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Phytochemical analysis of stem bark of some medicinal plants

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Abstract
Several medicinal plants have been used to treatments and therapies from ancient times. This study focuses on the phytochemical analysis of three well known medicinal plants, namely *Anthocephalus cadamba* (Roxb.) Miq., *Bombax ceiba* L. and *Cordia dichotoma* G. Forst. Phytochemical compositions of spices were carried out in the different solvent like Petroleum Ether, Chloroform, Methanol, Alcohol, Benzene, Acetone and Distilled Water. Qualitative phytochemical analysis of these spice Medicinal plants extracts confirm the presence of various phytochemicals like Tannins, Phenols, Alkaloids, Saponins, Iridoids, Quercetin, Kaempferol, Catechin, Coumarin, 6,7-Dimethoxy coumarin, 5-Methoxy genistein, Anthocyanin, Proanthocyanin.

Keywords: medicinal plants, phytochemical analysis, bark extract

1. Introduction

India is considered to be the origin of *Ayurveda*. As far as biodiversity is concerned, India is amongst the topmost countries. Most of the medicinal properties of plants are due to the phytochemicals, which they contain. Phytochemicals are the non-nutritive secondary metabolites that have defensive or disease preventive properties (Tan *et. al*,. 2010; Suhas *et. al*., 2014) [27, 25]. Plants are reported to produce phytoalexins in response to attack by bacteria and fungi (Hammerschmidt 1999) [8]. Phytochemicals are actually not required for the immediate survival of the plants but are synthesized by the plants to increase their own fitness for proper survival. These compounds allow the plants to interact with their surrounding environment including pathogens, insects and herbivores and also contribute to the plant's color, aroma and flavor. They also protect the plants from environmental hazards such as pollution, stress, draught and UV exposure. Thus phytochemicals are one of the means of adaptation (Gibson *et.al.,* 1998) [5]. Amongst plants there is competition for better survival and thus they keep on modifying their phytochemicals and try to be better with each passing generation (Kennedy and Wightman 2011) [17]. Current research revealed that they can also protect humans and other animals against diseases (Russo, *et al.* 2012) [24]. There are thousands of well known phytochemicals and many thousands are under investigations (Meagher and Thomson 1999) [20]. Every plant in nature contains few or more phytochemicals. Some of them might be toxins but most are found to be useful in some or other diseases. Phytochemicals are found to be present in all parts of plants including leaves, fruits, seeds, flowers, stems and roots, but stem barks and root barks are seen to possess a wide variety of phytochemicals. That might be the reason why they are important ingredients of many *Ayurvedic rasayanas* as well as Unani medicines.

Today's shining world of phytomedicines was not so, right from the beginning. It has gone through many ups and down and a lot of struggle. Herbal preparations were in use from centuries but isolation of first few active principle alkaloids like morphine and quinine in the early 19th century started a new era in the science of medicinal plants and thus modern medicinal plant research came into existence. But, tremendous development in synthetic pharmaceutical chemistry and microbial fermentation after 1945 put the plant derived drugs out of picture. Science of phytomedicines almost went into extinction during the last decade of the 20th century due to the use of more powerful and potent synthetic drugs. As side effects of these drugs started showing their effects, people turned their minds towards phytomedicines and medicinal plants earned their values again. Though the effects of natural remedies are slower, the results are many times much better on the long run especially in chronic diseases (Akunyili 2003) [1]. Over the last decade, however, interest in medicinal plants and their compounds has grown steadily (Hamburger and Hostettmann 1991) [7]. Utilization of medicinal plants in Western Europe during this period has almost doubled. Awareness regarding natural products, the efficacy of phytochemical preparations like *Vicco turmeric, Safi, Drakshasav* etc. and increased interest of major pharmaceutical companies (*Vicco, Himalaya, Baidyanath* etc.) in variety of medicinal plants as sources for new compounds has been the main reasons for this renewal of interest. With the development of newer and better isolation techniques and revolution in analytical chemistry, scientists began to extract chemical products from medicinal plants. As various active principles in medicinal plants got identified and isolated, plant based prescriptions began to be substituted more and more with pure substances, which were as effective as the synthetic ones and easier to prescribe and administer (Harvey 2000).

Today, *Patanjali Yog Pitha* is one of the largest seller of plant derived medicinal compounds and has taken lots of efforts to teach people about the importance of Indian traditional system of medication not only in India but also throughout the world. Chemically phytochemicals are classified as Alkaloids, Anthocyanins, Aanthracene glycosides, Anthraquinones,

Aucubins & Iridoids, Carbohydrates, Cardiac glycosides, Carotenoids, Coumarins, Emodins, Flavonoids, Polyuronoids, Reducing sugars, Saponins, Steroids, Tannins and Triterpenoids (Hahn 1998) [6]. Different phytochemicals with almost all types of medicinal properties includinganti-spasmodics, anti-inflammatory, anti-viral, anti-cancer, anti-fungal, anti-bacterial, anti-oxidant, anti-malarial, anti-ulcer, anti-hypertensive, anti-depressive, hypocholesterolemic, immunomodulatory, clot dissolving, detoxifying and many others are reported (Mamta, *et al*. 2013) [19].

Anthocephalus cadamba (Roxb.) Miq., *Bombax ceiba* L. and *Cordia dichotoma* G.Forst are referred as the storehouse of phytochemicals and are considered as a plants of immense importance in *Ayurveda*. Extraction is the separation of medicinally active portions of plants using selective solvents. For extraction purpose, sox let assembly is generally used in which phytochemicals are separated from dried powder of plants parts in the increasing order of polarity. Compounds with particular polarity get dissolved in the solvent of same polarity by either nonpolar-nonpolar interaction or polar-polar interaction. During successive extraction, care has to be taken to dry the powder between two successive extractions so that to evaporate the previous solvent completely. The extracts are dried and the powder can be used to check out the activity. Phytochemical screening of the extracts can be done.

2. Material and method

Plant Material

The stem bark of *Anthocephalus cadamba (Roxb.) Miq.*, was collected from Shivaji park Paithan, *Bombax ceiba* L. was collected from Dr. BAMU campus Aurangabad, and *Cordia dichotoma* G.Forst was collected from Jayakwadi, Paithan. The plant materials were identified and Authenticated by pertinent literature.

Preparation of Extract

The stem bark of selected medicinal plants shade dried, and then these are made into coarsely powdered form using dry grinder. The powdered bark of the plants (180gm.) were packed in sox let apparatus and continuously extracted with petroleum ether (40-600C) till complete extraction, after completion of extraction the solvent were removed by distillation and then concentrated extract obtained were dried under reduced pressure using rotator evaporator at temperature not exceeding 400C and then give moderate heating on water bath. A yellowish extract approximate 1 gm. was obtained. From the drug petroleum ether were removed and the defatted drugs were extracted with methanol (95%) till complete extraction, after completion of extraction the solvent was removed by distillation and then concentrated extract obtained dried under reduced pressure at temperature not exceeding 400C and then give moderate heating on water bath. The methanolic extract obtained was dark yellow in color, weighed about 42.8 gm. The methanolic extract was kept in Petridis and it was stored in desiccators at cool place (Mukherjee 2001) [21].

3. Result and discussion

Phytochemical screenings were done for Three barks of *Anthocephalus cadamba* (Roxb.) Miq., *Bombax ceiba* L., and *Cordia dichotoma* G.Forst. The value of medicinal plants lies in some chemical substances that produce a definite physiological action on the human body and the most important phytochemicals are alkaloids, flavonoids, tannins and phenolic compounds (Hill, 1952; Florence *et. al.*, 2015).

The present investigations of phytochemical screening were carried out on three plants to study the presence of medicinally active phytochemicals test, Tannins, Phenols, Alkaloids, Saponins, Iridoids, Quercetin, Kaempferol, Catechin, Coumarin, 6,7-Dimethoxy coumarin, 5-Methoxy genistein, Anthocyanin, Proanthocyanin, Carbohydrates, Flavonoids, Glycosides and Proteins in the medicinal plants. The results are summarized in table.

Table 1: Phytochemistry of Three Selected Medicinal Plants

Sr. No.	Name of the Species	Tannins	Phenols	Alkaloids	Saponins	Iridoids	Quercetin	Kaempferol	Catechin	Coumarin	6,7-Dimethoxy coumarin	5-Methoxy genistein	Anthocyanin	Proanthocyanin
1.	*A. cadamba*	+	+	+	+	-	-	-	-	-	-	-	-	-
2.	*B. ceiba*	+	+	+	-	-	-	+	-	-	-	-	-	-
3.	*C. dichotoma*	-	-	+	+	-	+	-	-	+	-	-	-	-

Tannin and Phenols are present in *Anthocephalus cadamba* and *Bombax ceiba* but both are absent in *Cordia dichotoma*. Alkaloids are present in all selected medicinal plants. Iridoids, Catechine, 6,7-Dimethoxy coumarin, 5-Methoxy genistein, Anthocyanin and Proanthocyanin are absent in all selected medicinal plants. Saponins are present in *Anthocephalus cadamba* and *Cordia dichotoma* but absent in *Bombax ceiba*. Quercetin are absent in *Anthocephalus cadamba* and *Bombax ceiba* but present in *Cordia dichotoma*. Kaempferol are absent in *Anthocephalus cadamba* and *Cordia dichotoma* but present in *Bombax ceiba*. Coumarin are present in *Cordia dichotoma* but absent in *Anthocephalus cadamba* and *Bombax ceiba*.

Phytochemical screening of the bark showed some differences in the presence of phytoconstituents which are known to have importance in medicine (Sukumaran, 2011; Kiruba, 2011; Jeeva, 2011; Jeeva, 2012; Johnson, 2012; Florence *et. al.* 2014) [26, 18, 11, 2, 12, 13, 3]. The preliminary screening tests may be useful in the detection of the bioactive principles and subsequently may lead to the drug discovery and development

(Florence, 2012; Joselin, 2013; Joselin, 2012; Joselin, 2014) [15, 2, 16].

Flavonoids are also reported to have inhibitory action on growth and proliferation of different types of tumors (Netto, 2007) [22]. Alkaloids, a wonderful group of phytocompounds have been well studied for their anti-arrhythmic, analgesic, anti-hypertensive, antipyretic, antimalarial and antitumor activities and their use in the treatment of cough and gout is very common (Robert, 1992) [23].

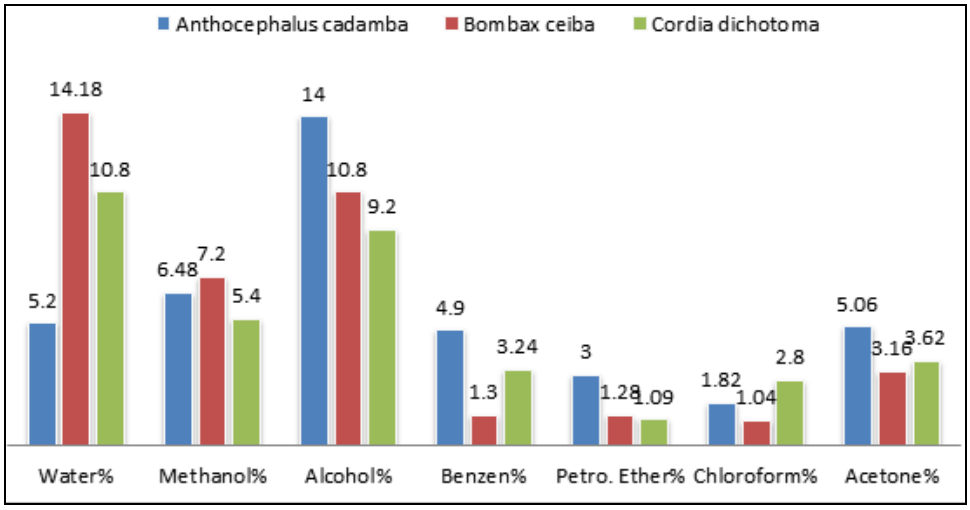

Fig 1: Extractive values of bark samples

4. Conclusion

Phytochemical analysis indicates that *Anthocephalus cadamba*, *Bombax ceiba* and *Cordia dichotoma* are the storehouse of phytochemicals. Almost all phytochemicals are found in one or the other parts of these creative plants. The various compounds isolated from these plants can serve as new drugs and can be screened for the treatment of many diseases and disorders. Not only stem barks, but also leaves, fruits and flowers are found to be rich in phytochemical content.

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