



Research Article

QUALITATIVE PHYTOCHEMICAL ANALYSIS OF *MAMAJJAKA* (*ENICOSTEMMA LITTORALE* BLUME)

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ABSTRACT

The phytochemical analysis of plants plays a significant role commercially and has great interest in pharmaceutical companies for the manufacture of the new drugs to treat a variety of disorders. The Medicinal properties of a plant species lies in its phytochemical components that cause definite pharmacological action on the body. In the present study *Mamajjaka* (*Enicostemma littorale* Blume) was selected for qualitative phytochemical component analysis. The phytochemical analysis of aqueous and ethanolic extract samples was done to determine the phytochemical components in the plant. These extracts were used for qualitative phytochemical analysis using standard chemical tests. Results show the presence of various bioactive compounds such as carbohydrates, alkaloids, amino acids, protein, saponin, glycosides, phenolic compound, flavonoids, tannin and absence of steroids.

INTRODUCTION

Medicinal plants still play significant roles in lives of people today. Medicinal plants not only serve as substitutes or complements for modern medical treatments, but also enhance the security and health of local people. As per WHO, the primary health care of individuals depend on traditional medicines and mostly on natural plant products of developing countries (Vines 2004).^[1] The main phytochemical constituents, present in medicinal plants are alkaloids, tannins, saponins, cardiac glycosides, steroids, flavonoids, terpenoids, anthraquinones, phlobatannins and reducing sugars. The medicinal power of traditional plants species lies in phytochemical components that cause definite pharmacological action on the human body (Naseem 2014).^[2] On the basis of metabolic activity of plant, phytochemical constituents are generally divided into two groups, one is primary comprises of chlorophyll, sugars, proteins, and amino acids, and other is secondary which include alkaloids,

tannins, flavonoids, saponins, phenolic compounds and many more (Krishnaiah 2007).^[3] By using the appropriate solvent and extraction techniques, the most important components of medicinal plant were separated. To determine the phytochemical content of plant species, various extraction techniques were applied, including ethanol, methanol, acetone, chloroform, petroleum ether, ethyl acetate, hexane, and aqueous (water).

The main objective of the research work was to check the presence or absence of the phytochemical constituents in the selected medicinal plant as well as to provide information for the research community to conduct further scientific investigations in medicinal plants.

Mamajjaka was collected from local areas and gardens of Gujrat. The identification of plant *Mamajjaka* was done at Department of Dravyaguna Vigyan, National Institute of Ayurveda, Jaipur and further authentication was done at CSIR-National Institute of Science Communication and Information Resources, Raw Material Herbarium, Delhi (RHMD). All the Voucher specimens (Ref. No. NIScPR/RHMD/Consult/ 2022/4103-04-1), dated 18/05/2022 were deposited for additional future references.

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The plant of *Mamajjaka* was selected due to its several recognized medicinal properties. For the preparation of powder, leaves were collected and washed properly with fresh and clean tap water several times and then rinsed well in sterilized distilled water. They were then spread out on the polythene sheets and were air dried. After drying the leaves were ground in the ball miller to obtain fine powder. The powder was stored in the air tight containers for further use in the experiment.

The qualitative phytochemical analysis was carried out to detect the presence of different phytochemicals in *Mamajjaka* powder. The procedures for phytochemical tests are described as follows:

Phytochemical Screening

Freshly prepared extracts were tested for the presence of various active phyto compounds like carbohydrates, alkaloids, amino acids, protein, saponin, glycosides, phenolic compound, flavonoids, steroids and tannin by the method of Kokate and Khandelwal.

Qualitative Analysis of Extracts

The extracts obtained from the research drug were subject to qualitative examination to evaluate general phytochemical profile as per the Pharmacopoeia of India (IP).

Tests for Carbohydrates [4]

- Molisch's test
- Benedict's test
- Barfoed's test
- Fehling solution test

Molisch's Test

2ml of test Solution was taken in a test tube and 2ml of the Molisch's reagent was added and shaken carefully and then about 1ml of conc. H_2SO_4 is poured from wall of the test tube and then allowed to stand for one minute. A Purple colour ring at the junction of the two layers if formed indicated the presence of Carbohydrate.

It is used for reducing sugars and is composed of mainly copper sulphate and sodium hydroxide. To the 4ml of aqueous solution of drug, 1ml of Benedict's solution was added and heated almost to boiling. Formation of green, yellow, orange, red or brown colour in order of increasing concentrations of simple sugar in the test solution, due to formation of cuprous oxide.

The test sample was dissolved in water and heated with a little of the Barfoed's reagent. Formation of red precipitate of cuprous oxide within two minutes indicates the presence of monosaccharides.

This test is used for reducing sugars and comprises of two solutions, mixed in situ. Fehling

solution A composed of 0.5% of copper sulphate whereas Fehling solution B composed of Sodium Potassium Tartarate.

Fehling solution A and Fehling solution B in equal volumes (1ml each) were mixed and aqueous solution (2ml) of drug was added followed by boiling for 5-10 minutes on water bath.

Tests for Alkaloids [5]

- Mayer's reagent test
- Dragon Droff's reagent test
- Wagner's Test
- Hager's Test

Mayer's Reagent Test

2ml of test Solution was taken in a test tube to which 2ml of the Mayer's reagent (potassium mercury iodide solution) was added. A white or pale yellow precipitate if formed indicated presence of alkaloids except with alkaloids of the purine groups and few others.

2ml of test Solution was taken in a test tube in which 2ml of the Dragon Droff's reagent (mixture of potassium iodide and bismuth sub nitrate solution) was added. An orange precipitate if formed indicated presence of Alkaloids.

Drug solution + few drops of Wagner's reagent (dilute Iodine solution), formulation of reddish-brown precipitate.

An aqueous solution (saturated) of picric acid was used for this test. When the test filtrate was treated with this reagent, an orange yellow precipitate was obtained which indicates the presence of alkaloids.

Test for Amino acids [6]

➤ Ninhydrin test

This test is used for detecting the presence of proteins containing free amino groups and alpha-amino acids. Protein solution when heated with ninhydrin molecules, it gives characteristic deep blue or pale yellow colour due to the formation of complex between two ninhydrin molecule and nitrogen of free amino acid.

Tests for Proteins

- Biuret test
- Xanthoprotic test
- Millons test
- Biuret test

A few mg of the residue was taken in water and 1ml of 4% sodium hydroxide solution was added to it, followed by a drop of 1% solution of copper sulphate. Appearance of pink or violet colour indicates the presence of proteins.

➤ **Xanthoprotic test**

A small quantity of test sample was taken with 2ml of water and 0.5ml of concentrated nitric acid was added to it. Development of yellow colour shows the presence of proteins.

Millons test

A small quantity of test sample was taken and 2 to 3ml of millons reagent was added. The white precipitate changes to pink, indicate the presence of proteins.

Test for saponin [7]

Foam test

A small quantity of the test sample was taken in a test tube and shaken vigorously with a small amount of sodium bicarbonate and water. A stable, characteristic honeycomb like froth indicates the presence of saponins.

Test for glycosides [8]

Borntragar's Test

1ml and 0.5ml of benzene and dilute ammonia solution respectively was added to the ethanolic extract and was observed for the formation of reddish pink colour.

Test for Phenolic Compound [9]

The extract was taken in water and warmed; to this 2ml of ferric chloride solution was added and observed for the formation of green and blue colour.

Test for Flavonoids

Shinods test

A small quantity of test sample was dissolved in 5 ml ethanol (95%v/v) and reacted with few drops of

concentrated hydrochloric acid and 0.5gm of magnesium metal. Appearance of pink, crimson or magenta colour within a minute or two indicates the presence of flavonoids.

Test for Steroids

➤ **Salkowski Reaction**

Few mg of extract was taken in 2ml of chloroform and 2ml of concentrated sulphuric acid was added from the side of test tube and then shaken for few minutes. The appearance of red colour shows the presence of steroids.

Test for Tannins

➤ Ferric chloride solution

➤ Lead acetate

➤ Pot. Dichromate

➤ **Ferric Chloride Solution**

A 5 percent solution of ferric chloride in 90% alcohol was prepared. Few drops of this solution were added to above filtrate. Appearance of deep blue or dark green colour indicates the presence of tannins.

➤ **Lead Acetate**

Basic lead acetate (10 percent w/v solution in distilled water) was added to the test filtrate. Formation of precipitate shows the presence of tannins.

➤ **Pot. Dichromate**

A solution of potassium dichromate was added to the filtrate. Appearance of dark colour indicates the presence of tannins.

Table 1: Phytochemical screening of Mamajjaka

Name of Test for Mamajjaka	Aq.	Alc.
1. Carbohydrate		
Molish test	+	+
Benedict test	+	+
Fehling test	+	+
2. Alkaloids		
Dragendorff test	+	+
Wagner's test	-	-
Hager's test	+	+
3. Amino acids		
Ninhydrine	-	+
4. Protein		
Biuret test	+	+
Xanthoprotic test	-	-
Millon test	+	+
5. Saponin		
Foam test	+	-

6. Glycosides		
Borntrager's test	-	+
7. Phenolic compound		
Phenolic test	+	+
8. Flavonoids		
Shinods test	+	+
9. Steroids		
Salkowaski	-	-
10. Tannins		
Fecl ₃	+	+
Lead acetate	+	+
Pot. Dichromate	+	+

RESULTS AND DISCUSSION

Phytochemical Analysis of Mamajjaka

The details of result for qualitative analysis of phytochemicals in water and alcoholic extract of Mamajjaka powder are presented in Table 1. Phytochemical screening of medicinal plant extracts revealed the presence of various bioactive compounds such as carbohydrates, alkaloids, amino acids, protein, saponin, glycosides, phenolic compound, flavonoids, tannin and absence of steroids.

CONCLUSION

In conclusion, this present study showed the presence of various phytochemical like flavonoids, alkaloids, proteins, phenolic compounds, cardiac glycosides and tannins. This study revealed the presence of medicinally important constituents in these plant species. These herbal extract can be used for curing diseases. These can also act as a source of useful drugs because of the presence of various phytochemical components.

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