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Biochemical Evaluation of the Tradomedicinal Uses of the Seeds of *Persea americana* Mill., (Family: Lauraceae)

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Abstracts: The effects of the aqueous extracts of *Persea americana* seeds (Lauraceae) at different dose levels on weight, blood pressure, cholesterol, glucose, protein, albumin, urea, sodium and potassium levels have been determined, Twenty five (25) albino rats were divided into five groups of 5 rats each. The first group of rats were feed entirely on rats mash groups 2, 3, 4 and 5 were given 92g of rat mash and 8g of sodium chloride. While groups 3, 4 and 5 were given 200 mg/kg, 500 mg/kg and 700 mg/kg body weight dose levels of the aqueous extract daily, groups 1 and 2 were given equivalent volume of water. At the different dose levels aqueous extract of *Persea americana* seeds significantly reduced blood pressures of hypertensive rats compared to the hypertensive control (group 2). Although there were no significant ($P<0.05$) changes in weight gained, the crude extract also significantly ($P<0.05$) reduced cholesterol, glucose, urea and sodium levels compared with the hypertensive control. Protein and albumin levels were significantly increased, while potassium level was not significantly altered. These results demonstrate the antihypertensive, hypoglycaemic and cholesterol reducing tendency of *P. americana* seed extract.

Key words: Persea *americana* · Biochemical parameters · Seeds, Hypertension

INTRODUCTION

Some medicinal plants have been reported to possess antihypertensive property, examples are *Carica papaya* [1], *Allium sativa* [2], *Jatropha curcas* [3] among others. Extract of *Persea americana* seeds have been traditionally used to treat hypertension.

Persea americana is known as avocado, alligator pear or butter pear. It originates from Central America and has spread to most subtropical and tropical places. It is an evergreen tree that may reach 33 ft (10 m) and more. The small flowers are scented and the green skined fruits are well known and appreciated all over the world [4]. The seed contains 13.6% tannin, 13.25% starch. Amino acids in the seed oil are reported as: capric acid, 0.6; myristic, 1.7; palmitic, 23.4; stearic, 8.7; oleic, 15.1; linoleic, 24.1; linolenic, 2.5%. The dried seed contains 1.33% of a yellow wax containing sterol and organic acid. The seed and the roots contain an antibiotic which prevents bacterial spoilage of food [5].

Studies on the antimicrobial ability of an extract in avocado seed acetone determined that it has an antibacterial effect on *S. aureus, B. subtillis, Aspergillus glaucus* and *Penicillium notarum*, but it did not show any effects on *E. coli* and *Pseudomonas fluorescens* [6] The use of the aqueous decoction from seeds of *Persea americana* revealed that it has glycemic properties, which vary from one dose to another [7]. This work was done to justify the use of the seed of this plant in the treatment of hypertension, as well as its effect on some biochemical indices.

MATERIALS AND METHODS

Source of the Plant Materials: Fresh fruits of *Persea americana* Mill. were purchased from Oba market, Benin city, Edo state, Nigeria in March, 2008.

Preparation of Plant Extract: The seeds were removed from the fruit and chopped into smaller pieces; they were dried in an oven at 40°C for 3hrs. 2 kg of the seeds were homogenised using mortar and pestle. 500 grams of the powdered seeds was macerated in 2.0 L of distilled water and the homogenate was filtered several times through a

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sieve (Endecoffs London, Aperture 1.10 mm). The filtrate was concentrated to dryness with a rotary evaporator at reduced pressure. The concentrate was stored in the refrigerator until required for use in the experiment.

Experimental Design: Forty albino rats of wistar strain were acclimatised for two weeks after which, they were divided into 5groups of 5 rats each. The first group were feed entirely on rats mash while the other four groups were given 92 g of rat's mash and 8 g NaCl. Groups III, IV and V were administered 200 $mgkg^{-1}$, 500 $mgkg^{-1}$ and 700 $mgkg^{-1}$ body weight of extract while groups I and II were given equivalent volume of water. Daily measurements were made of weight, feed intake and faecal output.

The feed and drug were administered accordingly for five weeks after which the systolic and diastolic blood pressures of rats were taken using a double channel recorder (Gemini 7070). Blood samples were collected from the rats by cardiac puncture into containers with or without anticoagulants for various biochemical analysis.

Biochemical Analysis: Sodium and potassium levels were determined using the flame photometric method [8]. Cholesterol, glucose, protein, albumin and urea were estimated using diagnostic kits products of Randox Laboratories, (Crumlin, Co-Antrim Spain). Cholesterol was determined by the enzymatic endpoint method [9], protein by the biuret method [8], glucose by the glucose oxidase method, albumin by the bromocresol green method [10] and urea by the Urease-Berthetot method [11].

Statistical Analysis: All data were expressed as mean± SEM. The students' 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 mean effects.

RESULTS

There were no significant change in weight gained and feed intake of hypertensive rats and those hypertensive rats administered aqueous seed extract compared to the normal control (Table 1). Hypertensive rats (group II) had significant ($p< 0.05$) increase in mean systolic and diastolic blood pressures compared with normal control.

Although the blood pressures of rats administered aqueous extract of *P. americana* seeds were significantly ($p< 0.05$) higher than the normal control, they were however significantly lower compared with the hypertensive control (Table 2).

There were significant increases in glucose concentration of hypertensive rats compared to the normal control rats, a slight but significant reduction was observed on administration of the aqueous drug extract compared with the hypertensive control rats. Cholesterol levels of rats administered with 500 mg/kg and 700 mg/kg body weight of the seed extract were significantly ($p< 0.05$) reduced compared with the normal control, others were not significantly altered.

Protein and albumin concentration of the hypertensive rats were significantly ($p< 0.05$) reduced compared with the normal control rats, however, protein

Table 1: Weight gain, feed intake and faecal output of rats

Treatment	Weight gain (g)	Feed intake (g)	Faecal output (g)
Normal Control	19.30±3.1	62.70±5.2	34.30±5.6
Hypertensive rats (control)	15.00±2.9	62.70±4.4	37.50±8.9
Hyp. Plus 200 mg/kg	19.00±5.5	66.00±4.2	38.20±3.6*
Hyp. Plus 500 mg/kg	17.50±2.6	70.50±3.7*	36.00±4.1
Hyp. Plus 700 mg/kg	19.30±2.3	65.00±4.6	34.50±2.8

Results are expressed in mean± S.E.M * $p< 0.05$, significantly different from normal control, Paired t-test (n = 5), Hyp =. Hypertensive rats

Table 2: Effect of Aqueous extract of *Persea americana seeds* on blood pressure in rats

Treatment	Mean Systolic (mmHg)	Mean Diastolic (mmHg)
Normal Control	81.00±3.08	52.33±4.34
Hypertensive rats (control)	166.00±5.20*	128.60±4.16*
Hyp. Plus 200mg/kg	145.00±2.74*	76.68±5.65*
Hyp. Plus 500 mg/kg	125.10±3.54*	65.00±3.75*
Hyp. Plus 700 mg/kg	91.40±5.54*	56.56±4.74

Results are expressed in mean± S.E.M * $p< 0.05$, significantly different from normal control, Paired t-test (n = 5), Hyp =. Hypertensive rats

Table 3: Biochemical parameters in hypertensive rats administered with aqueous extract of *Persea americana* seeds

	Normal Contr	Hyp. Contr.	Hyp. + 200mg/kg	Hyp. + 500mg/kg	Hyp. + 700mg/kg
Cholesterol (Mmol/L)	0.78±0.2	0.78±0.1	0.75±0.2	0.64±0.1*	0.65±0.2
Glucose (Mmol/L)	4.84±0.8	8.00±1.5*	7.00±1.4*	7.05±1.5*	7.06±1.20*
Protein (g/L)	75.00±8.1	39.00±4.2*	75.00±2.5	79.00±6.1	79.10±7.2
Albumin (g/L)	35.00±8.7	12.00±4.1*	32.00±5.2	37.00±4.3	37.20±5.7
Urea (Mmol/L)	6.35±1.1	16.98±2.8*	11.28±1.5*	10.97±2.5*	9.10±1.8*
Sodium (Mmol/L)	150.00±5.8	164.80±3.5*	150.00±5.4	145.00±3.0	122.00±5.5
Potassium (Mmol/L)	4.80±0.8	4.00±1.2	4.40±0.8	4.2±0.7	4.1±0.8

Results are expressed in mean± S.E.M * $p< 0.05$, significantly different from normal control, Paired t-test (n = 5).

and albumin levels were not significantly altered in rats administered with the aqueous extract compared with the normal control. Serum urea levels of hypertensive rats and those hypertensive rats administered with the aqueous extract of *P. americana* were significantly higher than the normal control. Sodium levels were significantly higher in the hypertensive rats compared with the normal control, but the extract significantly reduced sodium levels in hypertensive rats in a dose dependent manner.

DISCUSSION

Five weeks after the administration of the different dose levels of the aqueous exract of *P. americana* seeds to hypertensive rats, results revealed significant reduction in blood pressure. Sodium, glucose and urea levels were significantly reduced compared to the hypertensive control rats. The extract also reduced cholesterol levels compared with the normal control suggesting a hypocholesterolemic effect. In addition, increased glucose, urea and sodium levels and reduced protein and albumin levels were observed in hypertensive rats compared with the normal control.

Various pathological and physiological changes have been reported in spontaneously hypertensive rats [12-14] that total protein excretion increase dramatically with age, with increase in blood pressure. Increased sodium levels were found to cause elevation of blood pressure in rats [15].

High urea levels and low protein levels in hypertensive rats may suggest a possible kidney malfunction if protein reduction is as a result of its excretion. Low albumin levels may also imply impairment in the synthesis of albumin by the liver. This study therefore justifies the use of aqueous crude extract of *P. americana* seeds in the treatment of hypertension and demonstrate its safe use at 200 mg/kg, 500 mg/kg and 700 mg/kg body weight of rats.

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