



RESEARCH ARTICLE

Phytochemical Analysis of Selected Medicinal Plants of India

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ABSTRACT

The present study has revealed the presence of phytochemicals considered as active medicinal chemical constituents. Important medicinal phytochemicals such as terpenoids, flavonoids, phenols, tannins, steroids, glycosides were studied in the collected samples. Plant *Aegle marmelos* Corr. having all these phytochemicals. Saponin was found only in two plants out of nine plants i.e. *Achyranthes aspera* Linn. and *Semecarpus anacardium* Linn. Terpenoids was found in *Aegle marmelos* Corr., *Calotropis gigantea* Linn.R.Br., *Mimosa pudica* Linn. Terpenoids are reported to have anti-inflammatory, anti-viral, antimalarial, inhibition of cholesterol synthesis and antibacterial. Cardiac glycosides content was found in *Achyranthes aspera* Linn., *Aegle marmelos* Corr., *Mimosa pudica* Linn., *Tribulus terrestris* Linn., *Calotropis gigantea* Linn.R.Br., *Ricinus communis* Linn.. Cardiac glycosides have been used for over two centuries as stimulant in case of cardiac failure. The flavonoids was found in *Achyranthes aspera* Linn., *Aegle marmelos* Corr., *Calotropis gigantea* Linn., *Mimosa pudica* Linn., *Cissus quadrangularis* Linn.Mart., *Tribulus terrestris* Linn. The biological functions of flavonoids apart from its antioxidant properties include protection against allergies, inflammation, free radicals, platelet aggregation, microbes, ulcers, hepatoxins, viruses and tumors.

Keywords: Medicinal plants, Phytochemicals, Secondary metabolites, Anti-inflammatory drug plants,

INTRODUCTION

Humans have used medicinal plants since ancient time ancient records indicates the vast use of herbal medicines. In most references, it is stated that the secondary metabolites extracted from plants are subdivided into 3 major classes i.e. terpenoids, alkaloids and phenolic's. They contain numerous natural products with interesting pharmacology activities.

Plants have bioactive compounds which are used for curing of various human diseases and play on important role in healing. Phytochemicals have two categories i.e. primary and secondary constituents. Primary constituents have chlorophyll, protein, sugar and amino acid. Secondary constituents contain terpenoids and alkaloids. Medicinal plants have antifungal, antibacterial and anti-inflammation activities. The phytochemical analysis of the plants is very important commercially and has great interest in pharmaceutical companies to produce the new drugs for curing of various diseases Plant products have been part of phytomedicines since time immemorial. These can be derived from any part of the plant like bark, leaves, flowers, root, fruits, seeds etc. i.e. any part of the plant may contain active components.

The present study included plant species which were *Achyranthes aspera* Linn., *Aegle marmelos* Corr., *Calotropis gigantea* Linn. R. Br., *Cissus quadrangularis* Linn. Mart., *Jatropha curcas* Linn., *Mimosa pudica* Linn., *Ricinus communis* Linn., *Semecarpus anacardium* Linn., *Tribulus terrestris* Linn.

The present study has revealed the presence of phytochemicals considered as active medicinal chemical constituents. Important medicinal phytochemicals such as terpenoids, Flavonoids, phenols, tannins, steroids, glycosides were present in the sample. The result of the phytochemical analysis shows that the nine plants are rich in at least one of flavonoids, tannin, saponin, terpenoid. Plant *Aegle marmelos* Corr. having all these phytochemicals. Saponin was found only in two plants out of nine plants i.e. *Achyranthes aspera* Linn. and *Semecarpus anacardium* Linn. Terpenoids was found in *Aegle marmelos* Corr., *Calotropis gigantea* Linn. R. Br., *Mimosa pudica* Linn. Terpenoids are reported to have anti-inflammatory, anti-viral, antimalarial, inhibition of cholesterol synthesis and antibacterial. Cardiac glycosides content was found in *Achyranthes aspera* Linn., *Aegle marmelos* Corr., *Mimosa pudica* Linn., *Tribulus terrestris* Linn., *Calotropis gigantea* Linn. R. Br., *Ricinus communis* Linn.. Cardiac glycosides have been used for over two centuries as stimulant in case of cardiac failure. The flavonoids was found in *Achyranthes aspera* Linn., *Aegle marmelos* Corr., *Calotropis gigantea* Linn., *Mimosa pudica* Linn., *Cissus quadrangularis* Linn. Mart., *Tribulus terrestris* Linn. The biological functions of flavonoids apart from its antioxidant properties include protection against allergies,

inflammation, free radicals, platelet aggregation, microbes, ulcers, hepatotoxins, viruses and tumors.

The selected medicinal plants are the source of the secondary metabolites i.e. Flavonoids, Tannins, Steroids, Terpenoids, Cardiac glycosides. Medicinal plants play a vital role in preventing various diseases. The anti-diuretic, anti-inflammatory, anti-analgesic, anticancer, antiviral, anti-malarial, antibacterial, anti-fungal activities of the medicinal plants are due to the presence of the above-mentioned secondary metabolites. The phytochemical analysis of the medicinal plants is also important and have commercial interest in both research institutes and pharmaceuticals companies for the manufacturing of the new drugs for treatment of various diseases identified by our study in the local available plants.

Plant products have been part of phytomedicines since time immemorial. These can be derived from any part of the plant like bark, leaves, flowers, root, fruits, seeds etc. i.e. any part of the plant may contain active components. (Thilagavathi *et al*, 2015. Pandey *et al*, 2013; Santhi *et al*, 2011; Mubashir & Wajaht, 2011).

These chemicals work with nutrient and fibers to form an integrated part of defense system against various diseases and stress condition. These chemical substances are called secondary metabolites. The medicinal plants are useful for healing as well as for curing of human diseases because of presence of phytochemical constituents.

MATERIAL AND METHODS

The present study included plant species which were, *Achyranthes aspera* Linn., *Aegle marmelos* Corr., *Calotropis gigantea* Linn. R. Br., *Cissus quadrangularis* Linn. Mart., *Jatropha curcas* Linn., *Mimosa pudica* Linn., *Ricinus communis* Linn., *Semecarpus anacardium* Linn., *Tribulus terrestris* Linn. (Table - 2)

Preparation of plant extract

Test for phenols and tannins

Crude extract was mixed with 2ml of 2% solution of FeCl₃. A blue-green or black coloration indicated the presence of phenols and tannins.

Test for flavonoids

- a) **Shinoda test:** Crude extract was mixed with few fragments of magnesium ribbon and concentrated HCl added drop wise. Pink scarlet colour appeared after few minutes which indicated the presence of flavonoids.
- b) **Alkaline reagent test :** Crude extract was mixed with 2 ml of 2% solution of NaOH. An intense yellow colour was formed which turned colourless on addition of few drops

of diluted acid which indicated the presence of flavonoids.

Test for saponins

Crude extract was mixed with 5ml of distilled water in a test tube and it was shaken vigorously. The formation of stable foam was taken as an indication for the presence of saponins.

Test for glycosides

- a) **Liebermann's test** : Crude extract was mixed with each of 2ml of chloroform and 2ml of acetic acid. The mixture was cooled in ice. Carefully concentrated H₂SO₄ was added. A colour change from violet to blue to green indicated the presence of steroidal nucleus, i.e., glycone portion of glycoside.
- b) **Salkowski's test** : Crude extract was mixed with 2ml of chloroform. Then 2ml of concentrated H₂SO₄ was added carefully and shaken gently. A reddish brown colour indicated the presence of steroidal ring, i.e., glycone portion of the glycoside.
- c) **Keller-Kilani test** : Crude extract was mixed with 2ml of glacial acetic acid containing 1-2 drops of 2% solution of FeCl₃. The mixture was then poured into another test tube containing 2ml of concentrated H₂SO₄. A brown ring at the interphase indicated the presence of cardiac glycosides.

Test for steroid

Crude extract was mixed with 2ml of chloroform and concentrated H₂SO₄ was added sidewise. A red colour produced in the lower chloroform layer indicated the presence of steroids. Another test was performed by mixing crude extract with 2ml of chloroform. Then 2ml of each of concentrated H₂SO₄ and acetic acid were poured into the mixture. The development of a greenish coloration indicated the presence of steroids.

Test for terpenoids

Crude extract was dissolved in 2ml of chloroform and evaporated to dryness. To this, 2ml of concentrated H₂SO₄ was added and heated for about 2 minutes. A grayish colour indicated the presence of terpenoids.

RESULTS AND DISCUSSION

This study has revealed the presence of phytochemicals considered as active medicinal chemical constituents Anubha Arora, (2013). Important medicinal phytochemicals such as terpenoids, Flavonoids, phenols, tannins, steroids, glycosides were present in the sample. The result of the phytochemical analysis shows that the nine plants are rich in at least one of flavonoids, tannin, saponin, terpenoid. Plant *Aegle marmelos* Corr. having all these phytochemicals. (Table - 2).

Saponin was found only in two plants out of 9 plants i.e. *Achyranthes aspera* Linn. and *Semecarpus anacardium* Linn. Terpenoids was found in *Aegle marmelos* Corr, *Calotropis gigantea* Linn.R.Br., *Mimosa pudica* Linn. Terpenoids are reported to have anti-inflammatory, anti-viral, antimalarial, inhibition of cholesterol synthesis and antibacterial. Cardiac glycosides content was found in *Achyranthes aspera* Linn., *Aegle marmelos* Corr, *Mimosa pudica* Linn., *Tribulus terrestris* Linn., *Calotropis gigantean* Linn. R.Br., *Ricinus communis* Linn. Cardiac glycosides have been used for over two centuries as stimulant in case of cardiac failure. The flavonoids was found in *Achyranthes aspera* Linn., *Aegle marmelos* Corr., *Calotropis gigantea* Linn. R.Br., *Mimosa pudica* Linn., *Cissus quadrangularis* Linn.Mart., *Tribulus terrestris* Linn. The biological functions of flavonoids apart from its antioxidant properties include protection against allergies, inflammation, free radicals, platelet aggregation, microbes, ulcers, hepatotoxins, viruses and tumors.

CONCLUSIONS

The selected medicinal plants are the source of the secondary metabolites i.e. Flavonoids, Tannins, Steroids, Terpenoids, Cardiac glycosides. Medicinal plants play a vital role in preventing various diseases. The anti-diuretic, anti-inflammatory, anti-analgesic, anticancer, antiviral, anti-malarial, antibacterial, anti-fungal activities of the medicinal plants are due to the presence of the above-mentioned secondary metabolites. The phytochemical analysis of the medicinal plants are also important and have commercial interest in both research institutes and pharmaceuticals companies for the manufacturing of the new drugs for treatment of various diseases identified by our study in the local plant of Tasgaon tehsil will be helpful in the coping different diseases of this particular region.

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Tribulus terrestris Linn.

Table 1: List of plants used for study

Sr.No	Botanical Name	Vernacular Name	Family	Parts used
1	<i>Achyranthes aspera</i> Linn.	Aghada	Amaranthaceae	Roots, seed, whole plant
2	<i>Aegle marmelos</i> Corr.	Bel	Rutaceae	Leaves, fruit, unripe fruit.
3	<i>Calotropis gigantea</i> Linn. R. Br	Rui	Apocyanaceae	Root bark, leaves, leaf, latex, seeds.
4	<i>Cissus quadrangularis</i> Linn. Mart	Kandvel	Vitaceae	Stem
5	<i>Jatropha curcas</i> Linn.	Mogali Erand	Euphorbiaceae	Flowers, seed, Bark, latex
6	<i>Mimosa pudica</i> Linn.	Lajalu	Mimosaceae	Whole plant dry root, leaves, seeds.
7	<i>Ricinus communis</i> Linn.	Erandi	Euphorbiaceae	Seed, root, leaves
8	<i>Semecarpus anacardium</i> Linn.	Biba	Anacardiaceae	Fruit, leaves
9	<i>Tribulus terrestris</i> Linn.	Gokhru	Zygophyllaceae	Fruit, leaves.

Table 2: Qualitative Phytochemical analysis of selected medicinal plants.

Plant Name	Phenol	Flavonoids		Saponin	Glycoside			Steroids		Terpenoids
		Shinoda Test	Alkaline reagent Test		Liebermann's Test	Salkowski's Test	Keller-Kilani Test	Test 1	Test 2	
<i>Achyranthes aspera</i> Linn.	-	-	+	+	-	+	+	+	+	-
<i>Aegle marmelos</i> Corr.	+	-	+	-	+	-	+	-	+	+
<i>Calotropis gigantea</i> (L) R.Br.	-	-	+	-	-	-	+	-	+	+
<i>Cissus quadrangularis</i> Linn.Mart.	-	-	+	-	-	-	-	-	+	-
<i>Jatropha curcas</i> Linn.	+	-	-	-	-	+	+	+	-	-
<i>Mimosa pudica</i> Linn	+	-	+	-	-	+	+	+	-	+
<i>Ricinus communis</i> Linn	+	-	+	-	-	-	+	-	+	-
<i>Semecarpus anacardium</i> L.	+	-	-	+	-	+	-	-	-	-
<i>Tribulus terrestris</i> L.	-	-	+	-	-	-	-	-	-	-



Achyranthes aspera Linn.



Jatropha curcas Linn.



Aegle marmelos Corr.



Mimosa pudica Linn.



Calotropis gigantea Linn. R. Br.



Ricinus communis Linn.



Cissus quadrangularis Linn. Mart.



Semecarpus anacardium Linn.