



Anti Diabetic Activity of Leaves Extract of *Bambusa Arundinacea*

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Abstract As an alternative medicine to treat diabetes mellitus, many herbal drugs are being studied throughout the world. In the present study, an attempt was made to investigate the anti-diabetic activity of *Bambusa Arundinacea*. Leaves extracts in different dosages (200, 500 and 600 mg/kg b.w.) in alloxan induced diabetic albino rats. The drug was administered orally for 20 days in different groups of animal, with each group containing 6 animals. The efficacy of this drug was compared with the diabetic rats. The blood glucose level of different groups was studied. Our study clearly showed that significant ($P < 0.05$) anti-diabetic activity in diabetic animals.

Keywords Antidiabetic activity, *Bambusa Arundinacea*

Introduction

Diabetes mellitus is a metabolic disorder affecting carbohydrate, fat and protein metabolism. It represents a heterogeneous group of disorders having hyperglycaemia, which is due to impaired carbohydrate (glucose) utilization resulting from a defective or deficient insulin secretory response [1]. To date there are different groups of oral hypoglycaemic agents for clinical use, having characteristic profiles of side effects [2]. Management of diabetes without any side effects is still a challenge to the medical system. This leads to increasing demand for natural products with antidiabetic activity and less side effects. Indian traditional medicine is one of the richest medicinal systems among those available around the world. Long before the use of insulin, since the time of Charaka and Sushruta, indigenous remedies have been in use for the treatment of diabetes mellitus. In accordance with the recommendations of the WHO expert committee on diabetes mellitus [3] an investigation of hypoglycaemic agents of plant origin used in traditional medicine seems important. Many herbs and plant products have been shown to have hypoglycaemic action [4].

Bambusa Arundinacea is the member of **Graminae (Poaceae)** family. Bamboos differ from other members of the grass family by the presence of branches at each node. A bamboo Culm consists of internodes (which is hollow for most bamboo) and a node, which is solid and provide structural integrity for the plant. At the node are one or more buds (depending on the species) which produce side branches [5]. A common bamboo found distributed throughout the moist parts of India, up to an altitude of 1250 m particularly near river banks, in Central and South India ascending up to 1100 m on the Nilgiri, also cultivated in many places in North-West India and Bengal [6].

The bamboo's lifespan is not very long only about 20 years, and it flower once every 7 to 20 years, depending on the species. Interestingly, all the bamboo of a particular species will flower at exactly the same time, regardless of their geographical location. Being a very versatile plant, bamboo grows in a lot of different climates- it can be found on all the continents except Antarctica. [7] Tensile strength of bamboo is superior to mild steel, and a weight-to-strength ratio better than graphite, bamboo is the strongest growing woody plant on earth. [8]

In India and China, bamboo has also been used for medicinal purposes. Covering nearly 9 million hectares of land, Indian bamboo accounts for 36 % of the world's bamboo [9,10]. Some of bamboo species are: *Acidosasa edulis*, *Bambusa bambos*, *Bambusa vulgaris*, *Phyllostachys nigra* (Black Bamboo), *Lophatheri gracilis*, *Coniogramme japonica*, *Phyllostachys pubescens*, *Rhapsis excelsa* and *Phyllostachys bambusoides* [11,12]. Leaves as well as young shoots are often used for preparing delicious soups and pickles. It is highly nutritious [13]. Adult culms are useful for the production of high quality charcoal along with the fibers which are ideal for paper and pulp



production. Because of a high growth rate (typically matures within 5–7 years) plus a number of important fuel characteristics such as low ash content, alkali index or heating value, bamboo is a promising energy crop for future [14]. Commonly known as Wans, Vanskapur(Guj.), Bamboo, Bamboo manna (Eng.), Bans-lochana, Banz (Hindi), Bans-kapur, Baansh (Beng.), Vanshalochana (Sans.), Tabashir (Arab), Bansa, Baambii (Marathi) [15].

Active Constituents: Bamboo plant has unusually high level of Acetylcholine which acts as a neurotransmitter. Other constituents are Cholin, betain, hydrate of silicic acid nuclease, urease, proteolytic enzyme, cyanogenetic glycoside, alkaloid, Vitamin C, Flavonoids, Hydrocyanic acids, Glutelin protein and Benzoic acid are active constituents [16-18]. The silicious substance found near the joint inside is a white camphor like crystalline in appearance, slightly sticky to the tongue and sweet in taste [19].

Shoot has active constituents are Oxalic acid, reducing sugar, resins, waxes, HCN, benzoic acid, diferuloyl arabinoxylanhexasaccharide, diferuloyl oligosaccharide, (5, 5'-di--(diferul-9, 9'-dioyl)-[α -L-arabinofuranosyl-(1 \rightarrow 3)-O- β -D-xylopyranosyl-9 (1 \rightarrow 4)-D-xylopyranose] (taxiphyllin) [20].

Seed contain arginine, cysteine, histidine, isoleucine, leucine, lysine, methionine, phenylamine, threonine, valine, tyrosine, niacin, riboflavin, thiamin.e Leaves mainly contain Protein, gluteline, contains lysine, methionine, betain, cholin, proteolytic enzyme, nuclease, urease [21].

Uses

Bamboo is the one kind of idle vegetable for its being pollution free, low in fat, high in edible fiber and rich in mineral element. Edible bamboo shoot is a traditional vegetable for many people [22-24]. Bamboo vinegar is also used as biofertilizer, bioinsecticide and as medicine for stomach disorder [25].

Root: root used in stimulate blood circulation, treatment of rheumatism, venereal disease and cancer, anxiety, fever, sleeping problems, general restlessness [26].

Shoot: Used stomach disorders, appetizer, in treatment of respiratory diseases, It also stimulate menstrual cycle. It also has anti cancer, anti microbial, anti inflammatory and anti oxidant properties [27].

Leaves: Antipyretic, Diuretic, head and chest colds, pharyngitis, Stomatitis, Arthritis, Haemoptysis, Febrifuge, Antileprotic, Counteracting spasmodic disorders and secretion of bleeding, Treat Diarrhea, Cooling tonic, Treatment of cough and asthma [28].

Stem: Used as splints in fracture, Stimulate menstruation, Sedative, Expectorant, Antitussive used for bronchial, cerebral infections, Used for vomiting and nose bleedings. [29]

Material and Methods

Plant

Healthy and fresh leaves of *Bambusa Arundinacea* were collected from Mohan Lal Sukhadia University Campus, Udaipur (Raj). The collected leaves were washed with tap water to remove the dust particles. The leaves were shade dried for 10 to 15 days then powdered by electric grinder.

Extract preparation

The powder was passed through sieve no.30 and stored in a container. The powder *Bambusa Arundinacea* leaves were packed in a Soxhlet apparatus and extracted with hydro alcoholic solvent for 12 hours. The obtained extract was dried at 35-40°C in hot air oven till solid/semisolid mass was obtained. The yield of the alcohol extract was approximately 15% of the powder. Extracts were stored in air tight container in refrigerator below 10°C. The suspensions of extracts were prepared by using normal saline as solvent for administration to experimental animals.

Animal selection

Healthy adult Wister rats of either sex weighing 150-180 g were selected for the study. The animals were housed with free access to food and water. Rats were starved 24 hr prior to the study.

Alloxan induced Anti-Diabetic Activity

Before starting the experiment, animals were separated according to their body weight. The animals were injected intra-peritoneally (i.p.) at a dose of 150 mg/kg b.w. alloxan monohydrate (S.D. Fine Chemicals Ltd., Boisar) freshly prepared in normal saline solution (Except normal control group i.e. Group I). After 4 hour of alloxan administration, animals were given feed ad libitum and 1ml of (100 mg/ml) glucose i.p. to combat ensuring severe hypoglycemia after 72 hr of alloxan injection; the animals were tested for evidence of diabetes by estimating their blood glucose level using glucometer (One touch, Johnson's & Johnson's). Diabetic animal selected for the experiment. And divided in three group. Group II (diabetic control), Group III (Extract treated 200 mg/kg) Group IV (Extract treated 500 mg/kg), and Group V (Extract treated 600 mg/kg). To the animals, the test extracts (200 mg/kg, 500 mg/kg and 600 mg/kg b.w. orally) were administered by preparing suspension in normal saline daily. The blood glucose level and body weight check on day 0th, 5th 10th and 20th day.



Statistical Analysis

All the values of the experimental results were expressed as mean±SEM and analyzed for ANOVA.

Result and Discussion

Preliminary phytochemical screening The preliminary phytochemical analysis of the extract of leaves of *Bambusa Arundinacea* shows presence of flavonoids, phenolic compounds, and glycosides.

Table 1: Phytochemical analysis of the leaves bark extract of *Bambusa Arundinacea*

Chemical Constituents	Chemical Tests	Result
Mucilages	Ruthenium red Test	Positive
	With aqueous KOH	Positive
Proteins	Xanthoprotic Test	Positive
	Ninhydrin's Test	Positive
Flavonoids	Shinoda Test	Positive
	Alkaline reagent Test	Positive
	Lead acetate Test	Positive
Saponins	Foam Test	Negative
	Froth Test	Negative
Tannins	Potassium dichromate ferric chloride Test	Positive
	Modified Borntrager's Test	Positives
Glycosides	Legal's Test:	Positive

Table 2: Effect of the *Bambusa Arundinacea* leaves EtOH extract on blood glucose level of alloxan-induced diabetic rats after treatment.

Treatment		Blood glucose mg/dl			
		0 day	5 th day	10 th day	20 th day
Group I	Normal Control	85±1.6	82±3.6	84±1.2	83±1.9
Group II	Diabetic control	299±3.4	301.2±2.6	306.2±1.6	310.2±2.6
Group III	EtOH extract (200 mg/kg)	284±2.3	123.6±2.8	119.2±3.1	115.2±3.5
Group IV	EtOH extract (500 mg/kg)	282±2.7	112.6±2.6	104±2.9	100±2.8
Group V	EtOH extract (600 mg/kg)	280±2.3	98±2.9	95±2.2	90±2.5

Data Analysis: Statical interpretation was calculated normal animal group evaluated with test control animal. ANOVA was calculated. $P \leq 0.05$ it was statically significant. The results were expressed as mean ± SD (n = 6).

Conclusion

On the basis of the current investigation, it could be concluded that the ethanolic leaves extract of *Bambusa Arundinacea* possesses phytochemicals i.e. flavanoids, glycosides tannins. The pharmacological studies of ethanolic leaves extract of *Bambusa Arundinacea* shows hypoglycemic activity in both normal and alloxan-induced diabetic animals. The traditional use of the plant to treat diabetes is supported by our research.

References

1. Reaven GM. Role of insulin resistance in human disease. *Diabetes* 1988; 37: 1597–1607.
2. Prout TE. In: Malaisse WJ Pirart, J (Eds.). *Proceedings VIII Congress of International Diabetes Federation*. Excerpta Medica, Amsterdam 1974: 162.
3. The WHO Expert Committee on Diabetes Mellitus *Technical Reports Series* 646. World Health Organization, Geneva. 1980.
4. Kameswara Rao B, Giri R, Kesavulu MM, Apparao Ch. *Herbal Medicines: In the treatment of diabetes mellitus*. Manphar Vaidya Patrika I. 1997; (4,5):33–35.
5. Shukla R, Sumit G, Sajal S, Dwivedi PK, Mishra A. Medicinal Importance Of Bamboo. *International Journal of Biopharm & Phytochemical Research*. 2012; 1(1): 9-15.
6. Anonymous. *The Wealth of India, Raw materials*. Council of Scientific and Industrial Research. New Delhi 1988; 2B: 1-38.
7. Mohmod AL, Tarmeze W, Ariffen W, Ahmad F. Anatomical features and mechanical properties of three Malaysian bamboos. *Journ. Trop. For. Sc.* 2. 1990: 227-234.



8. Ramyarangsi SI, Rao AN, Dhanarajan G & Sastry CB. Bamboo research in Thailand. Recent Research on Bamboo. CAF China and IDRC. 1985: 67-69.
9. Kirtikar KR, Basu BD. Indian Medicinal Plants. International Book Distributors, Dehradun. 1990; 4: 2724–2727.
10. Khare CP. Indian Medicinal Plants. An Illustrated Dictionary. Springer publication. New Delhi, India. 2007: 90.
11. Seedikkoyaa K, Azeezb PA, Abdul EA. Breeding biology of pond heron using *Bambusa Arundinacea*. Scientific Journal of Zoology. 2012; 1(3): 42-51.
12. Bahadur Bir, Lokendra Rao K & Madhusudan Rao M. Left and right handedness in seedlings of *Bambusa Arundinacea*. Wild. Curr. Science. 1978; 47: 584-586.
13. Das AN. Bamboo Research in Nepal. BAMBOOS Current Research. 1988: 1-5.
14. Boontawee B. Status of Bamboo Research and Development in Thailand. BAMBOOS Current Research. 1988: 12-14.
15. Eswarappa V and Bhatia SK. Naturally Based Biomaterials and Therapeutics. SpringerBriefs in Public Health. 2013: 15-16.
16. Choudhury D, Sahu K and Sharma GD. Biochemistry and Technology of Fermentation- a review. Indian Journal of Traditional Knowledge. 2012; 11(2): 242-249.
17. Chackol KC and Jayaraman MS. Effect of Container Size on Growth of *Bambusa Arundinacea* Seedlings. BAMBOOS Current Research. 1988: 96-98.
18. Thomas TP. Effect of N, P and K on Growth of *Bambusa Arundinacea* Seedlings in pots. BAMBOOS Current Research. 1988: 112-116.
19. Vaidya B. Some Controversial Drugs in Indian Medicine, Chaukhambha Orientalia, Varanasi. 1982: 203-207.
20. Rathod JD, Pathak NL, Patel RBG, Jivani NP and Bhatt NM. Phytopharmacological Properties of *Bambusa Arundinacea* as a Potential Medicinal Tree- An Overview. Journal of applied pharmaceutical science. 2011; 01(10): 27-31.
21. Chatterjee A., Pakrashi SC. The Treatise on Indian Medicinal plants, National Institute of Science communication, New Delhi. (2001); 6: 50-51.
22. Rabari D. Livestock Management: Herbal cure for diarrhoea, conjunctivitis and other ailments of livestock. National Innovation Foundation. 2002: 26.
23. Jayanetti DL. Some methods for preservative treatment of bamboo. The Sri Lanka Forester. 1975; 12: 101-103.
24. Sharma PV. Classical Uses of Medicinal Plants. Chaukhambha Visvabharati. 1996: 333.
25. Kigomo NB. Guide lines for growing Bamboo. Kenya Forestry Research Institute. 2007: 4.
26. Uthaman PK. Breeding of egrets in Kerala. Natural Hist. Society. 1990; 87 (1): 139.
27. Mukherjee AK, Saha SS. Casual observations on a heronry- a prospective site for a bird sanctuary. Newsletter Zoological Survey of India. 1976; 2(2): 40-43.
28. Mitchell CA, White DH, Kaiser TE. Reproductive success of Great Blue Herons Bull. Tex. Ornithol. Soci. 1981; 14 (1 & 2): 18-21.
29. Inderjit, Jarrod L, Pollock, Ragan M, Callaway and William Holben. Phytotoxic Effects of Catechin In vitro in Soil and in the Field. Plos ONE. 2008; 3(7): 1-11.

