Available online on 25.12.2017 at http://jddtonline.info

Journal of Drug Delivery and Therapeutics

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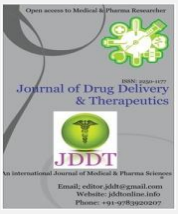

Open Access Research Article

Pharmacological Assessment of Antidiabetic Potential of Hydroalcoholic Extract of *Cassia fistula* Linn. in Streptozotocin-induced Diabetic Rats

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ABSTRACT

Major public health problem "diabetes" is approach*ing* epidemic proportions globally and increasing at alarming rate all over the world. The Medicinal plants of India plays important role in the management of diabetes as they possess potent activity against diabetes. The present study protocol is aimed to evaluate antidiabetic activities of hydroalcoholic extract of *Cassia fistula* pod in streptozotocin-induced diabetic rats. Diabetes was induced in the rats by single intraperitoneal administration of Streptozotocin (60 mg/kg b.wt.). *C. fistula* pod extract at three different doses (100, 200 and 500 mg/kg b.wt./day) were administered orally with for 30 days to diabetic rats. The results were compared with standard drug glibenclamide (5 mg/kg b.wt./day) treated rats. The results showed that streptozotocin treated diabetic control rats suffered with decrease in the body weight and glycogen content in the liver as well as significant increase in the blood glucose and glycosylated hemoglobin (HbA1c) levels as compared to normal control rats. Oral administration of *C. fistula* pod extract or glibenclamide to diabetic animals for 30 days increased body weight and hepatic glycogen content and significant reduction in the blood glucose and HbA1c levels and as compared to diabetic control rats. The present results and study showed that *C. fistula* pod possess significant antidiabetic activity.

Cite this article as: Malviya S, Vyas N, Joshi A, Kharia A, Malviya N, Pharmacological Assessment of Antidiabetic Potential of Hydroalcoholic Extract of Cassia fistula Linn. in Streptozotocin-induced Diabetic Rats, Journal of Drug Delivery and Therapeutics. 2017; 7(7):168-169

INTRODUCTION:

As per quoted in diabetic atlas of the International Diabetic Federation, 382 million people were affected by diabetes worldwide in the year 2013 and diabetes prevalence is expected to 592 million by the year 2035. According to World Health Organization projection of that diabetes will be the 7th leading cause of death in 2030. Diabetes mellitus (DM) is a chronic complicated metabolic disorder characterized by increased blood glucose level resulting from the defects in insulin secretion, insulin action, or both. *Cassia fistula* Linn. Caesalpiniaceae is an ornamental plant cultivated throughout India widely used for its medicinal properties. In traditional system of medicines pods of *C. fistula* has been recommended as anticancer, antifertility, antihyperlipidemic, anti-inflammatory, antioxidant, antimicrobial, hepatoprotective and also used for the treatment and management of diabetes[1]. Henceforth the present study was designed to evaluate the antidiabetic efficacy of hydroalcoholic extract of *C. fistula* pod in streptozotocin induced diabetic rats.

MATERIAL AND METHODS:

Fresh pods of *C. fistula* were collected, dried powdered and subjected to soxhlet extraction at 60°C-70°C for 12 h. The extract was suspended in water before administering to experimental animals. The Adult, healthy, rats of Wistar strain weighing 170-200 g were used in the present study. The animals were maintained as per guidelines of the Committee for the Purpose of Control and Supervision of Experiments on Animals. The study was approved by the Animal Ethical Committee of the Modern Institute of Pharmaceutical Sciences, Indore (1509/CPCSEA/2011).

Induction of Diabetes

Overnight fasted rats were induced diabetes by a single intraperitoneal injection of streptozotocin (STZ) at a dose of 60 mg/kg body weight dissolved in citrate buffer (pH 4.5). To prevent initial drug induced hypoglycemic mortality STZ treated animals were given 2% glucose solution for 24 h after 5 h of STZ injection. The diabetic rats used in the study were having blood glucose level above 240 mg/dl.

Experimental design

The rats were divided into six groups, consisting of six animals each

Groups	Treatment
Group I	Normal rats- treated by vehicle (Positive Control)
Group II	Diabetic rats- treated by vehicle (Negative Control)
Group III	Diabetic rats- treated by extract 100 mg/kg b.w
Group IV	Diabetic rats- treated by 200 mg/kg b.w
Group V	Diabetic rats- treated by 500 mg/kg b.w
Group VI	Diabetic rats- treated by glibenclamide standard drug (5mg/kg b.wt./day)

Duration of study was 30 days and all treatments were given by oral route. After 24 hours of the last treatment, animals of different groups were weighed and autopsied under mild ether anesthesia. Blood was collected directly by cardiac puncture of which 2 ml was added to an anticoagulant vial for the estimation of parameters in blood[2]. The vital organs from each rat were dissected out, cleaned off from adherent fat and blood clot and weighed on a digital electronic balance. Blood glucose levels and body weights of experimental rats were determined at 6 day interval for a period of 30 days. Glycosylated hemoglobin (HbA1c) was estimated by glycohemoglobin reagent set (Accurex Biomedical Pvt. Ltd. Mumbai, India) and total hemoglobin (Hb) concentration by using Sahli's apparatus[3, 4].

RESULTS AND DISCUSSION:

As compared to initial body weight of experimental animals, the mean body weight of the rats of positive control group was significantly increased by 9.23% while the mean body weight of negative control rats was significantly decreased. Diabetic rats treated with different doses of extract exhibited duration dependent significant increase in the mean body weight when compared to their initial body weight but it was comparatively less than that of positive control rats. Significant increase in body weight was observed in rats of group V after 10 days ($p \leq 0.05$, 4.37%), 20 days ($p \leq 0.05$, 10.96%) and 30 days ($p \leq 0.001$, 13.26%) as compared to their initial body weight (0 day). In group VI, the body weight gain was recorded as 9.51% ($p \leq 0.05$), 12.43% ($p \leq 0.01$) and 16.40% ($p \leq 0.001$) respectively after 10, 20 and 30 days of treatment period as compared with their initial body weight (0 day). Experimental animals of Group I showed sustained blood glucose level throughout the experimental period. In contrast to this, continuous increase in fasting blood glucose levels was recorded in negative control rats (group II) by 10.55% ($p \leq 0.05$), 14.72% ($p \leq 0.05$) and 17.30% ($p \leq 0.01$) respectively after 10, 20 and 30 days of experiment period as compared with their corresponding values on 0 day. The reduction in blood glucose level observed in the *C. fistula* extract (100, 200 and 500 mg/kg) treated rats on 30 days treatment duration was 40.52%, 45.79% and 52.31% respectively. In Group VI, the significant decrease in fasting blood glucose level ($p \leq 0.001$) by 54.46%, 62.40 and 63.48% respectively after 10, 20 and 30 days.

In Group II significant decrease in the levels of hepatic glycogen and total hemoglobin (Hb) with a concomitant significant ($p \leq 0.001$) increase in the percentage of glycosylated hemoglobin (HbA1c) in blood as compared to normal control rats (group I). The significant increase in the levels of hepatic glycogen [group III ($p \leq 0.05$), group IV, V and VI ($p \leq 0.001$)] and total Hb level in blood [group IV ($p \leq 0.01$), group V and VI ($p \leq 0.001$)] in diabetic rats treated with different doses of *C. fistula* pod extract or glibenclamide when compared to negative control rats. In contrast to this, the percentage of HbA1c in blood was significantly decreased [group III ($p \leq 0.05$), group IV, V and VI ($p \leq 0.001$)] as compared to negative control rats.

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