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Original Research Article

ANTIDIABETIC ACTIVITY OF *BAMBUSA ARUNDINACEAE* ROOT EXTRACTS ON ALLOXAN INDUCED DIABETIC RATS

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ABSTRACT

Aqueous ethanolic solvent extracts of *Bambusa Arundinaceae* root (Bambsaceae) were tested for anti-diabetic activity using alloxan induced diabetic rats and compared with standard. The results expressed that aqueous ethanolic extracts had shown significant protection and maximum reduction in blood glucose was observed in alloxan induced diabetic rats. The results of this comprehensive study reveal that *Bambusa arundinaceae* seed shown statistically significant Anti-Diabetic activity in comparison to the standard glibenclamide.

Key words: *Bambusa arundinaceae* root, Antidiabetic activity, Alloxan, Glibenclamide.

INTRODUCTION

Herbs used for the treatment of disease and disorders in traditional treatment like ayurvedic, siddha etc. Diabetic mellitus is a chronic disorder is a major public heath problem in the developed as well as developing countries caused by partial or complete insulin deficiency, resulting in hyperglycemia leading to acute and chronic complications [1]. Synthetic drugs are likely to give serious side effects in addition they are not suitable for intake during conditions like pregnancy [2-4]. *Bambusa Arundinaceae* seeds are used in the treatment of ulcer and inflammation. The decoction of the sprouts is beneficial in anorexia, dyspepsia and worms[5]. Vamsarocana (bamboo manna) is useful in various disorders/diseases like hyperpiesia, diarrhea, vomiting, Rakta pitta, heart diseases, cough, asthma, fever, tuberculosis and a general tonic in convalescents. The leaves are cooling, emmenagogue, hence, beneficial in convalescents and dysmenorrhea [6]. The roots are diuretic, tonic, depurative, laxative and cooling and also used in skin diseases, burning sensation, arthralgia, general debility and dysuria. The fruits are salutary in diabetes whereas, the seeds are useful in obesity to reduce fats [7]. The decoction of roots is an antidote for arka (Calotropis procera) poisoning. The present work has been carried out to evaluate the antidiabetic effect of aqueous ethanolic extracts of *Bambusa Arundinaceae* root.

MATERIALS AND METHODS

Alloxan monohydrate and Glibenclamide (Sigma-Aldrich Company, St. Louis, Missouri, USA), Ascorbic acid (Universal laboratories, Mumbai), Hydrogen peroxide (S.S.Pharm Hanamkonda), Glucometer kit (Taidoc Technology Corporation, San-Chung, Taipei country, Taiwan) were procured from local market. The solvents and other chemicals were procured from E. Merck, Mumbai and they were of analytical grade quality.

Collection of Plant material

Dried seeds of *Bambusa arundinaceae* root were purchased from commercial supplier of rural Nalgonda, Andhra Pradesh, India. The seeds and plants were authenticated by Prof. Dr.K. Raju, Head of Department of Botany, Kakatiya University, Warangal, India.

Preparation of extract

The root of the plant were shade dried and made into coarse powder. It was extracted with aqueous ethanol in a Soxhlet apparatus for 72 hours. The concentrated material was reduced to a thick mass at room temperature and water was removed by placing it on water bath. The weight of the dried material was recorded and used for experimental study [8].

Experimental animals

Albino Wistar rats (180-230 g) of either sex were fed with a standard diet and water ad

libitum. The animals were housed in spacious polypropylene cages bedded with rice husk. The animal room was well ventilated and maintained under standard experimental conditions (Temperature 27^{0}C and 12 hours light / dark cycle) throughout the experimental period. Animal experiments were carried out following the guidelines of the animal ethical committee of the institute.

Acute toxicity test

Aqueous ethanolic extracts of seed of *Bambusa arundinaceae* root were screened for acute toxicity, following the standard method (OECD/OCDE No: 425). Albino rats of either sex weighing 180-200gm were used in this study. Animals were maintained on normal diet and water prior to and during the course of experiment. The dose of aqueous ethanolic extract was prepared with 5% acacia and was administered orally. The acute toxicity was tested at the doses of 300 and 2000mg/kg. Evaluation of antidiabetic activity of seed of *Bambusa Arundinaceae root* fed alloxan induced diabetic Wistar rat.

Antidiabetic activity

Albino Wister rats (180-230g) of either sex were randomly divided in to 6 groups (6 rats/group) and were fasted overnight (18hrs). Animals in-group I were treated with acacia (5%) as control, remaining groups animals were treated with freshly prepared aqueous solution of alloxan monohydrate in a dose of 150mg/kg body weight through intraperitonial route [9,10]. Then 5% dextrose was administrated to combat the immediate hypoglycemia. Group II kept as a diabetic control. After 18 hrs, Group III animals treated with standard glibenclamide (600µg/kg b.w) through oral route, even Group IV, V, VI and animals were treated with 50, 100 and 200 mg/kg of seed of *Bambusa Arundinaceae* of aqueous ethanolic extract respectively through oral route. Blood samples were taken from the tail vein at 0, 1, 2, 3, 4, 5 and 6 hrs. The blood glucose concentration was measured by using glucometer and noted [11].

Statistical Analysis

The data was statistically analyzed by one-way ANOVA followed by Dunnett multiple comparison test with equal sample size. The difference was observed as significant when $p<0.01$. All the values were expressed as mean ± standard deviation (S.D.). Glucose level was observed at dose of 200 mg/kg of aqueous ethanol extracts of root of *Bambusa arundinaceae*

RESULTS

Table.1.Anti diabetic activity of aqueous ethanolic *Bambusa arundinaceae* root extracts

Interval	**Group-I**	**Group-II**	**Group-III**	**Group-IV**	**Group-V**	**Group-VI**
	Normal control	Alloxan induced control	Glibenclamide (600µg/kg)	Bambusa arundinaceae root (50mg/kg)	Bambusa arundinaceae root (100mg/kg)	Bambusa arundinaceae root (200mg/kg)
0 hr	116±4.02	224±5.65	231±8.02*	255±.24	239±6.12	237±0.01*
1hr	109±0.09	217±3.6	224±0.21*	233±5.56	229±4.62	222±2.4*
2hr	114±7.05	209±6.11	193±9.56**	219±4.71	193±2.97	189±8.34
3hr	112±5.73	201±6.66	132±1.07**	18+±7.09*	172±4.98	153±5.86
4hr	104±3.85	198±7.45	125±9.01**	168±5.23	140±2.84	139±4.90*
5hr	110±6.90	186±6.87	109±3.83**	148±2.71	126±4.06	118±6.03
6hr	107±5.71	176±7.75	90±2.06**	124±1.08*	115±6.93*	107±4.09*

n=6; values expressed as mean ± S.D * p<0.01, ** p<0.001

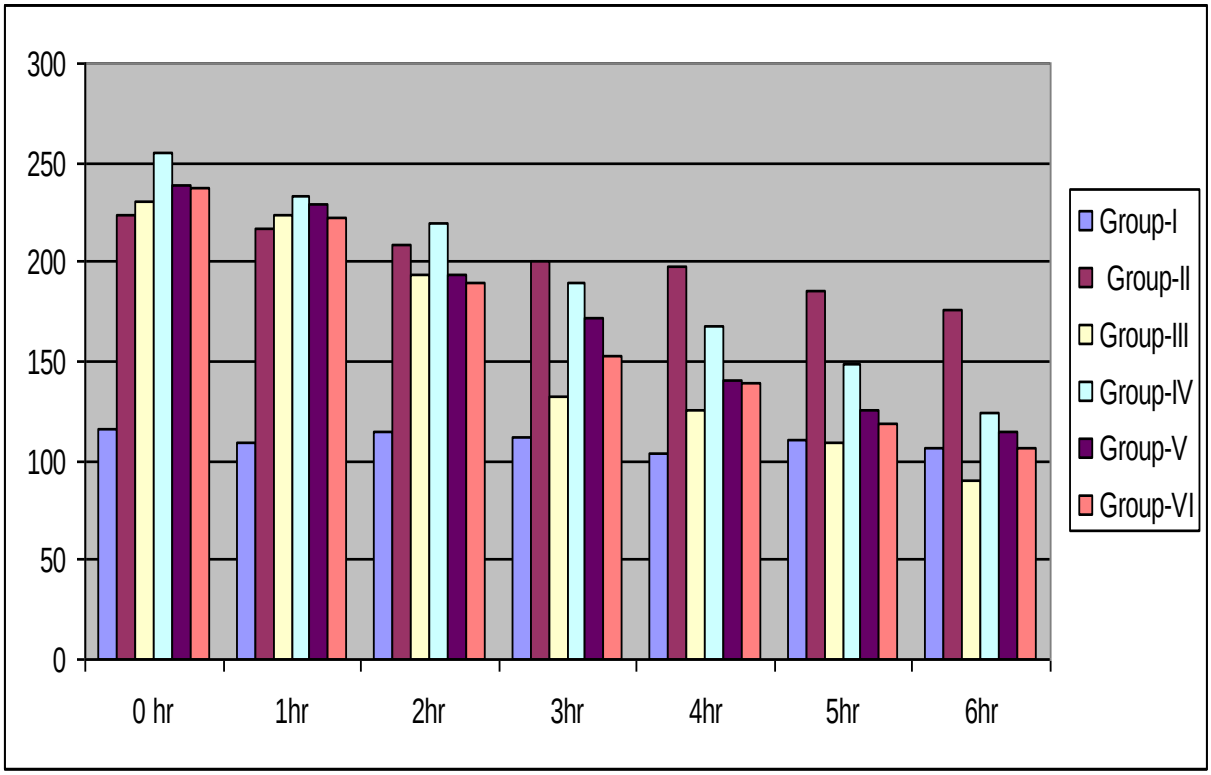

Fig.1.Antidiabetic activity of aqueous ethanolic *Bambusa arundinaceae root* extracts

DISCUSSION

Based on the acute toxicity studies, the dose of seed extracts was selected for further studies. Table 1 and figure 1 represents the evaluation of antidiabetic activity in root of *Bambusa Arundinaceae* (50, 100 and 200mg/kg) aqueous ethanolic extracts and Glibenclamide fed alloxan induced diabetic model (Wistar rats) shown the changes in the levels of blood glucose in groups. Aqueous ethanolic *Bambusa Arundinaceae* seed extract has shown maximum reduction in blood glucose level which calculated by comparing the blood glucose level at 6th hr with the blood glucose level at 0 hr of its respective groups based on the dose. The finally percentage reduction of blood glucose represented 200mg/kg concentrated aqueous ethanolic extract has shown maximum reduction in blood glucose as compared to control than other concentrations of *Bambusa Arundinaceae* root extracts. Group II, III, IV, V and VII showed suppression of blood glucose level at 6 hrs significantly ($p<0.01$) compared to zero hour to its respective group. In this study, 200mg/kg of aqueous ethanolic *Bambusa Arundinaceae seed* extract significantly ($p< 0.01$) suppressed blood glucose. Alloxan (beta cytotoxin) includes diabetes in a wide variety of

animals by damaging the insulin secreting beta cell resulting in a decrease in endogenous insulin release, which paves the ways for the decreased utilization of glucose by the tissues. The significant anti diabetic activity of seed *Bambusa Arundinaceae* may be due to inhibition of free radical generation and subsequent tissue damage induced by alloxan or potentiation of plasma insulin effect by increasing either pancreatic secretion of insulin from existing beta cells or its release from as indicated by significant improvement in glucose and protein level because insulin inhibit gluconeogenesis from proteins.

CONCLUSION

In conclusion, our findings show that chloroform *root of bambusa arundinaceae* extract reduction on blood glucose may be due to several flavanoids, glycosides present within the extract. More studies are required to ascertain the compounds and its mechanism of action, thereby providing a natural hyperglycemic control treatment, and thus decrease risk for diabetes, cardiovascular diseases. However, further studies are needed before *bambusa arundinaceae* can be used safely as food additives

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