IRJSE International Research Journal of Science & Engineering
Int. Res. J. of Science & Engineering, 2018; Special Issue A6 : 33-38 SJIF Impact Factor 6.68
ISSN: 2322-0015 UGC Approved Journal No. 63628
RESEARCH ARTICLE **OPEN ACCESS**

Preliminary qualitative phytochemical screening of aqueous and ethanolic extracts of different parts of *Semecarpus anacardium* Linn.

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Manuscript Details

Available online on http://www.irjse.in
ISSN: 2322-0015

Editor: Dr. Arvind Chavhan

Cite this article as:
Solankar BM, Mulani RM and Kadam RM. Preliminary qualitative phytochemical screening of aqueous and ethanolic extracts of different parts of *Semecarpus anacardium* Linn., Int. Res. Journal of Science & Engineering, 2018; Special Issue A6: 33-38.

ABSTRACT

Plants are the major source of large amount of drugs that are used in treatment of several diseases, it contains valuable secondary metabolites. In present investigation focused on the secondary metabolites (Phytochemicals) from the *Semecarpus anacardium* (L.), aqueous extract (Aq. E.) and ethanolic extract (Et. E.) of root, bark, leaves, flower and thalamus selected for preliminary phytochemical screening. The purpose of this study is to check the presence or absence of secondary metabolites such as alkaloids, tannins and saponins, etc.

Keywords:- Phytochemical screening, secondary metabolites, *Semecarpus anacardium* L.

INTRODUCTION

The *Semecarpus anacardium* (Linn.) is an important medicinal plant species belonging to family Anacardiaceae. It is a dry deciduous tree distributed in the sub Himalayan tract and in tropical part of India. The plant is used for treatment of various ailments like rheumatism, asthma, epilepsy, nervous debility and also tumours [1]. It is commonly also known as bibba, bhilawa, bhalataka. World Health Organization (WHO) stated as 80% of worlds' population living in rural area, rely directly on herbal traditional medicines as their primary health care [2].

The *S. anacardium* is present in dry deciduous forest of peninsular India and commonly found in the Marathwada region of Maharashtra. The edible part of bibba is thalamus (fulbibba) & Godambi (kernal). The seeds (nuts) are used in extraction of Kernals (Godambi) and oil. Parts of this plant also important economically as the dried thalamus, nuts, oils and kernals are sold for Rs. 50- 70/kg, Rs.40-50/kg, Rs.50-60/lit, Rs. 450-500/kg, respectively at Kandhar, Bhokar and Loha local market of Nanded districts of Maharashtra. The Kernals is an important nutritional component of post- natal care of mother. The oil (resinous juice) was traditionally employed for marking laundry cloth hence also called as 'marking nut'.

METHODOLOGY

Taxonomical classification

Kingdom: -	Plantae
Subkingdom: -	Tracheobionta
Super Division: -	Spermatophyta
Division: -	Magnoliophyta
Class: -	Magnoliopsida
Subclass: -	Rosidae
Order: -	Sapindales
Family: -	Anacardiaceae
Genus: -	*Semecarpus*
Species: -	*anacardium*

Fig-1 Morphology of *Semecarpus anacardium* L.

Sample Collection:

The plant materials of *Semecarpus anacardium* L were collected from farm field of Mr. Nandu Kachale (18˚ 49' 12 N, 077˚ 04 ' 43 E), A/P: Wanwadi Tq: Hadgoan in Nanded district of Maharashtra. The entire twig of *S. anacardium* L. was pressed in wooden card board for herbarium preparation. The pressed plant was then transferred on the standard herbarium sheet and the plant identification was confirmed by Prof. R. M. Mulani and the identified herbarium sheet is preserved in herbarium depository at School of Life Sciences in Swami Ramanand Teerth Marathwada University, Nanded.

Shade dried: Plant parts were washed in running tap water for removing of dust particle and foreign particles and shade dried for uniform weight.

Preparation of extract: Shade dried parts were used for preparation of powder with electric blender. These powders were stored in plastic container for further use. Around 25 gm powder used for extraction in 250 ml aqueous and ethanolic solvents [3]**.** The extraction was done by Soxhlet extraction techniques till dark colouration of the solvent and discolouration of powder extract. The solvents were evaporated to complete dryness by rotavator and stored in eppendorf's tube at 4˚C for further use [4, 5].

Preliminary qualitative phytochemical screening: The root, bark, leaves, flowers and thalamus of *S. anacardium* (L.) were extracted with aqueous and ethanolic solvent. The various qualitative tests were undertaken for detection and identification of secondary metabolites using various method suggested by Harborne, [6], Gomathi *et.al,* [7], Santanu *et al.* [8], Ali [9], Jerald and Jerald [10] and Wankhade and Mulani [11&12].

Methods of preliminary qualitative phytochemical screening:-

1. Alkaloids:-

(a) Hager's test [8]

About 2mg crude extract taken in a test tube add few drops of Hager's reagent. Alkaloids presence was confirmed after the formation of yellow precipitate.
(Hager's reagent:- 1gm picric was added 100ml distilled water).

(b) Wagner's test [8]
2 mg of crude extract taken in a test tube add 3-4 drops Wagner's reagent acidified with 1.5% v/v of hydrochloric acid. Alkaloids presence was confirmed after the formation of yellow or brown precipitate.
(Wagner's reagent:- 6gm Potassium iodide and 2gm of iodine was dissolved in 100ml distilled water).

(c) Mayer's tests [8]
2 mg of crude extract taken in a test tube add 3-4 drops Mayer's reagent was added. Alkaloids presence was confirmed after the formation of white or pale yellow precipitate.
(Mayer's reagent:- In 60 ml of distilled water add 1.358 gm mercuric chloride was dissolved. 5gm potassium iodide in 10 ml distilled water, total volume was made 100 ml.)

2. Carbohydrates:-
(a) Anthrone test [8]
To 10 ml of distilled water 2 mg of crude extract was dissolved, then it was filtered and filtrate was concentrated. To this solution 2ml added anthrone reagent. Carbohydrates presence was confirmed after the formation of green or blue colour.
(Anthrone reagent:- To 100 ml of ice cold Sulphuric acid 200 mg anthrone was dissolved).

(b) Fehling's test [8]
To 10 ml of distilled water 2 mg of crude extract was dissolved, then it was filtered and filtrate was concentrated. 1ml of Fehling's solution A and B were added to 1ml of extract and later on boiled it for few minutes. Presence of carbohydrates was confirmed after the formation of brick red or red coloured precipitate.

(Fehling's solution – It was prepared after the addition of same quantity of Fehling's solution A and B. **Fehling's solution A-** To 500ml of distilled water 34.66gm copper sulphate pentahydrate was dissolved. **Fehling's solution B**- To 500 ml of cold distilled water 50gm of sodium hydroxide and 173gm potassium sodium tartrate was dissolved).

(c) Molisch's test [8]
To 10 ml of distilled water 2 mg of crude extract was dissolved, then it was filtered and filtrate was concentrated. Add few drops of freshly prepared 20% alcoholic solution of α- naphthol was added. 2ml concentrated sulphuric acid was added which form a layer below the mixture. Carbohydrates presence was confirmed after the formation of red violet ring which get disappeared with the addition of excess alkali.

(Molisch's reagent- To 100 ml of alcohol or chloroform 15 g of 1- naphthol was dissolved.)

3. Proteins:-
(a) Biuret's test [8]
Few drops of 10% w/v sodium hydroxide solution was added to 1 ml of hot aqueous extract then it was followed by the addition of 1-2 drops of 3% w/v of copper sulphate solution. Presence of proteins was confirmed after the formation of violet red colour.

4. Flavonoids
(a) Shinoda's tests [8]
2mg of crude extract was added in 5 ml of ethanol then 10 drops of dilute Hydrochloric acid was added, it was followed by addition of small piece of magnesium. Presence of flavonoids was confirmed after the formation of brown reddish or pink colour.

5. Glycosides
Molisch's test [8]
2mg of crude extract was added in 10 ml of distilled water then it was filtered and filtrate was concentrated. Add few drops of Molisch's reagent were added, followed by the addition of 2 ml of concentrated sulphuric acid along the side of test tube carefully. Glycosides presence was confirmed after the appearance of reddish violet ring.
(Molisch's reagent- to 100 ml of alcohol or chloroform 15 gm of 1- naphthol was dissolved).

6. Triterpenoids

Liebermann- Burchard's test [8]

2mg of crude extract was dissolved in 2 ml of acetic anhydride then boiled and cooled, it was followed by addition of 1ml of concentrated sulphuric acid along the side of test tube carefully. Triterpenoids presence was confirmed after the formation of pink colour.

7. Resins [8]: 2mg of crude extract was dissolved in 2 ml of acetone then it was poured in equal quantity of distilled water. Presence of resin was confirmed after the formation of turbidity.

8. Saponins [8]

2mg of crude extract was dissolved in 2 ml distilled water in a test tube. Add few drop of sodium bicarbonate then test tube was shaken vigorously and kept in test tube stand for few minutes. Presence of saponins was confirmed after the formation of honey comb like froth.

9. Steroids

Liebermann- Burchard's test [8]

2mg of crude extract was dissolved in 2 ml of acetic anhydride then boiled and cooled, it was followed by addition of 1ml of concentrated sulphuric acid along the side of test tube. Steroids presence was confirmed after the formation of green colour.

(b) Salkowski reaction [8]

2mg of crude extract was dissolved in 2 ml of chloroform shaken vigorously then sulphuric acid was added slowly to the chloroform layer along the side of test tube. Steroids presence was confirmed after the formation of red colour.

10. Tannins [8]

2mg of crude extract was dissolved in 2 ml of distilled add few drops of 5% w/v ferric chloride. Formation of green brown colour indicated the presence of tannins.

11. Starch [8]

2mg of crude extract was dissolved in 2 ml of distilled. 0.075 gm of potassium iodide and 0.001 gm of iodine were dissolved in 5 ml distilled water. Add 2-3 ml of this solution. Presence of starch was confirmed after the formation of blue colour.

RESULTS AND DISCUSSIONS

In present investigation phytochemical screening of aqueous extract (Aq. E.) and ethanolic extract (Et. E.) of root, bark, leaves, flower and thalamus of *S. anacardium* L. was carried out. We found that the alkaloids, saponins and tannins are present commonly in all plant parts (See Table no. 1), like Jain *et. al.,* [13] reported phytochemical screening for alkaloids, glycosides, phenolic compounds, saponins, steroids, carbohydrates, tannins, flavonoids etc. from methanolic nut extract of *S. anacardium* L. and showed positive tests for these secondary metabolites. Similarly Pednekar and Raman [14] carried out preliminary phytochemical test and revealed the presence of alkaloids, glycosides, tannins, flavonoids, steroids, phenols, proteins, hexose sugars, diterpenes, nonreducing polysaccharides, mucilages and gums in methanolic leaf extract of *S. anacardium* L. and later on Bagewadi, *et.al*. [15] analyzed petroleum ether nut extract of *S. anacardium* L. reported by presence of steroids, triterpenoids, anthraquinones and phenols while alkaloids, saponins, tannins and flavonoides were absent.

Mohanta, *et. al*., [16] in aqueous nut's extract of *S. anacardium* L. found that it contains most of phytochemical like alkaloids, saponins, tannins, anthraquinones and ascorbic acids, while phytochemical analysis oil of *S. anacardium* L. shows the presence of alkaloids, tannins, flavonoids and anthraquinones. It was observed that nut's extract of *S. anacardium* L. having highest phytochemicals present in aqueous extract as compared to ethanol, chloroform, and petroleum ether extract. In present investigation highest phytochemicals were recorded in ethanolic extract as compared to aqueous in all parts of *S. anacardium.*

Table 01: Preliminary qualitative phytochemical screening of aqueous (Aq. E) and ethanolic (Et. E.) extract of different parts of *Semecarpus anacardium* L.

Sr. No.	Secondary metabolites	test	Various part *Semecarpus anacardium* L.									
			Root		Bark		Leaves		Flower		Thalamus	
			Aq. E.	Et. E.	Aq. E.	Et. E.	Aq. E.	Et. E.	Aq. E.	Et. E.	Aq. E.	Et. E.
1	Alkaloids	Hager's	+	+	+	+	+	+	+	+	+	+
2		Wagner's	+	+	+	+	+	+	+	+	+	+
3		Mayer's	+	+	+	+	+	+	+	+	+	+
4	Carbohydrates	Anthron	-	-	-	-	-	+	+	+	+	+
5		Fehling's	-	-	-	-	-	-	-	-	+	+
6		Molisch's	+	+	+	+	+	+	+	+	+	+
7	Proteins	Biuret's	+	+	+	+	+	+	+	+	-	-
8	Flavonoids	Shinoda's	-	+	-	+	-	+	+	+	-	-
9	Glycosides	Molisch's	-	+	+	+	+	+	+	+	+	+
10	Triterpenoids	Liebermann-Burchard's	-	+	+	+	+	+	+	+	+	+
11	Resins	Resin	-	-	-	-	-	+	+	+	-	-
22	Saponins	Saponin	-	+	+	+	+	+	+	+	+	+
13	Steroid's	Liebermann-Burchard's	-	-	-	+	-	+	+	+	-	-
14		Salkowski reaction	-	+	-	-	-	-	+	+	+	+
15	Tannin's	Tannin's	+	+	+	+	+	+	+	+	+	+
16	Starch	Starch	-	+	-	+	-	+	-	-	-	-

Where: (Aq. E) = Aq = aqueous, E. = extract (Et. E.) = Et. ethanolic E. = extract
+ = Present - = Absent

We detected phytochemicals like alkaloids, tannins and saponins in all parts in ethanolic extracts and aqueous extracts of *S. anacardium* other phytochemicals summarized in (Table no.01). Kalase and Jadhav [17] showed presence of phenols, tannins, alkaloids and reducing sugar from leaf and bark of methanolic extract of *Holigarna grahamii* (Wight) Kurz. while Pradeep and Saj [18] reported alkaloids, steroids, tannins, phenolic compounds, flavonoids, resins, fatty acids, gums from bark and leaves of *Holigarna arnottiana* Hook f. All these above three plant species showing similar phytochemicals like alkaloids, saponin and tannins, may be because of are belonging to same family.

CONCLUSION

In present investigation, the phytochemicals such as alkaloids, tannins and saponins are present in all parts of the plant while the occurrence of other phytochemicals are less in preliminary phytochemical screening of aqueous (Aq. E.) and ethanolic (Et. E.) extract of *S. anacardium* L. The presumptive tests had shown that we can have major amount of phytochemicals such as alkaloids, tannins and saponins from *S. anacardium* for various medicinal applications. For further research we are investigating antimicrobial, antioxidants and HPLC analysis of plant extracts of *S. anacardium*.

Acknowledgement:
We are thankful to Director School of Life Sciences for providing necessary facilities. We are extremely thankful to Rajiv Gandhi Science and Technology Commission (RGSTC) Government of Maharashtra for financial support.

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