</td>
</tr>
</tbody>
</table>

Table 1: Physical appearance of *Basella alba* varieties

Table 2: Preliminary Phytochemical analysis in water and methanol leaves extract of *Basella alba* varieties.

<table>
<thead>
<tr>
<th>S.NO</th>
<th>PHYTOCHEMICALS</th>
<th>BASELLA ALBA VARIETIES</th>
<th>GREEN</th>
<th>REDDISH PURPLE</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Water leaf extract</td>
<td>Methanol leaf extract</td>
</tr>
<tr>
<td>1.</td>
<td>ALKALOIDS</td>
<td></td>
<td>_</td>
<td>_</td>
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<tr>
<td>2.</td>
<td>FLAVONOIDS</td>
<td></td>
<td>_</td>
<td>+</td>
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<tr>
<td>3.</td>
<td>STEROLS</td>
<td></td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>4.</td>
<td>TANNINS</td>
<td></td>
<td>_</td>
<td>+</td>
</tr>
<tr>
<td>5.</td>
<td>GLYCOSIDES</td>
<td></td>
<td>_</td>
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<tr>
<td>6.</td>
<td>FIXED OILS &amp; FATS</td>
<td></td>
<td>_</td>
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<tr>
<td>7.</td>
<td>SAPONINS</td>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>8.</td>
<td>GUM AND MUCILAGE</td>
<td></td>
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</table>
Table 3: Showing Phytochemical test in water and methanol stem extract of *Basella alba* varieties.

<table>
<thead>
<tr>
<th>S.NO</th>
<th>PHYTOCHEMICALS</th>
<th>BASELLA ALBA VARIETIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>GREEN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chloroform stem extract</td>
</tr>
<tr>
<td>1.</td>
<td>ALKALOIDS</td>
<td>_</td>
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<tr>
<td>2.</td>
<td>FLAVONOIDS</td>
<td>+</td>
</tr>
<tr>
<td>3.</td>
<td>STEROLS</td>
<td>_</td>
</tr>
<tr>
<td>4.</td>
<td>TANNINS</td>
<td>_</td>
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<tr>
<td>5.</td>
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<tr>
<td>8.</td>
<td>GUM AND MUCILAGE</td>
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CONCLUSION

The *Basella alba* varieties are the source of the secondary metabolites. Both the varieties contain flavonoids, tannins and saponins but in reddish green variety have sterols along with this above mentioned secondary metabolites. The green leafy vegetables play a vital role in preventing various diseases. The antifungal, anticonvulsant, analgesic, anti-inflammatory, androgenic activities of the green leafy vegetables are due to the presence of the above mentioned secondary metabolites. Green leafy vegetables are used for discovering and screening of the phytochemical constituents which are very helpful for the manufacturing of new drugs.

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