IJMPR 2020, 4(1), 115-119

International Journal of Modern Pharmaceutical Research
www.ijmpronline.com

ISSN: 2319-5878
IJMPR
Research Article
SJIF Impact Factor: 5.273

PRELIMINARY PHYTOCHEMICAL ANALYSIS OF SOME MEDICINAL PLANTS

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Received on: 14/01/2020
Revised on: 04/02/2020
Accepted on: 25//02/2020

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ABSTRACT

Plants are rich in phytochemicals. These play active role in the treatment of diseases. Though chemotherapeutic drugs are used to treat diseases they have side effects and develop resistance, hence there is need of alternative medicine. The present study was therefore undertaken to screen some medicinal plants for phytochemical constituents by simple chemical qualitative tests. For this ethanol, ethyl acetate and petroleum ether extracts of leaves of *Abrus precatorius L.*, *Psidium guajava L. Piper betle L.*, *Azadirechta indica* L.and stem bark of *Acacia nilotica L.*were prepared by Soxhlet method. The study revealed the presence of alkaloids, carbohydrates, phytosterols and tannins in all selected plants extracts. However amino acids were absent in all selected plants extracts. Saponins and cardiac glycosides were found in all selected plants extracts except ethyl acetate and petroleum ether extract of *Abrus precatorius L.* Flavonoids and anthraquinones were found only in *Acacia nilotica L.*Fixed oils and fats were present in only *Psidium guajava L* however,proteins in *Psidium guajava L.* and *Acacia nilotica L.*Presence of various phytochemicals in the plants selected for study is suggestive of their medicinal use in folk medicine.

KEY WORDS: Phytochemical, soxhlet, saponins, *acacia nilotica l.*, tannins, anthraquinones.

INTRODUCTION

Plants have been extensively used to treat various diseases. The practice of using plants as a source of medicines could be traced back as far back the beginning of human civilization. The earliest mention of use of plants to treat diseases in Hindu culture is found in ―Rigveda which was written between 4500 -1600 BC.[1]

Abrus precatorius L. belongs to family *Fabaceae*.In India it is commonly known as Indian liquorice, Gunja or Crab's eye This plant has been used to treat diseases in Hindu medicine since long time. The seeds are used for the treatment of ulcers and skin infections. The roots are chewed for snake bite and also for the treatment of tapeworm infestations, gonorrhea, and asthma.[2]

Azadirechta indica is a very useful traditional medicinal plant. It is native to Asia but is also found in African sub-continent. The plant is used to treat malaria and other associated conditions in the form of decoction.[3]

Piper betle L. commonly known as "Pann" is traditionally used for treatment of various diseases. In Ayurveda, medicinal importance of *Piper betle* L. is found.[4] Traditionally, Fresh leaves in the form of packets known as "betel quid" which consists of *Piper betle* L. leaves painted with burnt lime and catechu containing pieces of *Areca catechu* and flavors are chewed. It is believed that chewing of betel quid in combination with ingredients improve efficiency and stamina.[5] The leaf extract is useful to relieve toothache and gum.[6]

Psidium guajava L. commonly known as guava belongs to family *Myrtaceae*. Every part of the plant like leaves, bark, fruit and roots is used to treat various diseases. To treat diarrhea, malaria and dysentery infusion decoction made from bark of tree has been used. A decoction of leaves is used to relieve toothache and gum boils and to treat cholera, diarrhea and to reduce vomiting.[6]

Acacia nilotica L. belongs to the Family *Mimosaceae*. It is commonly known as Indian gum Arabic tree. *Acacia nilotica* (L) is an important multipurpose plant used extensively for treatment of various diseases including cold, bronchitis, diarrhea, dysentery, bleeding piles, eczema and leucoderma.The tender twigs are used as tooth brushes.[7] Decoction of the bark together with ginger is an astringent wash for teeth and so is useful in bleeding gums. Tender leaves are crushed with little water and swallowed to treat gonorrhea.[6] The present investigation was carried out to detect the presence of various phytochemicals in ethanol,ethyl acetate, petroleum ether extract of leaves of *Abrus precatorius L.*, *Psidium guajava L. Piper betle L.*, *Azadirechta indica* L.and stem bark of *Acacia nilotica L.*

MATERIALS AND METHODS

Plant material

Collection of plant material

Table 1: Plants used for present study.

Sr.No.	Name of plant	Plant part used	Source
1	*Abrus precatorius L.*	Leaf	Local market, Solapur, Maharashtra.
2	*Psidium guajava L.*	Leaf	Botany garden,Dayanand college, Solapur, Maharashtra
3	*Piper betle L.*	Leaf	Local market,Solapur,Maharashtra
4	*Acacia nilotica L.*	Stem bark	Smruti van Solapur, Maharashtra, India.
5	*Azdiracta indica L.*	Leaf	Botany garden, Dayanand college, Solapur, Maharashtra

The plant parts were collected in the month of January. These were identified and authenticated in the Department of Botany, D.B.F. Dayanand college of Arts and Science, Solapur, Maharashtra.

Preparation of extract

The plant materials were washed under running tap water and dried under shade and powdered. The powder of each plant material was extracted with ethanol, ethyl acetate and petroleum ether using Soxhlet method.[8] Then the solvent was evaporated at room temperature. The dried extract was then used to study its physical characteristics. The presence of different phytochemicals was studied by performing following quality analysis tests.

Preliminary phytochemical analysis[8]

Detection of Alkaloids Solvent free extract [50 mg] was stirred with few ml of dilute hydrochloric acid and filtered. The filtrate was tested carefully with various reagents a follows.

1. Mayer's test –To a few milliliter of filtrate, a drop of Mayer's reagent is added by the side of the test tube. A white or creamy precipitate indicates the test as positive.

2. Wagner's test –To a few milliliter of filtrate, few drops Wagner's reagent are added by the side of the test tube. A reddish brown precipitate confirms the test as positive.

3. Hager's test—To a few milliliter of filtrate 1 or 2 ml of Hager's reagent is added. A prominent yellow precipitate indicates the test as positive.

Detection of Carbohydrates [Benedict's test] – To a 0.5 ml of filtrate 0.5 ml of Benedict's reagent was added. The mixture was heated on boiling water bath for 2 minutes. A characteristic colored filtrate indicates the presence of sugar.

Detection of Amino acids and proteins- The extract [100mg] was dissolved in 10 ml distilled water and filtered through Whatman no.1 filter paper and the filtrate was subjected to test for proteins and amino acids.

Biuret test-Two ml of filtrate was treated with one drop of 2% copper sulphate solution. To this 1ml. of ethanol was added followed by excess of potassium hydroxide pellets. Pink color in the ethanol layer indicates presence of proteins.

Ninhydrin test – Two drops of ninhydrin solution were added to 2 ml. of aqueous filtrate. A characteristic purple color indicates the presence of amino acids.

Detection of Saponins [Foam test] –The extract [50mg] was dissolved in 20 ml. of distilled water. The suspension was shaken in a graduated cylinder for 15 minutes. A two cm. layer of foam indicates the presence of Saponins.

Detection of Tannins [Ferric chloride test] –The extract [50mg] was dissolved in 5 ml of distilled water. To this few drops of 5% Ferric chloride were added. A dark green color indicates the presence of tannins.

Detection of flavonoids [Magnesium and hydrochloric acid reduction test] –The extract [50 mg] was dissolved in 5 ml of alcohol and few fragments of magnesium ribbon and concentrated hydrochloric acid [drop wise] were added. If any pink to Crimson color develops presence of flavonoids was inferred.

Detection of anthraquinones- The extract [50mg] was dissolved in distilled water. To 2 ml of extract, 1ml dilute ammonia solution was added and shaken vigorously. Pink color in ammonia layer indicates presence of anthraquinones.

Detection of Cardiac glycosides[Killer kiliani test] –The extract [50mg] was dissolved in distilled water and then filtered. To 2 ml of filtrate 1ml of glacial acetic acid and a drop of Ferric chloride and a drop of concentrated sulfuric acid was added. Green blue color to upper layer and reddish brown color at the junction of two layers indicates the presence of cardiac glycosides.

Detection of fixed oils and fats [Spot test]-A small quantity of extract was pressed between two filter papers. Oilstain on the paper indicates the presence of fixed oils.

RESULTS

Table 2: Physical characteristic of extracts.

Sr.No.	Name of plant	Physical character	Solvent used		
			E	EA	PE
1	*Abrus precatorius L.*	Colour	Dark green	Olive green	Olive green
		Consistency	Sticky semisolid	Dry powdery	Dry powdery
		Odour	Organic	organic	Organic
2	*Psidium guajava L.*	Colour	Dark green	Dark green	Green
		Consistency	Sticky semisolid	Sticky solid	Sticky solid
		Odour	Organic	organic	Organic
3	*Piper betle L.*	Colour	Dark green	Dark green	Dark green
		Consistency	Sticky solid	Sticky solid	Sticky solid
		Odour	Organic	organic	Organic
4	*Acacia nilotica L.*	Colour	Dark chocolaty	Dark chocolaty	Dark chocolaty
		Consistency	crystalline	crystalline	Crystalline
		Odour	Organic	organic	Organic
5	*Azdiracta indica L.*	Colour	Dark green	Olive green	Dark green
		Consistency	Dry powdery	Dry powdery	Dry powdery
		Odour	Organic	organic	Organic

E=ethanol, EA=ethyl acetate, PE=petroleum ether

Table 2 shows the physical characteristics of plant extracts.The color of leaf extracts to green except of *Acacia nilotica L* was Dark chocolaty with organic odor while the *consistency* of *Abrus precatorius L.*, *Psidium guajava L. Piper betle L.*extract was sticky solid while that of *Acacia nilotica L.* was crystalline and of *Azdiracta indica L.* was dry powdery.

Table 3: Percentage yield of extracts.

Sr.No.	Name of plant	Details	Solvent used		
			E	EA	PE
1	*Abrus precatorius L.*	Wt. of dry powder[g]	15	15	15
		Wt. of extract[g]	2.8	1.4	0.80
		% yield	18.6	9.3	5.3
2	*Psidium guajava L.*	Wt. of dry powder[g]	15	15	15
		Wt. of extract[g]	2.5	1.9	1.4
		% yield	16.7	12.7	9.3
3	*Piper betle L.*	Wt. of dry powder[g]	15	15	15
		Wt. of extract[g]	1.5	1.5	1.6
		% yield	10	10	10.6
4	*Acacia nilotica L.*	Wt. of dry powder[g]	15	15	15
		Wt. of extract[g]	2.4	2.0	1.8
		% yield	16	13.3	12
5	*Azdiracta indica L.*	Wt. of dry powder[g]	15	15	15
		Wt. of extract[g]	2.5	1.5	1.8
		% yield	16.7	10	12

[note:E==ethanol,EA=ethyl acetate,PE=petroleum ether]

Percentage yield of plant extracts is depicted in table 3.Ethanol was found to yield high amount of extract compared to ethylacetate and petroleum ether for all selected plants.Highest yield was obtained [18.66%]in ethanol leaf extract of *Abrus precatorius L.*followed by *Psidium guajava L.*and *Azdiracta indica L.* [16.7%]. However lower yield was obtained in petroleum ether extract of *Abrus precatorius L.*

Table 4: Preliminary phytochemical analysis of plants.

Sr.No.	Phytochemicals	Name of test	Ai			Ap			An			Pb			Pg		
			E	EA	PE	E	EA	PE	E	EA	PE	E	EA	PE	E	EA	PE
1	Alkaloids	Mayer reagent	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		Wagner reagent	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
		Hager reagent	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	Carbohydrates	Benedicts test	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3	Saponin	Foam test	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+
4	Proteins	Biuret test	-	-	-	+	+	+	-	-	-	-	-	-	+	+	+
5	Amino acids	Ninhydrin test	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Phytosterols	Libermann-Burchard test	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+
7	Fixed oils & fat	Spot test	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+
8	Flavanoids	Mg&HCl test	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-
9	Tannin	$Fecl_3$ test	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
10	Cardiac glycosides	Keller Killani	+	+	+	-	-	-	+	+	+	+	+	+	+	+	+
11	Anthraquinone	Ammonia test	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-

[note:Ap= *Abrus precatorius L*,An= *Acacia nilotica L.*,Ai= *Azdiracta indica L*,Pb= *Piper betle L.*,Pg= *Psidium guajava L]*

Preliminary phytochemical analysis of plant extract is presented in table 3.The comparison of the phytochemical constituents of selected plant extracts of extracts showed that all contained alkaloids, carbohydrates, tannins and phytosterolss but none of them contained amino acids. Saponins and cardiac glycosides were found in all selected plants extracts except ethyl acetate and petroleum ether extract of *Abrus precatorius L*. Flavonoids and anthraquinones were found only in *Acacia nilotica L*.Fixed oils and fats were present in only *Psidium guajava L* however,proteins in *Psidium guajava L.* and *Acacia nilotica L.*

DISCUSSION

The preliminary phytochemical analysis of *Abrus pulchellus* L. and *Abrus precatorius* L.showed the presence of flavonoids, alkaloids and saponins in both plant extracts.[9] In the present investigation tannins, carbohydrates and cardiac glycosides were also found in *Abrus precatorius* L. This difference may be due to geographic differences. The phytochemical characters of bark of *Acacia nilotica* L.and reported the presence of alkaloid, flavonoids, steroids and tannins which is in accordance with the previous studies.[10]

The total phenolic content of aqueous and ethanol extract from the bark of *Acacia nilotica* L. was 35% and 32.5% respectively.[10]The preliminary phytochemical analysis of these extracts exhibited the presence of alkaloids, tannins, terpenoids, saponins, flavonoids and glycosides.[7] The present findings are in accordance with this studies.

Preliminary phytochemical analysis of methanolic extracts leaf of *Psidium guajava* L. revealed the presence of flavonoids, steroids and tannins.[11] Phytochemical analysis showed the presence of flavonoids, alkaloids, terpenoids, tannins, saponins and glycosides in methanolic leaf extract of *Psidium guajava* L.[12] This correlates present investigation.

Preliminary phytochemical screening revealed the presence of flavonoids,tannins,sterols and phenols in leaves of *Piper betle* L..However,alkaloids and catecins were absent.[13] Preliminary phytochemical screening revealed the presence of flavonoids, tannins, steroids, alkaloid and glycosides in *Piper betle* L. methanolic extract of leaves.[14] Ethanol extract of *Piper betle* L.leaf showed the presence of carbohydrate, proteins, polyphenolic compounds, flavonoids, alkaloids.[15] The differences found in present study may be due to method of extraction and the solvent used and geographic location.

CONCLUSION

From the present investigation it can be concluded that ethanol is is better solvent for extraction compared with ethyl acetate and petroleum ether. Preliminary phytochemical analysis revealed the presence of alkaloids, carbohydrates, phytosterols and tannins in all selected plants extracts. However amino acids were absent in all selected plants extracts. Saponins and cardiac glycosides were found in all selected plants extracts except ethyl acetate and petroleum ether extract of *Abrus precatorius L*. Flavonoids and anthraquinones were found only in *Acacia nilotica L*.Fixed oils and fats were present in only *Psidium guajava L* however, proteins in *Psidium guajava L.* and *Acacia nilotica L.*

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