

EFFECT OF *ERYTHRINA SENEGALENSIS* EXTRACT ON SERUM GLUCOSE CONCENTRATION IN ALLOXAN INDUCED DIABETIC RATS AFTER A TREATMENT PERIOD OF 14 DAYS

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Abstract

On evaluation, the hypoglycaemic effects of *Erythrina senegalensis* extract on albino wistar rats were established. The experimental animals were treated with graded doses of *Erythrina senegalensis* extract for a period of 14 days after inducing diabetes with alloxan in 0.1M sodium citrate buffer. All the groups treated with *Erythrina senegalensis* extract (100mg/kg, 150mg/kg and 200mg/kg body weight) became normoglycaemic (4.69 ± 0.29 mmol/L, 4.64 ± 0.34 mmol/L, and 4.38 ± 0.29 mmol/L) respectively when compared with the diabetic control (7.37 ± 0.49 mmol/L, $p < 0.05$), and had significantly improved glucose tolerance.

Recently, the use of herbs has become a more popular option of medication (Bucci, 2000). Investigations into the biological and chemical activities of plants have yielded compounds possessing hypolipidemic, hypoglycaemic, antiplatelet, antitumor or immune stimulating properties for the development of synthetic organic chemistry (Suffness and Douros, 1982; Baker *et al*, 1995; Bucci, 2000). In different herbs a wide variety of active phytochemicals including flavonoids, terpenoids, lignins, polyphenols, carotenoids, coumarins, saponins, plant sterols and organic sulphur compounds have often been identified (Winston, 1999). Of these phytochemicals, flavonoids are frequently

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found in plants with hypoglycaemic actions while glycosides and phytosterols are frequently active constituents found in hypoglycaemic inducing plants (Winleman, 1989).

For good reason, diabetes has been called disorder of the very engine of life. When the body cannot metabolize glucose, a number of vital mechanisms can break down, sometimes with life-threatening consequences. Diabetes mellitus refers to a number of disorders that share the cardinal characteristic feature of elevated blood glucose levels (Olefsky, 2001), due to absolute or relative deficiencies of insulin (Haslett *et al*, 1999), with a significant impact on the health, quality of life and life expectancy of patients as well as the health care system (Dey *et al*, 2002). Diabetes mellitus represents a syndrome with disordered metabolism of carbohydrate, protein, and fat. However, the most clinical feature is hyperglycaemia with fasting plasma glucose level > 7.1 mmol/L or glycosylated haemoglobin A1c (Gba1c) > 6.9 per cent (Dey *et al*, 2002).

Medicinal herbs with antihyperglycaemic activities are increasingly sought for in the treatment of diabetic patients. This led to an increase in the use of plant extract in the management of the disease (Dey *et al*, 2002). *Erythrina senegalensis* (referred to as Usiere-Efik, in Cross River State of Nigeria), has been evaluated to possess suppressive activity against *Plasmodium berghei*, and analgesics capability (Saidu, *et al* 2000), antibacterial activity and hence contain active bacteriocides (Kone *et al*, 2004). However, few traditional antidiabetic plants have received scientific or medical scrutiny to assess their efficacy and *Erythrina senegalensis* is one of them.

Materials and Methods

Experimental Animals

Thirty (30) albino rats of *wistar* strain weighing between 180-230 grams, were obtained from the animal house of the College of Medical Sciences, University of Calabar, Calabar, Nigeria, after approval for the study was obtained from the College of Medical Sciences Ethical Committee. The rats were randomly placed into five groups; one normal control, one diabetic control, and three test groups. Each group consisted of six rats. The dose administered by gavage were 100, 150, and 200 mg/kg body weight in a distilled water volume of 0.5ml twice daily to experimental animals in group II, III, and IV respectively for 14 days. The control groups (normal control and diabetic control) were gavaged 0.5ml distilled water twice daily for 14 days. The animals were fed on commercial rat chow obtained from livestock feeds, Aba, Nigeria. The animals were housed in stainless steel cages at room temperature of $27 \pm 2^{\circ}\text{C}$ and were quarantined for a 7-day period prior to introduction of the extract. All the test and control animals had free access to food and tap water throughout the experimental period after which they were sacrificed and their blood samples collected for analyses.

Preparation of Extract

Fresh leaves of *Erythrina senegalensis* were obtained from Ikot Ene in Akpabuyo Local Government Area of Cross River State, Nigeria, where they are planted as hedges. The leaves were identified at the botanical garden of the University of Calabar, Calabar, Nigeria and were subsequently sun-dried for 48 hours. Dried *Erythrina senegalensis* leaves were then blended and extracted using methanol as solvent. The extract was subsequently concentrated to about 10 per cent of its original volume.

Collection of Blood Samples

Whole blood obtained by cardiac puncture from each animal was collected in EDTA containers and allowed to stand for 60 minutes to clot before being centrifuged at $300 \times g$ for 10 minutes. The serum was extracted and stored at 4°C for subsequent analysis for glucose levels. The glucose levels were determined using the enzymatic oxidation kit in the presence of glucose oxidase (Barham and Trinder, 1972).

Results and Discussion

Serum glucose levels were measured at the end of the experimental period of 14 days. The results (Fig.1) show that serum glucose concentrations in animals treated 100mg /kg body weight (4.38 ± 0.29 mmol/L), 150mg/kg body weight (4.64 ± 0.34 mmol/L), and 200 mg/kg body weight (4.38 ± 0.29 mmol/L) were not significantly different ($p > 0.05$) from the serum glucose concentration of the normal control animals (4.44 ± 0.29 mmol/L). However, when the respective groups were compared to the diabetic control (7.37 ± 0.49 mmol/L) the serum glucose levels of the various test groups (groups I, II, III, and IV were significantly lower ($p < 0.05$).

Effect of Erythrina Senegalensis Extract on Serum Glucose Concentration in Alloxan Induced Diabetic Rats after A Treatment Period of 14 Days

Key:

- I = Normal control (distilled water)
- II = 100mg/kg body weight *E. senegalensis* extract
- III = 150mg/kg body weight *E. senegalensis* extract
- IV = 200mg/kg body weight *E. senegalensis* extract
- V = Diabetic control (Distilled water)

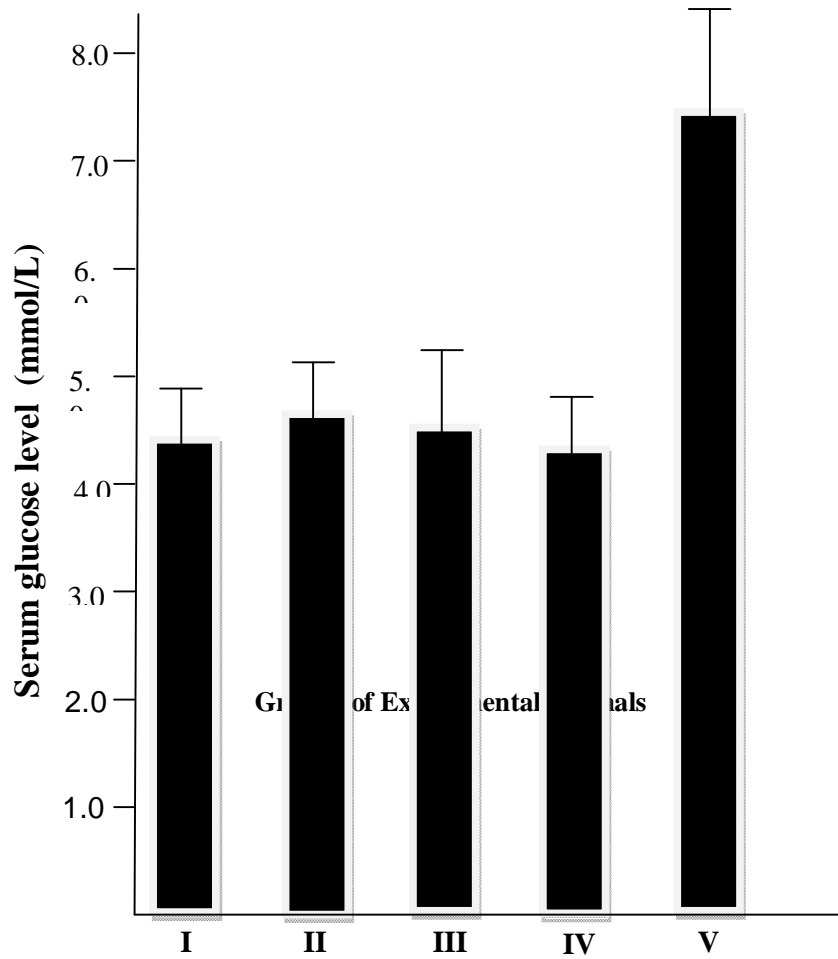


FIG. 1: Effects of *Erythrina senegaensis* extract on serum glucose concentrations (mmol/ L), in alloxan induced diabetic rats after a treatment period of 14 days.

References

- Baker, J. T., Borris, R. P., Carte, Cordell, G. A., Soejarto, D. D., Cragg, G. M., Gupta, M. P., Iwa, M. M., Madulid, D. R. & Tyler, V. E. (1995). Natural product drug discovery and development: New perspective on international collaboration. *Journal of Natural Products*, 58, 1325-1357.
- Barham, D. J. & Trinder, P. (1972). Blood glucose assay. *Analyst*, 72, 142.
- Bucci, L. B. (2000). Selected herbal and human exercise performance. *American Journal of Clinical Nutrition*, 72, 624-636.
- Dey, L. Attele, S. A. & Yuan, C. S. (2002). Alternative therapies for type 2 diabetes. *Alternative Medical Reviews*, 7 (1), 45-48.
- Haslett, C., Childers, E. R., Hunter, J. A. & Boon, N. A. In Davidson *principles and practice of medicine* (18th ed.). Churchill Livingstone, N Y. 1999.
- Kone, W. M., Atindehou, K. K., Terreaux, C., Hostettman, K., Traore, D. & Dosso, M. (2004). Traditional medicine in north Cote-d'voire: Screening of 50 medicinal plants for antibacterial activity. *Journal of Ethnopharmacology*, 93, 43-49.
- Olefsky, J. M. Insulin resistance and pathogenesis of NIDDM. Cellular and molecular mechanism. In Olefsky, J. M. (Ed.), *New concepts in the pathogenesis of NIDDM*. Plenum publishers, New York. 1999. pp.32-56.
- Saidu, K., Onah, J., Orisadipe, A., Olisola, A., Wambebe, C. & Gammel, K. (2000). Antiplasmodial and analgesic and anti-inflammatory activities of aqueous extract of stem bark of *Erythrina senegaleusis*. *Journal of Ethnopharmacology*, 71 (1), 273 – 280.
- Suffness, M., & Doures, J. (1982). Current status of plant and animal products programme. *Journal of Natural Products*, 45, 1-14.
- Winleman, M. (1989). Ethnobotanical treatments of diabetes in Baja. *Medical Anthropology*, 11, 255-268.
- Winston, J. C. (1999). Health promoting properties of common herbs. *American Journal of Clinical Nutrition*, 70, 491-499.