IJBPAS, September, 2022, 11(9): 4377-4382

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

ANTIDIABETIC ACTIVITY OF STEMS OF *CASSIA JAVANICA* LINN IN ALLOXAN INDUCED DIABETIC RATS

JAIN BV* AND MD. RAGEEB MD. USMAN

Smt. Sharadchandrika Suresh Patil College of Pharmacy, Chopda, Maharashtra, India

***Corresponding Author: Dr. Bharat V. Jain: E Mail: bharatjain2006@gmail.com**

Received 19th Oct. 2021; Revised 25th Nov. 2021; Accepted 1st Feb. 2022; Available online 1st Sept. 2022

https://doi.org/10.31032/IJBPAS/2022/11.9.6426

ABSTRACT

Objective: The aim and objectives of this research work carried out to evaluate the antidiabetic activity of ethanol extract of stems of *Cassia javanica* Linn. **Methods:** Aqueous extract of stems of *Cassia javanica* Linn studied on alloxan induced diabetic rats as two different doses were studied. **Results:** Both extract showed significant reduction in the blood glucose level. Concurrent histopathological examination of pancreas of these animals showed comparable regeneration by aqueous extracts (lower and higher dose) which were earlier, necrosed by alloxan. **Conclusion:** The Aqueous extracts also showed improvement in parameters like body weight and lipid profile as well as regeneration of β-cells of pancreas in diabetic rats. Histopathological studies reinforce the healing of pancreas, by methanolic *Cassia javanica* extracts, as a possible mechanism of their antidiabetic activity.

Keywords: Antidiabetic activity, stems, *Cassia javanica* Linn, Alloxan induced diabetic, aqueous extracts, Glibenclamide

INTRODUCTION

Diabetes is a disorder of the chemical reaction that is necessary for proper utilization of carbohydrates, fats and protein from the diet, along with inadequate secretion or lack of insulin. Insulin is a hormone produced by the pancreas to regulate the amount of sugar in the blood **[1]**.

Diabetes is the seventh leading cause in U.S. About 1-2% of the adult population has diabetes mellitus even though various types of diabetes may have different pathogenetic mechanism and metabolic characteristics, along term complication in blood vessels, kidneys, eyes and nerves occur in all types and are the major causes of morbidity and mortality in diabetes **[2]**.

Cassia javanica, also known as Java cassia, pink shower, apple blossom tree and rainbow shower tree (family Fabaceae). *Cassia javanica* Linn. is a beautiful garden tree that belongs to family Leguminosae. It is cultivated throughout India for beautiful pink blossoms **[3-4]**. Previous literature provides information about therapeutic uses of the plant. Bark of Cassia javanica is used as one of the ingredients in antidiabetic ayurvedic formulation **[5]**. Stems are proved to be active against Herpes simplex infection **[6]**. Stems are reported to contain variety of secondary metabolites, such as, flavones, sterols, several hydrocarbons, anthraquinone, glycosides etc **[7-8]**. Among these flavones, glycosides and sterols are considered to be antidiabetic compounds **[9-10]**. The presence of these antidiabetic phytochemicals of *Cassia javanica* stems may give desired pharmacological action. As there are no scientific data available regarding antidiabetic effects of stems, it felt relevant to assess bioactivity of stems of *Cassia javanica*.

MATERIAL AND METHOD

Plant material:

The plant specimens for the proposed studies were collected from in the deep forest of Satpuda hills with the help of forest officers of Chopda Tahsil, Dist. Jalgaon, Maharshtra (India) in the month of Dec. 2020 care was taken to select healthy plants and for normal organs. The plant was authenticated by Prof. (Dr.) Priyanka A Ingle, scientist, BSI (Botanical Survey of India), Pune (M.S.). The stms of the plant were dried under and then coarsely powdered with help of mechanical grinder. The powder was passed through sieve no. 40 and stored in an airtight container for further studies. Extraction was carried out by cold maceration process for 72 hr.

Animals

Male wistar rats weighing about 150-180 gm were procured from listed suppliers of Venkataswara Enterprises, Bangalore, India selected. The animals were kept under a conventional light regimen at room temperature (about 25^0 C) and humidity.

Animals were housed in polypropylene cages and were allowed free access to standard laboratory feed and water. All the animals have been divided into five groups and placed in separate cages, each consisting of six animals. The animals were acclimatized to the laboratory condition for one week before the onset of experiment.

Sample Collection

The blood samples were collected for the measurement of blood glucose level from the tail vein and estimated using electronic glucometer (on-call now) and glucostix.

Experimental Design

Alloxan monohydrate (BDH) 150-mg/kg body weights were dissolved in normal saline and injected intra peritoneally after 18 hrs. Fasting to induce hyper- glycemic group **[11-12].**

After one hour of alloxan administration the animals were fed on standard pellets and water *ad libtum.* The experimental animals were fasted for 18 hr. before alloxan injection. The blood glucose level (BGL) was monitored after alloxanization in blood sample collected by tail tipping method using a glucometer. After 72 hr. the rats having BGL above 150 mg/dl of blood were selected for the study and the animals were divided into five group and each group contained 6 rats.

Group-I served as normal and received normal saline solution. Group-II recieved alloxan monohydrates (150 mg/kg). Group III and IV received alloxan and *Cassia javanica* Linn. stems aqueous extracts (400 and 800 mg/kg P.O.). Group V recieved standard antidiabetic drug Glibenclamide (0.5 mg/kg P.O).

The blood glucose levels were monitored after initial 3, 6 and 12 hr. of administration of a single dose of the extract and at the end of initial 3, 6 and 12 days for prolonged treatment. On the 12th day all the animals were sacrificed by over dose of ether anesthesia. The whole pancreas from each animal was removed after sacrificing the animal and collected in 10% formaline solution and immediately processed by the paraffin technique section of 5 micron thickness were cut and stained by haematoxylin and eosin (H and E) for histological examination. The photomicrographs of histological studies are presented in **Figure 1**.

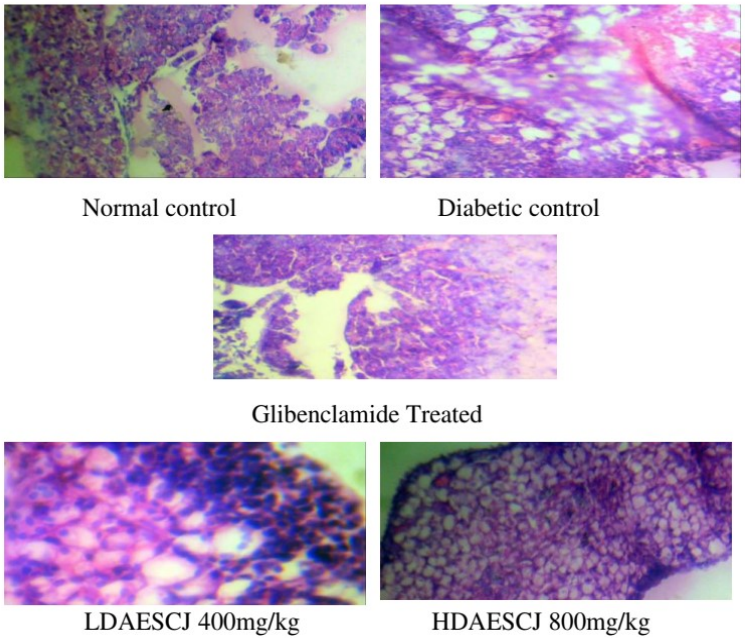

Figure 1: Histopathology of pancreas

Statistical Analysis

Dunnett's multiple comparison test, was carried out and * $P < 0.5$ was considered as significant. Groups were compared with control group.

RESULTS

The hypoglycemic effect of aqueous extract of stems of *Cassia javanica* Linn. was investigated in alloxan induced diabetic rats and the results are expressed in **Table 1 and 2.**

The BGL of fasted rats were measured at initial 3rd, 6th and 12th hours and initial 3rd, 6th and 12th day after treatment with Glibenclamide and aqueous extracts when compared with standard drug Glibenclamide.

CONCLUSION

Based on the literature survey and information obtained about it medicinal use in folkore medicine. This plant was selected. The phytochemical and pharmacological studies were done on the stems of *Cassia javanica* Linn. The stems of the plant were separated, dried and powdered and extracted by cold maceration. In these extract the phytochemical constituents were identified by chemical test and these test showed the presence of many active component like tannins, saponins, phenolic compound sterol, flavonoid, glycoside and phytosterols.

Since aqueous extract of stems of *Cassia javanica* Linn. showed the presence of many phytoconstituents, it was selected for the pharmacological study.

The antidiabetic activity was evaluated by using alloxan induced diabetic rats. Since the aqueous extract of stems of *Cassia javanica* Linn. Showed significant antidiabetic activity, thus it can be suggested that formation of insulin should have been increased by the extract.

Since the present study revealed that the stems of *Cassia javanica* Linn. was found to possess significant antidiabetic activity when compared to standard drug. These factors support the use of the plant in traditional folklore medicine.

Table 1: Effect of *Cassia javanica* Linn. on blood glucose level in alloxan induced diabetic rats

Groups	Treatment	Change of BGL of alloxan induced diabetic rats after single treatment (mg/dl)			
		1hr	3hr	6hr	12hr
Normal	D/W 10ml/kg P.O	74.333± 2.227**	75.333 ± 2.044**	75.667 1.994**	75.000 1.862**
Diabetic control	D/W 10ml/kg P.O	399.50± 1.408**	402.83± 1.327**	409.50 1.204**	418.83 1.108**
Positive control	Glibenclamide 0.5mg /kg P.O	379.67± 1.542**	373.00 ± 2.280**	364.67 2.525**	347.33 1.726**
Lower dose of Aqueous extract	400 mg/kg P.O	393.33± 1.838 **	390.33 ± 1.944*	387.33± 1.687**	381.67± 1.838**
Higher dose of Aqueous extract	800 mg/kg P.O	385.50± 1.607 **	377 .33± 2.330**	371.33.± 2.654*	358.83± 2.023**

n = 6; *P <0.5, **P = P <0.01 Vs control
Values are expressed as mean ± SEM when compared with control.
(one – way ANOVA followed by Dunnett's multiple comparision test)

Table 2: Effect of *Cassia javanica Linn*. On blood glucose level of alloxan induced diabetic rats after 12 days of treatment in mg/dl

Groups	Treatment	Change of BGL of alloxan induced diabetic rats after 12 days of treatment in mg/dl			
		Initial	3rd	6th	12th
Normal	D/W 10ml/kg P.O	74.833± 2.227	75.667± 2.667	82.167± 2.151	76.000± 2.309
Diabetic control	D/W 10ml/kg P.O	399.50± 1.408**	434.33± 1.358**	451.83± 1.887**	479.00± 1.265**
Positive control	Glibenclamide 0.5mg /kg P.O	379.67± 1.542**	305.50± 1.688**	264.67± 2.951**	117.00± 2.683**
Lower dose of Aqueous extract	400 mg/kg P.O	393.33± 1.838*	378.00± 3.751*	304.67± 1.994**	186.00± 2.033**
Higher dose of Aqueous extract	800 mg/kg P.O	385.50± 1.607*	319.33± 2.011**	286.17± 1.447**	145.67± 2.333**

n = 6; *P <0.5, **P = P <0.01 Vs control
Values are expressed as mean ± SEM when compared with control.
(one – way ANOVA followed by Dunnett's multiple comparision test)

REFERENCE

[1] Savitri Ramaiah, diabetes, an essential and informative guide to diabets, reprint 2004, New Delhi-110 020 Page 1-22.

[2] Prakash Ghadi, Pathophysiology for pharmacy, second edition, 2001, Nashik, P-258-259.

[3] Kirtikar KR, Basu BD: Indian Medicinal Plants. Vol. 4. Dehradun, India: Oriental Enterprises 2001; 4, 1226-1227.

[4] Blatter E, Millard WS: Some Beautiful Indian Trees, Bombay Natural History Society. 2nd ed. Oxford: University Press 1997; pp. 27–9.

[5] Joshi CS, Ekambaram SP, Venkataraman S: Acute and subacute toxicity studies on the polyherbal antidiabetic formulation Diakyur in experimental animal models. J Health Sci. 2007; 3:245-9.

[6] Cheng H, Yang C, Lin T, Shieh D, Lin C. ent-Epiafzelechin- (4 alpha→8)- epiafzelechin extracted from Cassia javanica inhibits Herpes simplex virus type 2 replication. J Med Microbiol. 2006; 55:201-6.

[7] The Wealth of India: Raw Materials. Vol. 3. New Delhi: Publication and Information Directorate, CSIR 1992; Anonymous; pp. 345–6.

[8] Rastogi RP, Mehrotra BN. Compendium of Indian Medicinal Plants. Vol. 5. New Delhi: Central Drug Research Institute, Lucknow and National Institute of Science Communication 1993; pp. 175-6.

[9] Dhanabal SP, Mohan Maruga Raja MK, Ramanathan M, Suresh B. Hypoglycemic activity of Nymphaea stellata leaves ethanolic extract in alloxan induced diabetic rats. Fitoterapia, 2007; 78: 288-91.

[10] Neeli GS, Kute SH, Girase GS, Karki SS, Shaikh MI. Hypoglycemic effect of leaves of Lawsonia alba in alloxan induced and euglycemic rats. Indian Drugs 2007; 44:561-3.

[11] World Health Organisation Expert Committee on diabetes mellitus. Tech Rep. series 1980.

[12] Yanarday R. Colak H. Effect of Churd (*Beta vulgari* L *Vas cicla*) on BGL in normal and alloxan induced diabetic rabbits. Pharm Pharmacol comno 1998; 4:309-11.