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BLOOD GLUCOSE LOWERING EFFECT OF AQUEOUS LEAF EXTRACTS OF *AGERATUM CONYZOIDES* IN RATS.

N. Nyunai^{ab*}, Njifutie Njikam^b, Catherine Mounier^c, Philippe Pastoureau^d

^aLaboratoire d'Endocrinologie et de Radioéléments, Institut de Recherches Médicales et d'Etudes des Plantes Médicinales, B.P. 3805 Yaoundé, Cameroun ^bLaboratoire de Physiologie animale, Faculté des Sciences, Université de Yaoundé 1, B.P. 812 Yaoundé. Cameroun ^cLaboratoire de lipogénèse hépatique, Université du Québec à Montréal, 1200 St Alexandre, Montréal, Québec, Canada H3B 3H5 ^dInstitut de Recherches Servier, 11 rue des Moulineaux, 92150 Suresnes, France

E-mail : nyunain@yahoo.fr

Abstract

This study was undertaken to investigate the effect of aqueous extracts from leaves of *Ageratum conyzoides* (300mg/kg) on blood glucose in normoglycemic and streptozotocin-diabetic rats. The extract was administered orally and the blood glucose level was measured hourly for 4h. The hypoglycaemic activity was evaluated by comparing with the initial blood glucose level. In streptozotocin-diabetic rats, the aqueous extract from leaves of *Ageratum conyzoides* showed a significant reduction of blood glucose level of 9.5% after 1hour and 21.3% after 4 hour.

Key words: *Ageratum conyzoides*, glucose lowering effect, streptozotocin-diabetic rats

Introduction

It is well known that the incidence of diabetes mellitus is high all over the world. Different types of oral hypoglycaemic agents such as biguanides and sulphonylurea are available alongside insulin for the treatment of diabetes mellitus (Holman and Turner, 1991). Their uses are, however, associated with side effects (Kameswara et al, 1997; Valiathan, 1998). There is a growing interest in herbal remedies because of their effectiveness, minimal side effects in clinical experience and relatively low costs. Herbal drugs or their extracts are prescribed widely, even when their biologically active compounds are unknown. Even the World Health Organization (WHO) approves the use of plant drugs for different diseases, including diabetes mellitus. Therefore, studies with plant extracts are useful in order to establish their efficacy, mechanism of action and safety. Medicinal plants used in diabetes were reviewed recently (Shukla et al, 2000; Grover et al, 2002).

Ageratum conyzoides L., (Asteraceae), is an annual herbaceous plant with a long history of traditional medicinal uses in several countries of the world and also reputed to possess varied medicinal properties (Okunade, 2002) including the treatment of wounds and burns (Durodola, 1977). In Cameroon and Congo, it is used traditionally to treat fever, rheumatism, headache, and colic (Menut et al, 1993; Bioka et al, 1993). Some other communities use the plant as an antibiotic, antidysenteric and antilithic agent (Borthakur and Baruah, 1987). Phytochemical studies revealed many bioactive compounds such as flavonoids (Vyas and Mulchadani, 1986), free amino acids (Amal et al, 1998), alkaloids (Trigo et al, 1988 ; Wiedenfeld and Roder, 1991), coumarins (Ladeira et al, 1987), essential oils (Jaccoud, 1961), terpenes (Ekundayo et al, 1988) and chromenes (Gonzales et al, 1991).

It has also been reported that the whole plant or leaves of *A. conyzoides* L. are used in Reunion to treat diabetes (Lavergne and Véra, 1989). Hence our interest in determining the effect of the aqueous extracts of *A. conyzoides* on blood glucose level in normoglycaemic and streptozotocin-diabetic rats.

Table 1: Effect of *Ageratum conyzoides* leaf aqueous extracts 300 mg/kg, p.o. on plasma glucose levels in normal and streptozotocin-induced (55 mg/kg, iv.) diabetic rats.

Treatment	Time (min)	Glucose ^a (mg/dl)		Reduction (%)	
		Normal	Diabetic	Normal	Diabetic
	0	54.4 ±7.1	318.2 ±6.8	0	0
<i>Ageratum conyzoides</i> (300mg/kg body weight)	60	72.2 ±6.3*	287.8 ±17.5*	-32.7	9.6
	120	56.4 ±4.8	250.4 ±28.0**	-3.7	21.3
	180	56.2 ±1.3	255 ±34.1*	-3.3	19.9
	240	52 ±4.1	250.4 ±31.5*	4.4	21.3

^a Values are expressed as mean ± S.E.M.; n=5 for each group. Statistically significant differences are compared to the corresponding zero time value; * $P < 0.01$, ** $P < 0.001$ vs. control (initial values); Students *t*-test.

Materials and Methods

Chemicals

Streptozotocin was purchased from Sigma-Aldrich Co Ltd, United Kingdom.

Animals

Male Wistar albino rats weighing 180-230g were used in the present study. They were maintained on standard laboratory diet and tap water *ad libitum* at the Animal house of Institute of Medical Research and Studies of Medicinal Plants, Yaoundé, Cameroon. Prior to the experiment, the animals were subjected to fasting for 16 h but allowed free access to water.

Induction of experimental diabetes

Diabetes was induced by a single intravenous injection of a freshly prepared streptozotocin (STZ) solution (55mg/kg body wt.) in acidified saline solution. Control animals received only the acidified saline solution. Diabetic rats were those with persistent fasting blood glucose more than 200mg/dl, 72h after injection of streptozotocin. Animals which received only acidified saline solution served as the negative control.

Plant material and extract preparation

A. conyzoides fresh leaves were collected in the city of Yaoundé (Cameroon) at Kodengui quarter in February 2005 and authenticated by a Botanist, Mr. NANA Victor in National herbarium in Yaoundé. A voucher specimen N°19050/SFR/Cam was deposited in the National herbarium, Yaoundé. The dried leaves (138g) were soaked in 2.25l of distilled water, heated for 30 min, allowed to cool slightly at room temperature and then filtered. The filtrate was dried in an air convection oven at 55°C to obtain aqueous dry extracts. The yield was 29% (w/w) of the dried plant powder.

Measurement of plant activity

Normoglycaemic (n = 5) and diabetic rats (n = 5) were used after 16h of fasting. Rats received a single oral dose of extracts dissolved in distilled water 10ml/kg body wt. using a gastric tube. Blood glucose levels were measured before oral administration of the extract and at 60, 120, 180 and 240 min after. Blood was then collected from the tail vein and the glucose level was measured with a glucometer, Glucotrend®2 (An Accu-Chek system of the Roche Group Germany, Roche diagnostics GmbH D-68298 Mannheim, Germany) in all animals. Blood glucose levels at each time were compared to the corresponding zero time value. The results of the experiments are expressed as the mean \pm SEM. Statistical analysis was performed by student's t-test. A p value of less than 0.001 was considered to be significant.

Results and Discussion

The oral administration of 300mg/kg of aqueous extracts of the leaves of *A. conyzoides* caused a reduction in the blood glucose level of diabetic rats by 21.31% after 4h and did not have any effect on normoglycaemic rats. The decreased glucose level in diabetic rats clearly showed the antihyperglycaemic effect of the leaves and seem to justify the claim of the traditional healers. However, the dose, 300mg/kg body weight was selected after observations of behaviour during preliminary acute toxicity tests. Further studies are needed to confirm the hypoglycaemic activity of this plant and to evaluate its potential in the treatment of diabetes.

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