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Original Article

ANTIDIABETIC ACTIVITY OF *ASYSTASIA GANGETICA* (L.) T. ANDERSON FLOWER EXTRACT IN STREPTOZOTOCIN INDUCED DIABETIC RATS

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ABSTRACT

Objective: *Asystasia gangetica* has long been used in the antiasthmatic medicinal preparations of traditional healers Nigeria of South Africa, in India the plant is being used for treating diabetes and microbial infections. The present study was evaluated for antidiabetic activity of *A. gangetica* flower ethanol extract (AGFEE) in streptozotocin induced diabetic rats.

M**ethods:** Diabetes was induced by 45 mg/kg STZ and after STZ induction; the hyperglycemic rats were treated with the extract orally at the dose 250 mg/kg body weight daily for 45 d. Antidibetic activity measured by blood glucose, insulin, hemoglobin, glycosylated hemoglobin levels. The oxidative stress was measured in liver and kidney by level of antioxidant markers i.e. lipid peroxidation (LPO), superoxide dismutase (SOD), glutathioneperoxidase (GPx), catalase (CAT) vitamin C and vitamin E and the lipid profile were also studied.

Results: The extract produced significant reduction in blood glucose level and increase insulin level as compared with the diabetic rats and also reduced total cholesterol (TC), triglycerides (TG), low-density lipoprotein (LDL) and increased high-density lipoprotein (HDL) levels in STZ-diabetic rats. It also significantly obliterated the increase in the levels of GPx, SOD and CAT activities in both liver and kidney. The levels of vitamin C and vitamin E were significantly augmented in extract treated diabetic rats in comparison with control group.

Conclusion: This study concludes that the antidiabetic effect of AGFEE proved the folkloric use for various treatments. Further investigations on identification and characterization of the active compounds to carried out.

Keywords: *Asystasia gangetica*, Streptozotocin, Insulin, β-cells, Diabetes

INTRODUCTION

Diabetes mellitus is a metabolic disorder characterized by hyperglycemia with impaired metabolism of carbohydrates, fat and proteins due to defects in insulin secretion, insulin action or both which may lead to the complications like atherosclerosis, cardiac dysfunction, retinopathy, neuropathy, and nephropathy [1, 2]. *In vivo* models provide valuable evidences in understanding the pathological mechanisms of diabetes and are useful for the screening of drugs for the prevention and treatment of diabetes. STZ is a commonly used chemical to generate diabetic animals in the laboratory for insulin-dependent diabetes mellitus characterized by high fasting blood glucose levels and a drastic reduction in plasma insulin concentration [3]. Oxidative stress is a major problem observed during diabetes induced by the generation of free radicals. The increase in the levels of reactive oxygen species and free radicals cause damage in the biological structures and also cause microvascular and macrovascular complications, cardiovascular diseases, kidney and nerve damage [4]. Several antioxidants of plant origin have been evaluated for their antioxidant property to protect the biological system against oxidative stress in diabetes. In addition plant secondary metabolites such as phenols, flavonoids and alkaloids are reported in preventing the formation of reactive oxygen induced diseases [5].

Medicinal plants have always been an exemplary source of drugs and many of the currently available drugs have been derived directly or indirectly from them. *Asystasia gangetica* (L) T. Anderson (Acanthaceae) is a fast growing, spreading, perennial herb, plant is used in ethnomedicine for the treatment of heart pains, stomach pains, rheumatism, while in Nigeria, the leaves are popularly used in the treatment of asthma [6]. In India, the plant is being used for rheumatism and the sap is applied to swellings [7]. In Tamil Nadu, the plant root paste is used for skin allergies [8]. It reported to is use as a folk remedy for the treatment of diabetes mellitus in parts of south India [9]. Till today no studies reported on the diabetic activity of flowers of *A. gangetica,* therefore in the present study, we evaluated antidiabetic activity of AGFEE in streptozotocin induced diabetic rats.

MATERIALS AND METHODS

Extraction of plant sample

The plant sample was collected from surrounding area of Karpagam University campus, Coimbatore, Tamil Nadu, India and was identified as *A. gangetica* (L.) T. Anderson (Acanthaceae) by Botanical Survey of India, Coimbatore (Voucher specimen number BSI/SRC/5/23/2011-12/Tech-667). Flowers were dried at room temperature for 2 w and ground into powder. Dry powder (200 g) was dissolved in 1000 ml of ethanol and kept in a rotary shaker for 72 h. The extract was filtered; the filtrate was concentrated in a room at 40 °C for 24 h and stored at 4 °C for further use.

Animals

Rats weighing (150-200 g) were maintained under standard conditions of humidity temperature (28±2ºC) and light (12 h light/dark). The animals were housed in polypropylene cages (45×24×15 cm) and were handled according to the university and institutional legislation, regulated by the ethical committee (Regd. No. 739/03/abc/CPCSEA).

Experimental induction of diabetes

The male albino Wistar rats weighing (150-200 g) were made diabetic by intraperitoneal injections of STZ. The animals were allowed to fast for 24 h and were given STZ injection (45 mg/kg bw), with freshly prepared aqueous solution of citrate buffer as a vehicle, pH 4.5. The control animals received buffer alone. STZ treated animals were allowed to drink 5% glucose solution overnight to overcome drug induced hypoglycemia. After 72 h of STZ administration, the blood glucose range above 250 mg/dl were considered as diabetic rats and used for the experiment.