

Effect of Dry Powdered Leaves of *Loranthus bengwensis* L. (African Mistletoe) on Blood Pressure and Electrolyte Level of Normal and Hypertensive Rats

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Abstract: Work has been done to determine the effect of *Loranthus bengwensis* supplemented diet on food intake, blood pressure and electrolyte levels in normal and hypertensive rats. Consequently, sixteen albino rats were divided into four groups of four each. The first group were fed on growers mash only (control), the second group on 92% growers mash and 8% NaCl (salt loaded group) the third on 8% NaCl, 8% mistletoe powder and 84% growers mash (salt loaded and mistletoe group) while the fourth on 8% mistletoe powder and 92% growers mash (normal and mistletoe group). The weight changes, daily food intake, faecal output, systolic and diastolic mean arterial and pulse pressures of the animals in various groups were recorded. The Na⁺, K⁺, Cl⁻ and HCO₃⁻ levels were determined. Results indicate that rats in the salt loaded group had significantly higher systolic, diastolic and mean arterial pressures (P<0.05) but significantly lower pulse pressure (P<0.05) compared with control rats. Rats in the salt loaded and mistletoe group and normal and mistletoe group had lower systolic pressure and lower pulse pressure compared with control rats. Rats fed with salt loaded diet and salt loaded with mistletoe powder had higher Na⁺ and Cl⁻ levels compared with control but the K⁺ and HCO₃⁻ concentrations did not differ significantly (P<0.05) from those of control rats. Rats in the three groups recorded higher food intake and faecal output but lower weight gain compared to control rats. The results showed that *Loranthus bengwensis* significantly reduced (P<0.05) diastolic, systolic and mean arterial pressures as well as Na⁺ and Cl⁻ concentration but significantly reduced weight gain in normal and hypertensive rat.

Key word: Hypertensive • electrolyte • mistletoe • rats • salt- loaded

INTRODUCTION

Hypertension is the most important modifiable risk factor of cardiovascular disease. It is a disease of disordered auto-regulation of blood pressure [1]. Presently, drugs used for the management of the disease are imported and expensive prompting many Nigerians to seek alternative managements which includes the use of herbal preparations.

The use of plants or plant parts as source of medicines to treat different ailments and disease conditions is common to all tribes in the world. For example in 1996 alone, six of the top 20 pharmaceutical drugs sold were natural products and more than 50% of these were linked directly to natural product research [2].

Mistletoe preparations are commonly used in complementary medicines as anticancer agents [3] and in the management of diabetes mellitus [4, 5]. The aqueous

extract of the African mistletoe has been shown to evoke a concentration dependent contraction of the smooth muscle of the rabbit jejunum and guinea pig ileum [6]. The plant have also shown a wide spectrum of antimicrobial activities against certain multiple drug resistant bacterial and fungal isolates of farm animals [7].

The purpose of this work was to investigate the effect of the dry powdered leaves of the plant on the blood pressure, pulse and electrolyte level of normal and hypertensive rats and thereby investigates the pharmacological basis for the successful use of the plant in the management of hypertension by traditional medical practitioners in Nigeria.

MATERIALS AND METHODS

Collection of plant materials: The plant was collected from uselu, Egor local government area of Edo state in

the month of June 2006 with the help of a herbalist. It was identified and authenticated by Dr. S. Ayinde of the Department of Pharmacognosy, Faculty of Pharmacy, University of Benin, Benin city. A specimen has been preserved in the herbarium of the department for future reference.

The fresh leaves were air dried for a period of 2 weeks. They were ground to fine powder with the aid of a mechanical grinder. The dried powdered leaves were added to the daily diet of the rats in definite ratio.

Pharmacological evaluation: The animals were acclimatized for a week. They were divided into 4 groups of 4 animals each. They were fed with guinea growers mash produced by Bendel feed and flour mill limited.

The control group was fed with 100% growers mash. Group 2 were fed with 92% growers mash and 8% salt. Group 3 were fed with 84% growers mash and 8% salt and 8% of the powdered mistletoe leaves. Group 4 were fed with 92% growers mash and 8% of the powdered leaves.

The change in weight, food consumed and faecal output were recorded throughout the duration of the study. The blood pressures of the animals were taken via a pressure transducer based on the experimental procedure reported by Obiefuna [8].

The electrolytes levels of the plasma were determined by measuring the emission spectrum in a Beckman flame photometer. A diluted sample of the plasma was dispersed

in the mixture of gas flame (butane) and air. The energy emitted by excited particles in the flame passes through a filter and transforms to photocurrent in a photoelectric cell. The emitted light intensity is proportional to the strength of photocurrent that is electrolyte concentration.

Statistical analysis: All data were expressed as mean±SEM. The student's t-test was applied to determine the significance of the difference between the control and test groups. The least significant difference test was used to identify the significant treatment mean effects.

RESULTS AND DISCUSSION

Loranthus bengwensis has been used for the management of hypertension by herbalist in Nigeria. The diets of the rats were formulated in order to induce hypertension in the rats in Group 2 (salt loaded). High salt intake has been associated with a higher blood pressure level [9, 10]. Group 2 rats also showed an increase in body weight. This result is consistent with earlier reports that hypertension occurs more frequently in overweight than in underweight [11].

The rats fed with the powdered plant had an increase in food intake (Table 1). This suggest that the plant improves the palatability of the diet leading to an increase in faecal output (groups 3 and 4).

Elevated systolic blood pressure has been associated with hypertension [12]. There is an increase systolic

Table 1: Food intake and dry faecal output and weight gain of rats fed *Loranthus benginensis*

Group	Food intake	Faecal output	Weight gain
Control	86.03±5.36	35.73±3.46	16.63±3.43
Salt loaded	115.03±2.83	57.65±3.28	7.75±1.53
Salt loaded and mistletoe powder	99.17±3.77	51.09±3.67	2.10±2.63
Mistletoe powder	111.68±2.84	52.74±3.42	3.36±1.08

Table 2: Blood pressure of rats fed *Loranthus benginensis*

Group	Systolic pressure	Diastolic pressure	Mean arterial pressure	Pulse pressure
Control	127.0±10.33	93.30±11.3	104.50±0.6	33.67±4.8
Salt loaded	148.5±7.44	135.20±7.54	139.60±0.2	13.36±0.9
Salt loaded and mistletoe powder	114.1±10.63	97.70±10.19	103.20±0.1	16.40±1.6
Mistletoe powder	105.5±9.44	92.39±10.51	96.75±0.48	13.10±4.7

Table 3: Electrolyte levels of rats fed *Loranthus benginensis*

Group	Na ⁺	K ⁺	Cl ⁻	Hco ₃ ²⁻
Control	151.2±0.9	4.9±0.2	104.0±2.0	22.5±2.5
Salt loaded	187.5±0.8	5.7±1.1	183.5±1.0	25.5±0.5
Salt loaded and mistletoe powder	173.0±1.3	3.9±1.3	150.0±3.0	22.5±2.5
Mistletoe powder	144.0±1.3	3.2±1.3	100.0±4.0	21.5±1.5

blood pressure in the salt fed rats (group 2) (Table 2). The increased mean arterial pressure in group 2 rats is associated with high salt intake of the rats [13]. Thus any lowering of these parameters reduces the risk of hypertension. There was a significant reduction in the systolic and mean arterial blood pressures of rats fed with the plant (groups 3 and 4) when compared with control.

A significant ($P < 0.05$) decrease in Na^+ , K^+ and Cl^- in the electrolyte level of the rats in the test control group (group 3) was observed compared to those in the test group (group 2) (Table 3). This has shown that the plant promote the excretion of these ions from the blood. Hence the plant could have a cleansing effect on the blood by removing excess amount of Na^+ from the body which if left to accumulate could lead to increase in blood pressure and therefore hypertension.

CONCLUSION

The positive response on the antihypertensive properties of the African mistletoe plant justifies the traditional use of the plant in the management of hypertension. Further work will be carried out to identify and characterize the chemical components responsible for the pharmacological action using a bio-activity guided isolation techniques.

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