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Phytochemical Screening and Nutritional Analysis of medicinal plant-*Aglaia lawii* .

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Abstract: *Aglaia lawii* (Wight) Saldanha ex Ramamoorty (Family Meliaceae) has been used in the traditional system of medicine to cure various disorders. The use of plant extracts and isolated compound/s has provided basis in the preparation of modern pharmaceutical medicines. The phytoconstituents using various cold solvent extracts of different solvent polarities ranging from non polar to polar are acknowledged. The nutritional quantitative analysis is carried out to evaluate the nutritive factors like fats, proteins, carbohydrates, vitamin – C, A. It has been proved as a good source of nutritional supplement. The preliminary studies of *Aglaia lawii* have been performed to investigate its potentialities. The quantitative determination of elements in the leaves is carried out. Phytochemical evaluation of various extracts indicated that the leaves are rich source of starch, proteins, sugars, alkaloids, tannins, triterpenoids, saponins, phenols, flavonoids carbohydrates etc. This study provides fundamental data on the availability of various chemical constituents present in *A. lawii* leaves. Loss on drying and moisture content experiments was carried out to know the presence of volatile organic matter.
Keywords: *Aglaia Lawii* leaves, Phytochemical parameters, elements, phytocostituents nutritional analysis

Introduction

Herbal medicines are used from ancient times. They have a great importance in Ayurveda. Aglaia is a genus of more than 100 species belonging to the family Meliaceae. These trees occur in the tropical and subtropical forests of Southeast Asia, Northern Australia and the Pacific[1]. Some are important trees, others have edible fruits, scented flowers or medicinal properties. Many have complex biological relationships with their dispersal agents. Some show insecticidal bioactivity[2]. More than fifty species are available in India. Certain species of Aglaia have traditionally been used for their medicinal and healing properties such as the treatment of fever, diarrhea, inflammation and wounds. Extracts have also been used as bactericides, insecticides and in perfumery[3].

Aglaia lawii is a woody big tree distributed in India, through Burma (Myanmar), Thailand, Indo-China and throughout Malaysia towards the Solomon Islands[4-6]. It grows up to 40 meters. It is a traditional medicinal plant having been used for the treatment of bacterial infection, liver, tumour diseases and headaches[7]. Literature survey revealed that various parts of the plant possess different biological activities. Its medicinal properties have yet to be studied systematically and scientifically. However there is no information available about the phytochemicals of *A. Lawii* leaves. All parts of the plants are reported to be medicinally important for the treatment of various diseases in Ayurveda[8]. The pharmacological studies have shown that Aglaia species possess various notable biological activities such as anthelmintic, antimicrobial, analgesic, anti-inflammatory, immunimodulatory, antifungal etc[9]. The presence of alkaloids, tannins, phenols, flavonoids and carbohydrates from leaves has not yet been reported. The preliminary phytochemical evaluation of various extracts indicated

that the leaves are rich source of alkaloids, tannins, phenols, flavonoids and carbohydrates. This study provides fundamental data on the availability of various chemical constituents present in *A. lawii* leaves. Loss on drying and moisture content experiments were carried out to know the presence of volatile organic matter. Taking into consideration the medicinal importance of the plant, screening of this cherished plant –*A.lawii* leaves was achieved. In the present study an attempts were made to investigate the preliminary phytochemical analysis which supports modern chemical formulation.

Material and Methods

2.1 Sample collection and Identification of plant materials

The plant material was collected from Mulshi district of Pune, Maharashtra, India. It was authenticated at Botanical survey of India, Pune, Maharashtra, India. Its Authentication No. is BSI/WRC/Tech/2010/1028, Pune, India.

2.2. Preparation of extracts

Extraction and determination of extractive value

The air shade, dried and pulverized material (10 g) was used for analysis. The powdered plant material was treated with hexane, ethyl acetate, chloroform, acetone, ethanol, methanol and water separately at room temperature for 48 hours. The extracts were filtered through Whatman filter paper No.1 and concentrated under reduced pressure with a rotary evaporator. The extracts were dried in a hot air and extractive values were calculated on dry weight basis using the equation:

% extractive value (yield %) = (Weight of dry extract/weight taken for extraction) × 100
The yield of crude masses is reported (Table 1)

Table 1 Extractive values

Solvents	Extractive values (%)
n-Hexane	07.95
Chloroform	10.10
Ethyl acetate	12.00
Acetone	10.20
Ethanol	13.90
Methanol	20.80
Water	30

2.3 Phytochemical analysis

The extracts prepared were analyzed for the presence of various phytoconstituents such as alkaloids, phenolic compounds, flavonoids, saponin, tannins, steroids, anthraquinone, cardiac glycosides and reducing sugars based on the protocols available in the literature[10- 13], which helps to isolate active metabolites. The results are reported (Table 2).

Table 2 Phytoconstituents of different extracts of *Aglaia lawii*

Chemical constituents	Leaf extracts						
	Hexane	chloroform	Ethyl acetate	Acetone	Ethanol	Methanol	Water
Alkaloids	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve
Steroid	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	-ve
Tannins	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	-ve
Phenols	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	-ve
Flavonoids	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve

Starch	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve
Proteins	-ve	- ve	- ve	- ve	- ve	- ve	+ ve
Sugar	+ ve	+ve	+ ve	+ve	+ ve	+ ve	+ ve
glycosides	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve
Amino acids	- ve	- ve	- ve	- ve	- ve	- ve	+ ve
Tri terpenoids	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve
Saponins	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve
Triple sugar	- ve	- ve	- ve	- ve	- ve	- ve	+ ve

2.3 a. Test for alkaloids

The crude extract of each solvent was evaporated to dryness in boiling water bath. The residues were dissolved in 2N hydrocholoric acid. The mixture was filtered and the filtrate was divided into three equal portions. One portion was treated with a few drops of Mayer's reagent; other portion was treated with equal amount of Dragondroff's reagent and the third portion with equal amount of Wagner's reagent respectively. The creamish precipitate, the orange precipitate and brown precipitate, indicated the presence of respective alkaloids[13].

2.3 b.Test for saponins

About 0.5 g of the plant extract was shaken with water and heated to boil. Frothing was observed which was taken as a preliminary evidence for the presence of the saponins.

2.3 c. Test for tannins

About 0.5 g of extract was added in water (10 ml) and filtered. A few drops of 0.1% ferric chloride was added and observed for brownish blue-black coloration[14].

2.3 d. Test for steroids

2 ml of acetic anhydride was added to 0.5 g of methanol extract of each sample with 2 ml sulphuric acid. The colour changed from violet to bluish green in some samples indicating the presence of steroids.

2.3 e. Test for flavonoids

2 ml of extract solution was treated with 50 % methanol (1.5 ml). The solution was warmed and magnesium metal was added. To this solution few drops of conc. hydrochloric acid was added and the red colour was observed for flavonoides and orange colour for flavons[15].

2.3 f. Test for anthraquinones

About 0.5 g of extract was treated in chloroform (5 ml) was added and shaken for 5 min. The extract was filtered and the filtrate shaken with equal volume of 10% of ammonia solution. A red colour in the ammonical layer indicates the presence of anthraquinones.

2.3 g. Test for cardiac glycosides

0.2 g of extract was dissolved in 1 ml of glacial acetic acid containing 1 drop of ferric chloride solution. This was added in 1ml of concentrated sulphuric acid. A brown ring obtained at the interface indicated the presence of a deoxy sugar characteristic of cardioids.

2.3 h. Test for Proteins

2ml of extract was added in 1ml of 40% NaOH solution. To it 1 to 2 drops of 1% $CuSO_4$ solution was added. A violet color indicated the presence of peptide linkage of the molecule.

2.3 i. Test for Amino Acids

To 2ml of sample was added to of Ninhydrin reagent (2ml) and kept in water bath for 20 minutes. Appearance of purple color indicated the presence of amino acids.

2.3 j. Test for Tri-Terpenoids

5ml of each extract was added to chloroform (2ml) and con. H_2SO_4 (3ml) to form a monolayer of reddish brown coloration at the interface which, showed the presence of tri- terpenoids.

2.3 k. Test for Triple Sugar

In 2 ml of extract, 2 drops of Molisch's reagent was added and shaken well. 2ml of con. H_2SO_4 was added on the sides of the test tube. A reddish violet ring appeared at the junction of two layers immediately indicated the presence of carbohydrates.

Nutritional Analysis

The phytochemical parameters namely loss on drying and moisture content were determined to find out volatile matter, total ash content, acid soluble matter and water soluble matter as per the standard procedures to investigate the essential and non-essential elements with insoluble silicates. The results are reported (Table 3).

Table 3 Analysis of phytochemical parameters

Parameter	Value (%)
Moisture content	9.3
Loss on drying	12.15
Total ash	2.97
Acid-insoluble matter	15.4
Water-soluble matter	84.6

The quantitative estimation of carbohydrate, proteins, fats, minerals and vitamins was carried out using dried material (100 g).The moisture content was achieved as per the standard procedure. Fats, proteins, carbohydrates were determined by standard protocols. Calcium and manganese were estimated. Other trace elements were predicted by atomic absorption spectroscopy (Chemito201 mech.) Vitamins were estimated as per the standard method of Indian Pharmacopoeia[16]. The results are reported (Table 4).

Table 4 Nutritional content of *Aglaia lawii*

Sr.No	Parameters	Values (%)
1	Energy value	218.0
2	Proteins	15.4
3	Carbohydrates	38.7
4	Fats	0.2
5	Vitamin A	22443.27
6	Vitamin c	5.15
7	Potassium	2.711
8	Calcium	2.378
9	Magnesium	0.2629
10	Phosphorus	0.145
11	Iron	0.0750
12	Copper	0.0007
13	Manganese	0.0051

+ ve = present, - ve = absent

Results and Discussion

The phytochemical parameters shows the acid insoluble matter is 15.4 % (Table 3). The values for successive solvent extractions are recorded (Table 1) and it indicates that the extractive value increase from non polar to polar solvents. The preliminary phytochemical analysis (Table 2) reveals the presence of alkaloids, steroids, tannins, phenols and flavonoids to be major active components in all extracts . Flavonoids are group of polyphenolic compounds which influence the radical scavenging, inhibition of hydrolytic and oxidative enzymes. The phenols, tannins, flavonoids and alkaloids are complex moieties present in *A. lawii* leaves extracts shows higher potentialities towards antioxidant properties[17]. The nutritive claims of the leaves are justified by the nutritional analysis. The nutritional principles are reported (Table 4). It indicates that *Aglaia lawii* be a suitable alternative for providing necessary nutrients.

Conclusion

The present study confirms the use of *A.lawii* leaves in traditional medicines and phytochemical data will be helpful in the standardization and quality control of precious indigenous drug and also for pharmaceutical industries.

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