

IN VITRO ANTIBACTERIAL ACTIVITY AND PHYTOCHEMICAL ANALYSIS OF CRUDE DRUGS OF MEDICINAL PLANTS

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Article Received on
02 March 2013,

Revised on 07 April 2013,
Accepted on 19 April 2013

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ABSTRACT

The prime purpose of this study was to screen out secondary metabolites and to evaluate the antimicrobial activity of crude powder of medicinal plants (viz. *Pterocarpus santalinus*, *Curcuma aromatica*, *Aloe vera*). Antimicrobial activity was also done *in vitro* by agar cup diffusion method by using ethanol and aqueous extracts of selected plant species against *Bacillus subtilis* bacteria,. Also preliminary secondary metabolite investigation of above plant extracts revealed that presence of Saponins, Tannins, Carbohydrates, Glycosides, Flavonoids, Alkaloids, Phenolic compounds and Terpenoids. The present results provide preliminary details to further characterization of some pharmacognostical parameters of these crude drugs available in market.

Keywords: *Pterocarpus santalinus*, *Curcuma aromatica*, *Aloe vera*, Antimicrobial, *Bacillus subtilis*.

INTRODUCTION

Recently, natural plants have received much attention as sources of biological active substances i.e. secondary metabolites. Since ancient time also human use plant drug to cure many diseases. Till today most of people believe on these plant drug than that of allopathy due to herbal drugs has no any kind of side effect. Although we know these drug has medicinal property, here is an attempt has been made to find out those active compounds essential in plants to have medicinal importance. The present investigation deals with antibacterial activity and phytochemical screening of crude drugs of plants available in ayurvedic market viz. *Pterocarpus santalinus*, *Curcuma aromatica*, *Aloe vera* powder. To know their perfect solubility different solvent like DW, methanol and chloroform.

According to International Legume Database & Information Service, *Pterocarpus santalinus* (raktachandana, Red Sandalwood) is a species native to India. Traditionally various medicinal properties and uses of this plant mentioned in Nighantus, like Bhavaprakasa Nighantu, Raja Nighantu etc. Rakta chandana has cold potency also used on kapha and pitta doshas, beneficial to the eyes and sukra dhatu, and alleviates the toxins and purifies the blood. It is used in diseases like cough, vomiting, fever, hyperdipsia, helminthiasis, diseases of the blood and eye, wounds etc ^[1] (Anonymous, 2012). *Curcuma aromatica* (wild turmeric) from family Zingiberaceae has been widely used as a cosmetic herbal in South Asia and nearby regions. Traditionally it is used as an anti-inflammatory agent. Many reports have suggested useful pharmacological properties of *Curcuma* drugs such as anti-inflammatory, anti-tumor and immunological effects ^[2,3,4] (Ahmed *et al.*, 2005; Ozaki, 1990 and Gonda *et al.*, 1993). *Aloe vera* L. (syn.: *Aloe barbadensis* Miller) from family Aloeaceae is a perennial succulent species belonging to the sub-family of the Asphodelaceae. There are more than 400 *Aloe* species worldwide distributed ^[5] (Eggli, 2001). *A. vera* is mostly used for medical and cosmetic purposes ^[6,7,8,9].

MATERIALS AND METHODS

Plant material

Crude drug powder of medicinal plants available in market was purchased (for testing solvents solubility of phytochemicals present) from different Ayurvedic medical shops, Satara. The crude powder of *Pterocarpus santalinus*, *Curcuma aromatica*, *Aloe vera* were air dried and subjected for different extractions.

Preparation of extracts

Dried powder were subjected to Chloroform, Methanol and aqueous extraction. About 5 g of powder were immersed in different solvent and after hour that was kept for splitting entire cell on sonicator. The clear filtrate was obtained by filtering through a Buchner funnel. The filtrates were used for further studies.

Qualitative phytochemical analysis

Preliminary photochemical testing for the presence of various compounds by standard methods like Steroids ^[10], Benedicts test for reducing sugar ^[11], Alkaloid tests by Wagner *et al.* ^[12], Tannins ^[13], Saponins by Kumar *et al.* ^[14] and compounds like Phenols, Flavonoids, Glycosides by Khandelwal ^[15] were conducted.

RESULT AND DISCUSSION

Phytochemical screening

In recent years focus on use of ethanolic traditional knowledge to treat disease has been demanded worldwide because of side effect of allopath, which directly affects loss of diversity of medicinal plants and hence there is an urgent need of search of supplementary herbal drugs.

Response of phytochemicals for their solubility in different solvents is recorded in table 1. It was found that all three solvent extracts of *Aloe vera* contained alkaloid, carbohydrate glycosides and steroids. But Dragendorff's reagent test of alkaloid, tannin test and Benedict's test of carbohydrates shows negative response in chloroform solvent for same species. It is evidence from result that in *Aloe vera* phytochemicals like flavonoids and saponin shows specificity for solvent i.e. chloroform and DW respectively. Similar type of work has been carried out by Thite *et al.* ^[16] on seven different medicinal plant drugs.

In case of *Curcuma aromatica* only flavonoid and Carbohydrates by Molisch's test shows positive response for all solvent extractions. Here chloroform extract shows maximum phytochemical solubility for *C. aromatica*. It shows that this species contain maximum organic soluble active compounds. Only saponins gives negative response in case of methanol. Kharade *et al.* ^[17] recorded same type studies in commelinaceae species.

For species *Pterocarpus santalinus*, carbohydrates shows positive reply firmly in methanolic extract. Similar to that of *C. aromatica* maximum phytochemicals found to be chloroform soluble later that methanol. In case of *P. santalinus*, tannins, steroids, flavonoids and saponins shows specificity of solubility. Similar kind of study has been carried out by Tupe *et al.* ^[18] for cucurbitaceae members.

Antibacterial activity against *Bacillus subtilis*

The anti bacterial properties of the medicinal plants from their crude drug extract are summarized in Table 2 and Fig. 1 in this present article which may give a new source of anti microbial agents. Bacterial pathogens have been causing serious diseases all over the world and even leading to death in severe cases. Ryan *et al.* ^[19] reported that *Bacillus subtilis* is not considered as a human pathogen; it may contaminate food but rarely causes food poisoning. Presently known fact is that synthetic drugs are not only expensive for our peoples but also

Table 1. PHYTOCHEMICAL SCREENING OF SOME CRUDE DRUG EXTRACTS USING DIFFERENT SOLVENTS.

Species	<i>Aloe vera</i>	<i>Curcuma aromatica</i>	<i>Pterocarpus santalinus</i>							
Solvent	DW.	Chloroform	Methanol	DW.	Chloroform	Methanol	DW.	Chloroform	Methanol	
1	Alkaloids									
	Wagner's reagent	+	+	+	+	+	-	+	+	+
	Dragendorf's reagent	+	-	+	+	-	+	+	-	-
2	Carbohydrate									
	Molisch's test	+	+	+	+	+	+	-	-	+
	Benedict's test	+	-	+	-	-	-	-	+	+
	Fehling's test									
	Fehling's test (f.r.s.)	-	-	+	-	+	-	-	-	+
	Fehling's test (c.r.s.)	+	+	+	-	+	+	-	+	+
3	Glycosides	+	+	+	-	+	+	+	+	-
4	Tannins	+	-	+	+	+	-	+	-	-
5	Steroids	+	+	+	-	+	+	-	-	+
6	Flavonoids	-	+	-	+	+	+	-	+	-
7	Saponins	+	-	-	+	+	-	+	-	-

Fig.1 Zone of Inhibition Against *Bacillus subtilis*

1. *Aloe vera* 2. *Curcuma aromatica* 3. *Pterocarpus santalinus*

Table 2. Activities of herbal crude drugs against *Bacillus subtilis*

Sr. No.	Name of species	Name Of Organism	Diameter of zone of inhibition
1.	<i>Aloe vera</i>	<u><i>Bacillus subtilis</i></u>	2 cm
2.	<i>Curcuma aromatica</i>	<u><i>Bacillus subtilis</i></u>	3 cm
3.	<i>Pterocarpus santalinus</i>	<u><i>Bacillus subtilis</i></u>	1.8 cm

inadequate for the treatment of diseases but also often with adulterations and side effects. Therefore, there is need to search new infection-fighting strategies to control microbial infections. It is evidence from results that *Curcuma aromatica* plant species has higher antibacterial potential, other species also i. e. *Aloe vera* and *Pterocarpus santalinus* contain antibacterial activity against *Bacillus subtilis* but less than that of *C. aromatica*.

CONCLUSION

It can be concluded from result that most of the phytochemicals present in plants are soluble in organic solvent. In studied species *Curcuma aromatica* contain higher amount of secondary metabolites and that species have great antimicrobial activity. This result support use of *Curcuma aromatica* in medicine and has wound healing activity. The result also helps to know that chloroform are very useful solvent for separation of phytochemicals.

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