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Successive solvent extraction and phytochemical profile of *Baccaurea courtallensis* muell.-arg and *Prosopis juliflora* DC

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ABSTRACT

Herbal medicine represents one of the most important fields of traditional medicine all over the world. The dried and powdered bark material of *Baccaurea courtallensis* Muell.-Arg and *Prosopis juliflora* DC was extracted successively with petroleum ether, chloroform, ethyl acetate and methanol in the increasing order of their polarity using soxhlet apparatus and the solvent was removed under pressure to obtain extracts. Yield of extract in each solvent was recorded. All the extracts were subjected to preliminary phytochemical screening. The results showed that most of the phytoconstituents tested were present in methanol extract of both the plants. A relatively less number of phytoconsituents were detected in petroleum ether extract. The presence of phytoconstituents namely alkaloids, terpenoids, flavonoids, saponins, steroids and tannins could be responsible for the pharmacological activities of plants.

KEYWORDS

Baccaurea courtallensis muell.-arg;
Prosopis juliflora DC;
Phytochemical profile;
Soxhlet extraction;
Polarity basis.

INTRODUCTION

Herbal medicine represents one of the most important fields of traditional medicine all over the world[1]. Contrary to the synthetic drugs, compounds of plant origin are not associated with side effects and have an enormous therapeutic potential to heal many disorders. For example, vincristine (an antitumor drug), digitalis (a heart regulator) and ephedrine (a bronchodilator used to decrease respiratory congestion) were all originally discovered through research on plants[2]. The plant may be considered as a biosynthetic laboratory, not only for the chemical compounds such as carbohydrates, proteins, and lipids that are utilized by man, but also for a multitude of compounds like glycosides, alkaloids, volatile oils, tannins etc., that exert a physiological effect[3]. Plants have an almost limitless ability to synthesize aromatic substances, most of which are phenols or their oxygen derivatives[4]. *Baccaurea courtallensis* Muell.-Arg is a lesser known wild edible tree distributed in Western Ghats of Karnataka, Kerala and Tamil Nadu and belongs to the family Euphorbiaceae. The plant is commonly called as Mootapalam, Muttithuri, Kalikuki, Muttathuri. The fruits of the plant are edible[5,6,7]. *Prosopis juliflora* belonging to Mimosae and is an evergreen tree native to South America, Central America and the Caribbean. It is fast growing, nitrogen-fixing, and tolerant to arid conditions and saline soils. In some

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circumstances, *P.juliflora* can provide a variety of valuable goods and services: fuelwood, charcoal, animal feed, construction materials, soil conservation and rehabilitation of degraded and saline soils[8,9]. The present investigation was conducted to extract the powdered bark material of *B.courtallensis* and *P.juliflora* successively using various solvents based on polarity and screen the extracts for associated phytochemical groups.

MATERIALS AND METHODS

Plant collection and extraction

The bark materials of selected plants were collected and authenticated to identity and voucher specimen was deposited for future reference. Bark was washed thoroughly 2-3 times with running tap water and once with sterile water, shade dried, powdered and used for extraction. The powdered material was extracted successively with petroleum ether, chloroform, ethyl acetate and methanol in the increasing order of their polarity[3,10]. A known amount of powdered material (200gm) was subjected to soxhlet extraction and exhaustively extracted with respective solvents for about 48 hours. The extracts were filtered and concentrated in vacuum under reduced pressure using rotary flash evaporator and dried in the dessicator[11]. The solvent was removed under pressure to obtain a total extracts. Yield of extract in each solvent was recorded by weighing extract in preweighed container and taking the difference. All the extracts were subjected to preliminary phytochemical screening.

Phytochemical analysis

Phytochemical analysis of petroleum ether, chloroform, methanol and ethyl acetate extracts for presence/absence of phytochemical groups namely alkaloids, flavonoids, tannins, steroids, saponins and terpenoids was carried out[3,12,13]. Qualitative phytochemical analysis of the sovlent extracts of selected plants was determined as follows: Tannins (200 mg plant material in 10 ml distilled water, filtered); a 2 ml filtrate + 2 ml $FeCl_3$, blue-black precipitate indicated the presence of Tannins. Alkaloids (200 mg plant material in 10 ml methanol, filtered); a 2 ml filtrate + 1% HCl + steam, 1 ml filtrate + 6 drops of Mayor's reagents/Wagner's reagent/Dragendroff reagent, creamish precipitate/brownish-red precipitate/orange precipitate indicated the presence of respective alkaloids. Saponins (frothing test: 0.5 ml filtrate + 5 ml distilled water); frothing persistence indicated presence of saponins. Steroids (Liebermann-Burchard reaction: 200 mg plant material in 10 ml chloroform, filtered); a 2 ml filtrate + 2 ml acetic anhydride + conc. H_2SO_4. Blue-green ring indicated the presence of terpenoids. Flavonoids (200 mg plant material in 10 ml ethanol, filtered); a 2 ml filtrate + conc. HCl + magnesium ribbon pink-tomato red color indicated the presence of flavonoids[13].

TABLE 1: Yield of different solvent extracts of selected plants

Plant	Extract Yield in gm			
	Petroleum ether	Chloroform	Ethyl acetate	Methanol
P.juliflora	0.61	0.56	1.94	24.85
B.courtallensis	0.97	0.77	0.43	1.48

TABLE 2 : Phytochemical profile of various solvent extract os *P.juliflora*

Group	Pet. ether	Chloroform	Ethyl acetate	Methanol
Alkaloids	ND	ND	ND	ND
Terpenoids	ND	ND	ND	+
Steroids	+	ND	+	ND
Tannins	+	+	+	+
Flavonoids	ND	+	+	+
Saponins	ND	ND	ND	+

'+' Detected; '-' Not detected

RESULTS AND DISCUSSION

Yield of different solvent extracts was given in TABLE 1. More extract yield was obtained in case of *P.juliflora* when compared to *B.courtallensis* in case of ethyl acetate and methanol while high yield was observed in *B.courtallensis* with solvents namely petroleum ether and chloroform as compared to *P.juliflora*. The results of preliminary phytochemical screening of *P.juliflora* showed the presence of steroids and tannins in petroleum ether extract, tannins and flavonoids in chloroform extract, steroids, tannins and flavonoids in ethyl acetate extract and terpenoids, tannins, flavonoids and saponins in methanol extract (TABLE 2). TABLE 3 shows phytochemical groups present in different solvent extracts of *B.courtallensis*. Petroleum ether extract did not revealed the presence of any constituent. Only steroid and tannins were detected in chloroform extract; tannins and flavonoids were observed in ethyl

TABLE 3: Phytochemical profile of various solvent extract os *B.courtallensis*

Group	Pet. ether	Chloroform	Ethyl acetate	Methanol
Alkaloids	ND	ND	ND	ND
Terpenoids	ND	ND	ND	+
Steroids	ND	+	ND	ND
Tannins	ND	+	+	+
Flavonoids	ND	ND	+	+
Saponins	ND	ND	ND	+

'+' Detected; 'ND' Not detected

acetate extract; and all except alkaloids and steroids were detected in methanol extract. Alkaloid was not detected in any of the extract. Lack of detection of some phytoconstituents does not suggest that the constituents are absent. They may be in very small concentration to detect or the test may not be so efficient to detect the constituents in some circumstances such as the extract having a very dark color. Literature survey reveals that data on phytochemical analysis of *B.courtallensis* is lacking hence the present study is the first to describe it. Phytochemical analysis of *B.courtallensis* revealed the presence of terpenoids, steroids, tannins and flavonoids.

Juliflorine and julifloricine, the main alkaloids of Prosopis juliflora, have been isolated for the first time by Ahmad et al.[14] and the antibacterial and antifungal activities were reported by Khan K.A. and Ahmad et al.[15-18]. From *P.juliflora*, a benzene insoluble alkaloidal fraction (containing 2 major and 3 minor alkaloids) have also been isolated and reported to possess antibacterial and antifungal activities[19,20]. Antibacterial therapeutic efficacy of juliflorine, julifloricine and a benzene insoluble alkaloidal fraction of *Prosopis juliflora* has been studied[21]. Most of plant metabolites are secondary metabolites, of which at least 12000 have been isolated, a number estimated to be less than 10% of the total. In many cases, these substances serve as plant defense mechanism against predation by microbes, insects and herbivores. Some, such as terpenoids, give plants their odors while quinones and tannins are responsible for plant pigments. Many compounds are responsible for plant flavor as in case of terpenoid capsaicin from chili peppers. Some of the same herbs and spices used by humans to season food yield useful medicinal compounds[4]. From ancient civilization various parts of different plants were used to eliminate pain, control suffering and counteract disease. Most of the drugs used in primitive medicine were obtained from plants and are the earliest and principal natural source of medicines. The plants used as drugs are fairly innocuous and relatively free from toxic effects or were so toxic that lethal effects were well known. The nature has provided the storehouse of remedies to cure al ailments of mankind. There is no doubt that plants are a reservoir of potentially useful chemical compounds which serve as drugs, are provided newer leads and clues for modern drug design by synthesis[22,23,24].

CONCLUSION

A knowledge of the chemical constituents of plants is desirable, not only for the discovery of therapeutic agents, but also because such information may be of value in disclosing new sources of such economic materials as tannins, oils, gums, precursors for the synthesis of complex chemical substances, etc. In addition, the knowledge of the chemical constituents of plants would further be valuable in discovering the actual value of folkloric remedies.

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