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Phytochemical Investigation of the extracts of *Crateva magna* Lour.

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ABSTRACT

Objective : To evaluate the role of seasons on the phytochemical properties of different extracts of *Crateva magna* . **Methods** : Dried plant parts (50g) using four different solvents (Petroleum ether , Chloroform, Methanol and aqueous) were subjected to soxhlet extracts for 16 hr at a temperature not exceeding the boiling point of the solvent. Standard methods have been used to screen the phytochemical constituents. **Results :** Alkaloid , Flavonoid and Terpenoid were present in all the extract of *crateva magna* and also in all the plant parts. Phenols were present in Petroleum ether , Methanol extracts of leaf , stem and bark . Saponins were present in methanol and aqueous extract of leaf , stem and bark and also present in petroleum ether bark. Steroids were present in petroleum ether , chloroform , methanol extract of leaf , stem and bark and absent in aqueous extract. Tannins were present in petroleum ether and aqueous extracts of leaf , stem and bark and also found to be in methanol extract of bark. Anthocyanin and quinine were found to be high in methanol and aqueous extract of leaf and it was absent in stem and bark. Volatile oil were high in petroleum ether, chloroform and methanol extract of leaf, stem and bark and it was absent in aqueous extracts. Protein was found to be high in methanol and aqueous extract of leaf and bark and aqueous extract of stem. The results obtained in the present study proved the efficacy of the plant *crateva magna.* **Conclusions:** From the observations it can be concluded that the plant extracts show the presence of several bioactive compounds which could be exploited further.

Key words : *Crateva magna* Lour, Phytochemical , Capparaceae

1. INTRODUCTION

Plants are known to be the source of many chemical compounds. Medicinal plants were used by people of ancient cultures without knowledge of their active ingredients. Plant-derived substances have recently become of great interest owing to their versatile applications. Medicinal plants are the richest bio-resource of drugs of traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates and chemical entities for synthetic drugs [1]. There is ample literature on preliminary phytochemical surveys 1-7 and the knowledge of the chemical constituents of plants is desirable to understand herbal drugs and their preparations. Most importantly, these studies will be helpful to isolate and characterize the chemical constituents present in those plant extracts. In addition, the knowledge of the chemical constituents of plants would further be valuable in discovering the actual value of folkloric remedies[2].

Crateva magna (Lour.) DC. (Capparaceae) is a high-value medium sized deciduous medicinal tree of tropical climate found in tropical regions of the world and also grows almost all over India, especially in the semiarid regions. Medicinal usage has been reported in traditional systems of medicine, such as Ayurveda and Unani, wherein the plant is frequently preferred in the treatment of urinary disorders that reoccur owing to development of antibiotic resistance by the infecting organism [3,4] It has lithnotriptic, diuretic, demulcent and tonic properties [5,6].

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2. MATERIALS AND METHODS

2.1 Plant collection and identification

The fresh plant parts of *Crateva magna* Lour. were collected from Singanallur area) in Kerala state. The collected plant material was identified and their authenticity was confirmed by comparing the voucher specimen at the herbarium of Botanical Survey of India, Southern circle Coimbatore, Tamilnadu. India. Freshly collected plant materials were cleaned to remove adhering dust and then dried under shade. The dried samples were powdered and used for further studies.

2.2 Preparation of extracts

The air dried, powdered plant material was extracted with petroleum ether, chloroform and methanol using soxhlet apparatus. Each time before extracting with the next solvent, the material was dried in hot air oven below 40 ºC. Finally, the material was macerated using hot water with occasional stirring for 24 h. The different solvent was

evaporated using a rotary vacuum-evaporator (Yamato RE300, Japan) at 50 ºC and the remaining water was removed by lyophilisation (VirTis Benchtop K, USA)

3. Phytochemical testes

Qualitative phytochemical analysis
The extracts were tested for the presence of bioactive compounds by using following standard methods [7].

3.1 Test for alkaloids

Mayer's test
A fraction of extract was treated with Mayer's test reagent (1.36 g of mercuric chloride and 5 g of potassium iodide in 100 ml of water) and observed for the formation of cream colored precipitate.

Wagner's test
A fraction of extract was treated with Wagner's reagent (1.27 g of iodine and 2 g of potassium iodide in 100 ml water) and observed for the formation of reddish brown colour precipitate.

Dragendrof's test
To 1.0ml of the extract 1.0ml of Dragendroff's reagent was added. Appearance of orange precipitate indicated the presence of alkaloids.

3.2 Test for Flavonoids

NaoH test
A small amount of extract was treated with aqueous NaOH and HCl, observed for the formation of yellow orange colour.

H_2SO_4 test
A fraction of the extract was treated with concentrated H_2SO4 and observed for the formation of orange colour.

3.3 Test for Phenols

Ferric chloride test
The fraction of extract was treated with 5% ferric chloride and observed for the formation of deep blue or black colour.

Liebermann's test
The extract was heated with sodium nitrite, added H_2SO4 solution diluted with water and excess of dilute NaOH was added and observed for the formation of deep red or green or blue colour.

3.4 Test for Saponins

Sodium bicarbonate test
To few ml of the extract a few drops of sodium bicarbonate was added and shaken well. Formatiom of honey comb like structure indicates the presence of saponins.

3.5 Test for Sterols

Liebermann-Burchard test
Extract (1ml) was treated with chloroform, acetic anhydride and drops of H_2SO4 was added and observed for the formation of dark pink or red colour.

3.6 Test for Terpenoids

Liebermann-Burchard test
Extract (1ml) was treated with chloroform, acetic anhydride and drops of H_2SO4 was added and observed for the formation of dark green colour.

3.7 Test for Tannin

Braemer's test
Added 2 ml of water to 1 ml of extract, boiled it and then filtered. Added few drops of 5% ferric chloride to the filtrate. A dark green, blue or brown color indicated the presence of tannin.

3.8 Test for Anthraquinones

Borntrager's test
About 50 ml of the extract was heated with 10% ferric chloride solution and 1 ml of concentrated Hcl. Cooled the extract, filtered and shaken the filterate with diethyl ether. The ether extract was further extracted with strong ammonia. Pink or deep red colorations of aqueous layer indicates the presence of anthraquinones.

3.9 Test for Anthocyanin

NaOH test
A small amount of extract was treated with 2M NaOH and observed for the formation of blue green colour.

3.10 Test for Quinones
A small amount of extract was treated with concentrated HCl and observed for the formation of yellow colour precipitate.

3.11 est for Volatile oils
2.0 ml of extract solution was shaken with 0.1 ml of dilute sodium hydroxide and a small quantity of dilute HCl. Formation of white precipitate indicated the presence of volatile oils.

3.12 Test for Proteins

Millon's test
To 2 ml of the extract 5-6 drops of Millon's reagent was added. Formation of red precipitate indicated the presence of proteins and amino acids.

Biuret test
The extract was heated in distilled water and filteres. The filterate is treated with 2% copper sulphate solution, to this added 95% ethanol and potassium hydroxide and observed for the formation of pink ethanolic layer.

Bradford's test
To 1 ml of the extract add few drops of Bradford's reagent (Coomassie Brilliant Blue G 250) and formation of blue color product indicates the presence of proteins.

4. Results

Table 1. Preliminary photochemical screening of the different extracts and different plant parts of *Crateva magna* Lour

S.No	Phytochemicals	LEAF				STEM				ROOT			
		PEE	ChL	MeH	AqE	PEE	ChL	MeH	AqE	PEE	ChL	MeH	AqE
1	**Alkaloids**												
	a. Mayer's test	+	-	+	-	-	-	+	-	-	+	+	+
	b. Wagner's test	+	+	+	+	+	+	+	+	+	+	+	+
	c. Dragendrof's test	-	-	-	+	-	-	-	+	-	-	-	+
2	**Flavonoids**												
	a. NaoH test	+	+	+	+	+	+	+	+	+	+	+	+
	b. H_2SO_4 test	-	-	+	+	-	-	+	+	-	-	-	+
3	**Phenols**												
	a. Ferric Chloride test	+	-	+	-	+	-	+	+	+	-	+	-
	b. Libermann's test	-	-	+	-	+	-	+	-	+	-	+	-
4	**Saponins**												
	a. Sodium bicarbonate test	-	-	+	+	-	-	+	+	+	-	+	+
5	**Steroids**												
	a. Libermann-Burchard test	+	+	+	-	+	+	+	-	+	+	+	-
6	**Terpenoids**												
	a. Libermann-Burchard test	+	+	+	+	+	+	+	+	+	+	+	+
7	**Tannins**												
	a. Brsemer's test	+	-	-	+	+	-	-	+	+	-	+	+
9	**Anthocyanin**												
	a. NaoH Test	-	-	+	+	-	-	-	-	-	-	-	-
10	**Quinones**												
	a. Hcl test	-	-	+	+	-	-	-	-	-	-	-	-
11	**Volatile oils**												
	a. NaoH test	+	+	+	-	+	+	+	-	+	+	+	-
12	**Proteins**												
	a. Bradfor's test	-	-	+	+	-	-	-	+	-	-	+	+
	b. Millon's test	-	+	-	+	-	-	+	+	-	+	+	-
	c. Biuret test	-	+	-	-	+	+	+	-	+	+	+	+

Key words: + indicates presence; - indicates absence, PEE- Petroleum ether, ChL – Chloroform, MeH – Methanol, AqE –Aqueou

5. DISCUSSION

The preliminary phytochemical tests result indicates the presence of alkaloids, flavonoids, phenols, saponins, steroids, terpenoids, tannins, anthraquinones, anthocyanins, quinones, volatile oils, proteins and carbohydrates in different extracts of various plants parts. The presence of wide range of phytochemical constituents indicates that the plant could be used in a multitude of ways which may be beneficiary to the population. Phytochemical may protect humans from a host of diseases. Phytochemical analysis conducted on the plant extracts revealed that the presence of constituents which are known to exhibit medicinal as well as physiological activities [7].

Several studies have described the antioxidant properties of medicinal plants which are rich in phenolic compounds [8]. Natural antioxidants mainly come from plants in the form of phenolic compounds such as flavonoids, phenolic acids, tannins, tocopherols [9]. Alkaloids, flavonoids, tannins and anthraquinones could participate for its clot lysis activity [10]. The plant extracts were also revealed to contain saponins which are known to produce inhibitory effect on inflammation [11]. Saponin has the property of precipitating and coagulating red blood cells. Some of the characteristics of saponins include formation of foams in aqueous solutions, hemolytic activity, cholesterol binding properties and bitterness [12]. Alkaloids have been associated with medicinal uses for centuries and one of their common biological properties is their cytotoxicity [13]. Anthocyanins exhibit important anti-oxidant and anti-inflammatory actions as well as chemotherapeutic effects [14]. Glycosides are known to lower the blood pressure according to many reports [15]. Triterpenoids are a large class of natural isoprenoids present in higher plants, which exhibit a wide range of biological activities [16].

Steroids (anabolic steroids) have been observed to promote nitrogen retention in osteoporosis and in animals with wasting illness [17] and they are very important compounds especially due to their relationship with compounds such as sex hormones [18]. Anthraquinone and its derivatives were reported to have antifungal activity [19]. Carbohydrate is reported to have numerous roles in living things, such as the storage and transport of energy (starch, Glycogen) and structural components (cellulose in plants, chitin in animals). Additionally carbohydrates and their derivatives play major roles in the working process of the immune system, fertilization, pathogenesis, blood clotting and development [20]. The clear separation between these three types (eugenol, geraniol, and thymol), as shown in this study using aromatic volatile oil, flavonoid, and RAPDs supports and extends the earlier botanical taxonomic work by [21]. The results revealed the presence of medicinally important constituents in the plants studied. Many evidences gathered in earlier studies which confirmed the identified photochemical to be bioactive. Several studies confirmed the presence of these photochemical contribute medicinal as well as physiological properties to the plants studied in the treatment of different ailments. Therefore, extracts from these plants could be seen as a good source for useful drugs. The traditional medicine practice is recommended strongly for this plant as well as it is suggested that further work should be carried out to isolate, purify, and characterize the active constituents responsible for the activities. Also additional work is encouraged to elucidate the possible mechanism of action of this plant extracts.

6. CONCLUSION

Based on the result in the study, it was concluded that *Crateva magna* were found to be rich in the phytochemicals . Further studies required to identify specific active principles of this plant for the significant antioxidant effect.

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