Journal of Chronotherapy and Drug Delivery

ORIGINAL RESEARCH PAPER

Preliminary Phytochemical Investigation of *Bambusa vulgaris* var. striata Holtum

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Key words
Bambusa vulgaris, pharmacognostical analysis, phytochemical screening

Abstract
Powdered leaves of *Bambusa vulgaris* were subjected to loss on drying (LOD), different ash and extractive values. Successive extraction of the powdered leaves was done using petroleum ether, chloroform, ethyl acetate, methanol and water as solvents. Different extracts were subjected to determination of yield, fluorescence analysis and phytochemical screening. The leaves exhibited LOD of 7.3%. The total ash, water soluble and acid insoluble ash values were 8.5, 5.0 and 3.3%, respectively. The extractive values for petroleum ether, chloroform, ethyl acetate, methanol and water were 3.5, 6.6, 1.4, 4.1 and 7.5%, respectively. Fluorescence characters of different extracts with various reagents were noted in ultraviolet and sun light. In the preliminary qualitative phytochemical analysis, alkaloids, flavonoids, phytosterols, terpenoids and phenols were found to be present in the chloroform and methanol extracts. These studies provided referential information for correct identification and standardization of this plant material.

J Chronother Drug Deliv | Vol 5 | Issue 1 | 2014: 27-31

INTRODUCTION

Bambusa vulgaris is a rhizomatous plant.[1] The genus of bamboo (Arundinaria, Oxytenanthera, Oreobambos and Bamboos) is present throughout the continent under rainfall ranging from 700 to 1500 mm. Because of the monocarpic character, episodic flowering, over-exploitation and bush fires, Thanks to its very easy adaptation to certain favourable ecological conditions, bamboo is often used to fight against water and wind erosions. Bamboo is a multipurpose species and is utilized in various handicraft, building, food and medicine. Although *B. vulgaris* is taxonomically a grass, its habit is tree-like. It forms dense stands of cylindrical, jointed woody stems up to 20 m in height and 4-10 cm in diameter; leafy branches at nodes, with narrow lanceolate leaves up to 30 cm long. It is the most widespread member of its genus, and has long been cultivated across the tropics and subtropics.[1]

Chemical constituents reported from Bambusa vulgaris include Silica 90 %, silacum, potash, lime, aluminia, choline, betaine, hydrate of silicic acid, nuclease, urease, proteolytic enzyme, cyanogentic glycoside and an alkaloid. Chemical analysis of the culms showed caustic soda 22 % and lignin in bamboo 22.9 %, in pulp 3.6 %, pentosans in bamboo 21 %, in pulp 17.6 %. Pulp yield was reported to be 44.4 % in unscreened plant, while it was 43.8% in case of screened plant.[1-3]

The plant is considered to have medicinal value in many traditions across Asia. There are many ethnomedical uses of Bambusa vulgaris, which are not clinically proven. In Java, water stored in golden bamboo tubes is used as a cure of various diseases. In the Congo, its leaves are used as part of a treatment against measles; in Nigeria, an infusion of macerated leaves is taken against sexually transmitted diseases and as an abortifacient - the latter has been shown to work in rabbits.[1,2,4,5] It ethnomedical uses also include treatment of diarrhoea, fever, inflammations, ulcers and wounds.[1,2] It is also used to control vomiting, hyperdipsia and burning sensation. It helps to cure cough, bronchitis, asthma, asthmatic bronchitis. It is used in syphilis, ophthalmic and hemorrhage.[1,2]

The present work was taken up to conduct phytochemical analysis of plant and its different extracts, so that a scientific validation of the ethnomedical claims can be made.

MATERIALS AND METHODS

Materials

Leaves of *Bambusa vulgaris* were collected in Kangra District (Himachal Pradesh, India) during the month of March 2010. All the chemicals, solvents and reagents used in the present study were of AR grade and were purchased from SD Fine Chem, Mumbai (India).

Authentication of Plant

The collected plant was authenticated by Forest Research of India, Dehradun (Uttarakhand, India). A voucher specimen is preserved in the Department for future use.

Determination of Pharmacognostic Parameters

The leaves of the plant were subjected to determination of physicochemical parameters like loss on drying, total, acid insoluble, water soluble ash values and extractive values using methods reported earlier.[6,7]

Preparation of Extracts

The collected material was dried at room temperature under shade for 15 days, and then it was converted into coarse powder using grinder. The air-dried leaves were ground to a fine powder, defatted with Petroleum ether, and macerated with chloroform, ethyl acetate, methanol and water successively to give chloroform extract (CE), ethyl acetate extract (EAE), methanol extract (ME), and water extract (WE). The extracts were collected separately and reduced to a small volume under reduced pressure.[6-9] The yield of different extracts was determined and represented as percentage with respect to dry weight of the plant material.

Phytochemical Screening of Various Extracts

Fluorescence analysis of the different successive extracts was carried out under sunlight and ultraviolet light as reported by Chase and Pratt (1949).[10] The presence of various chemical constituents in plant extracts was determined using different qualitative tests for different phytoconstituents such as alkaloids, carbohydrates, flavonoids, phytosterols, terpenoids, proteins, and phenols.[7-9]

RESULTS AND DISCUSSION

Preliminary studies were undertaken for standardization. The LOD value was found to be 7.3%. Different ash values were found to be 8.5% (total ash), 3.3% (acid insoluble ash), and 5.0% (water soluble ash) (Table 1). The total ash value was relatively low, which may be due to low content of carbonates, phosphates, silicates and silica. Ash values are useful in determining authenticity and purity of drug and they also serve as important quantitative standards.

Table 1. LOD and different ash values of *B. vulgaris*

Parameter	Resultant values (%)
Loss on drying	7.3 ± 0.152
Total ash	8.5 ± 0.170
Water soluble ash	5.0 ± 0.123
Acid insoluble ash	3.3 ± 0.251

The mean values of different solvent extractives are shown in Table 2. Extractive values were highest in water and alcohol indicating the possibility of considerable amount of polar compounds in the leaves of the plant.

Table 2. Different extractive values of *B. vulgaris*

Solvent	Extractive values (% w/w)
Pet. Ether	3.5 ± 0.182
Chloroform	6.6 ± 0.231
Ethyl acetate	1.4 ± 0.193
Methanol	4.1 ± 0.298
Water	7.5 ± 0.166

The yields of different extracts are given in Table 3. Fluorescence characters of different extracts with various reagents were noted in ultraviolet and sun light and the results are given in Table 4. Preliminary phytochemical screening of different extracts indicated high concentration of alkaloids, flavanoids, terpenoids and phytosterol (Table 5). These studies provide referential information for correct identification and standardization of this plant material.

Table 3. Percent yield of successive extracts of *B. vulgaris*

Solvents	Yield by cold maceration (%)	Yield by hot extraction (%)
Petroleum ether	3.0 ± SD	3.5 ± 0.171
Chloroform	2.5 ± SD	4.0 ± 0.211
Ethyl acetate	2.5 ± SD	3.8 ± 0.107
Methanol	3.5 ± SD	4.5 ± 0.165
Water	4.0 ± SD	4.8 ± 0.193

Table 4. Fluorescence analysis of various extract of *B. vulgaris*

Extracts	Sunlight	Ultraviolet light
Petroleum ether	Greenish yellow	Light green fluorescence
Chloroform	Green	Green fluorescence
Ethyl acetate	Dark green	Light green fluorescence
Methanol	Dark green	Green fluorescence
Water	Brown	Light brown

Table 5. Results of Phytochemical screening of successive extraction of *B. vulgaris*

	Components						
Extract	Alkaloids	Carbohydrates	Flavonoids	Phytosterols	Terpenoids	Protein & amino acids	Phenols
Pet. Ether	+	-	-	-	-	-	-
Chloroform	+	-	-	+	+	-	-
Ethyl Acetate	+	+	-	-	+	-	-
Methanol	-	+	+	+	-	-	+
Water	-	+	+	-	-	-	+

+ indicates the presence of constituents, - indicates the absence of constituents

CONCLUSION

From the results of present study, various preliminary standards for crude drug *Bambusa vulgaris* as well as its extracts were obtained which can serve as standards for identification of this plant material.

DECLARATION OF INTEREST

It is hereby declared that this paper does not have any conflict of interest.

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Received: Apr 08, 2014; Revised: Apr 14, 2014; Accepted: Apr 17, 2014

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