DAV International Journal of Science

PRELIMINARY PHYTOCHEMICAL ANALYSIS OF SOME MEDICINAL PLANTS

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ABSTRACT
The present study was carried out to screen some medicinal plants for phytochemical constituents by simple chemical qualitative tests. For this methanol and chloroform extracts of leaves of *Mangifera indica*, *Azadirechta indica*, *Moringa pterigosperma* and flowers of *Tagetes erecta* were prepared by Soxhlet method. The study revealed the presence of alkaloids and carbohydrates in all selected plants extracts. However fixed fats, oils and amino acids were absent in all selected plants extracts. Tannins were found in all selected plants extracts except chloroform extract of *Moringo pterigosperma.* Saponins were present in methanol and chloroform extracts of *Azadirechta indica* only.Flavonoids were found in methanol and chloroform extract of *Mangifera indica* and methanol extract of *Moringa pterigosperma* and *Tagetes erecta*. Cardiac glycosides were present in all selected plant extracts except chloroform extract of *Moringa pterigosperma*.Presence of various phytochemicals in the plants selected for study is suggestive of their medicinal use in folk medicine.

KEY WORDS: *Azadirechta indica, Mangifera indica,* Medicinal plants, *Moringa pterigosperma*, phytochemical, Soxhlet, *Tagetes erecta.*

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 (Bishnu Joshi, et. al., 2010). *Tagetes erecta* is common aromatic annual herb and is popular garden plant. Different parts of plant are used in folk medicine to cure various diseases. Flowers are especially used in fever, epilepsy, astringent, carminative, stomachache, scabies hepatic diseases and diseases of eyes. They are said to purify blood. Flower juice is used for treating bleeding piles. It is also used in rheumatism, colds and bronchitis (Kirtikar and Basu, 1987).

Mangifera indica is a large evergreen tree.It belongs to family Anacardiaceae. It is found all over the tropical regions of world.The leaves of this tree have been reported to contain Saponins, glycosides, unsaturated sterols, polyphenols, euxanthin acid, mangiferine, mangin, Gallic tannins. The leaves are used to treat burns, sores, cough and diarrhea. The leaf extract is used as antiseptic to treat burns (Bhosa, et.al., 2007). *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. (Timothy et al., 2011). *Moringa oleifera* also known as *Moringa pteiygosperma Gaertn*, is member of Moringaceae family. It is commonly named as drumstick tree.It is an edible plant.Every part of plant has medicinal and nutritive value. The dietary consumption of this plant is suggested as prophylactic measure against diabetes mellitus and cardiovascular diseases (Majumbu Mbikay et al., 2012).

MATERIALS AND METHODS

Plant material: Leaves of *Mangifera indica, Azadirechta indica* and *Moringa pterigosperma* were collected from Botany garden of D.B.F. Dayanand College of Arts and Science, Solapur. The stem bark of *Acacia nilotica* was collected from Smruti van, Solapur while flowers of *Tagetes erecta* were collected from local market. These were authenticated in the Department of Botany, D.B.F. Dayanand College of Arts and Science, Solapur.
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 methanol and chloroform using Soxhlet method (Raaman, 2006).Then the solvent was evaporated at room temperature.The dried extract was then used to study it's physical characteristics. The presence of different phytochemicals was studied by performing following quality analysis tests.

Preliminary phytochemical analysis: (Raaman, 2006).
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 1shows the physical characteristics of plant extracts. The color of *Mangifera indica* leaf extract was dark green with organic odor while the consistency of methanol extract was solid sticky and that of chloroform extract was dry powdery. The color of *Azadirechta indica* leaf extract was dark green with methanol as extracting solvent and olive green for chloroform as extracting solvent. The consistency of *Azadirechta indica* methanol extract was solid sticky and chloroform extract was dry powdery with organic odour. *Moringa pterigosperma* leaf extract were dark green with solid sticky consistency and organic odour. Percentage yield of plant extracts is depicted in table no.2.The percentage yield of *Mangifera indica* methanol leaf extract was 25 and that of chloroform extract was 7.0.Highest yield was obtained [34.66%]in chloroform leaf extract of *Azadirechta indica* followed by *Moringa pterigosperma* leaf extract [32%]. However lower yield was obtained of *Mangifera indica* chloroform leaf extract. Methanol was found better solvent for extraction of *Tagetes erecta* flower[15%] than chloroform [7.6%].Overall chloroform was found better extracting solvent for *Azadirechta indica.*However methanol yielded a good extract for *Mangifera indica* and *Moringa pterigosperma* and *Tagetes erecta* plants compared to chloroform as extracting solvent.

Table 1 Physical characteristic of extracts

Sr. no	Medicinal plant	Physical characteristics	Methanol	Chloroform
1	*Mongifera indica*	color	Dark green	Dark green
		consistency	Solid sticky	Dry Powdery
		odour	Organic	Organic
2	*Tagetes erecta*	colour	Dark brown	Dark brown
		consistency	Solid sticky	Sticky Solid
		odour	Organic	Organic
3	Moringa pterygosperma	color	Dark green	Dark green
		consistency	Solid sticky	Sticky Solid
		odour	Organic	Organic
4	Azadirachta indica	colour	Dark green	olive green
		consistency	Solid sticky	Dry Powdery
		odour	Organic	Organic

Table 2. Percentage yield of extracts

Sr.No.	Name of the plant	Details	Solvent used	
			methanol	**Chloroform**
1	*Mangifera indica*	Wt. of dry powder[g]	15	15
		Wt. of extract[g]	3.84	1.05
		% yield	25	7.0
2	*Tagetes erecta*	Wt. of dry powder[g]	15	15
		Wt. of extract[g]	2.25	1.15
		% yield	15	7.6
3	*Moringa pterigosperma*	Wt. of dry powder[g]	15	15
		Wt. of extract[g]	4.80	3.27
		% yield	32	21.8
4	*Azadirachta indica*	Wt. of dry powder[g]	15	15
		Wt. of extract[g]	3.14	5.2
		% yield	20.93	34.66

Table 3. Preliminary phytochemical analysis of plants

Sr. no.	phytochemicals	Name of test	Mi		Ai		Mp		Te	
			me	chl	me	chl	me	chl	me	chl
1	Alkaloids	Mayer test	+	+	+	+	+	+	+	+
		Wagner test	+	+	+	+	+	+	+	+
		Hager test	+	+	+	+	+	+	+	+
2	Carbohydrates	Benedict test	+	+	+	+	+	+	+	+
3	Saponins	Foam test	-	-	+	+	-	-	-	-
4	Proteins	Biuret test	-	-	-	-	+	+	+	+
5	Amino acids	Ninhydrin test	-	-	-	-	-	-	-	
6	Anthraquinones	-	+	-	-	-	+	+	+	+
7	Tannins	Ferric chloride test	+	+	+	+	+	-	+	+
8	Flavonoids	Magnesium & HCL reduction test	+	+	-	-	+	-	+	-
9	Fixed oils & fats	Spot test	-	-	-	-	-	-	-	-
10	Cardiac glycosides	Killer Kiliani test	+	+	+	+	+	-	+	+

[Mi=*Mangifera indica*, Ai=*Azadirachta indica*, Mp=*Moringa pterygosperma*, *Te=Tagetes erecta, me=methanol, chl=chloroform]*

Preliminary phytochemical analysis of plant extract is presented in table 3.The comparison of the phytochemical constituents of selected plant extracts of *Azadirechta indica, Mangifera indica* and *Moringa pterygosperma* leaves and *Tagetes erecta* flower extracts showed that all contained alkaloids, carbohydrates, tannins and cardiac glycosides but none of them contained fixed oils, fats and amino acids.The present study revealed that the Saponins were present only in *Azadirechta indica* leaf extracts. Out of 4 plants studied only *Moringa pterigosperma* leaf extract and *Tagetes erecta* flower extracts contained proteins. Anthraquinone was absent in only *Azadirechta indica* leaf extract and chloroform leaf extract of *Mangifera indica.* The study revealed the presence of flavonoids in *Mangifera indica* methanol and chloroform leaf extracts, methanol leaf extract of *Moringa pterigosperma* and methanol flower extract of *Tagetes erecta*.However flavinoids were totally absent in *Azadirechta indica* leaf extract.

DISCUSSION

Based on the traditional and folk medicinal uses of plants selected under investigations, the present study was conducted to ascertain the presence of pharmacologically potent and active components in them, The study showed the presence of medicinally valuable phytochemicals like alkaloids, tannins, Saponins, cardiac glycosides, flavonoids and anthroquinones in plants under investigations. Saponins are known to have antioxidant, anticancer, anti-inflammatory activities.It is also known to have antifungal properties (Ajjelaagbe and Paul, 2009).

Tannins are reported to have anti-viral, antibacterial and anti-cancer activities while cardiac glycosides are used in the treatment of congestive heart failure and cardiac arrhythmias.Flavonoids show anti-allergic, anti-inflammatory, antimicrobial and anti-cancer activity (Ajjelaabe and Paul, 2009). Qualitative analysis of flower extract of *Tagetes erecta* showed the presence of alkaloids, carbohydrates, proteins, tannins, flavonoids and glycosides. These findings correlate with the studies carried out by Ibrahim *et al.,* (2012). Phytochemical screening of leaf extract of *Azadirechta indica* revealed the presence of alkaloids, carbohydrates, saponins,tannins and cardiac glycosides while absence of proteins,amino acids and anthraquinones. This is in agreement with the studies by Timothy *et.al.,* (2011).Veena Sharma and Ritu Paliwal(2013) studied the phytochemical analysis by sequential extraction of *Moringa pterigosperma* pods and revealed the presence of various bioactive compounds.They found phenols, Saponins, alkaloids, terpenoids, tannins and cardiac glycosides.The results of present study are consistent with the above findings by Veena Sharma and Ritu Paliwal (2013). In the present study methanol and chloroform extract of leaves of *Mangifera indica* revealed the presence of alkaloids, carbohydrates, anthraquinones, tannins, flavonoids and the absence of saponins, proteins, amino acids and fats.Phytochemical profile of *Mangifera indica* investigated by Nagaveni *et al.,* (2011) showed the presence of alkaloids, carbohydrates, saponins, steroids, flavonoids and the absence of tannins, cardiac glycosides, proteins, and amino acids.Presence of saponins and absence of tannins in their study might be due to type of extraction method, solvent used and the difference in geographic source of plant material they used for their study.

CONCLUSION

It can be concluded from the present study that plants under investigations showed various bioactive compounds especially alkaloids, tannins, flavonoids, saponins and cardiac glycosides. The presence of these bioactive compounds explains its diverse traditional usage in the treatment of various diseases.

ACKNOWLEDGEMENT

Authors are grateful to the principal and local secretary of D.B.F. Dayanand College of Arts and Science, Solapur for their technical support.

REFERENCES

Bishnu Joshi, Govind Prasad Shah, Budha Bahadur Basnet, Meghraj Bhatt, Dinita Sharma, Krishna Subedi, Janardan Pandey and Rajani Malla. (2011). Phytochemical extraction and antimicrobial properties of different medicinal plants: *Ocimum Santum* (Tulsi), *Eugenia caryophyllata* (Clove), *Achyranthes bidentata* (Datiwan) and *Azadirecta indica* (Neem). *J. Microbiol Antimicrob.* **3**(1):1-7.

Nagaveni P., Sarvana Kumar K. and Grace Rathnam. (2011). Phytochemical profile and antipyretic activity of *Mangifera indica. J. TPS.* **2**(6):167-173.

Aiyelaagbe and Paul M.Osamudiamen. (2009). Phytochemical screening for active compounds in *Mangifera indica* leaves from Ibadan. *Oyo state Plant Sci. Res.* **2**(1):11-13

Kiranmai M and Mohmed Ibrahim. (2012). Antibacterial potential of different extracts of *Tagetes erecta* Linn. *Int. J. Pharm.* **2**(1):90-96.

Timothy S.Y., Abdussalam B., Mava Y. and Galadima I. H. (2011). Antibacterial and phytochemical screening of the ethanolic leaf extract of *AzadirecHta indica* (Neem). *Int. J. Applied Biol. Pharmaceut. Tech.* **2**(3):194-198

Raaman N. (2006). Phytochemical techniques, New India Publishing Company, New Delhi. PP19-22.

Kirtikar K. R. and Basu B D. (1987). Indian Medicinal plants, alit Mohan Basu, Alahabad, India. pp 1385-1386.
Bhosa G.S. et al., (2007). Antibacterial activity of *Mangifera indica* (L). *Afr. J. Ecol.* **45**(supp.1):13-16.
Veena Sharma and Ritu Paliwal. (2013). Preliminary Phytochemical investigation and thin layer chromatography profiling of sequential extracts of *Moringa Oleifera* pods. *Int. J. Green Pharmacy.* **7**(1): 41-45.
Majambu Mbikay. (2012). Therapeutic potential of *Moringa oleifera* leaves in chronic hyperglycemia and dyslipidemia: A review. *Front Pharmacol.* **3**:24.