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EFFECT OF *HYPTIS SUAVEOLENS* ETHANOLIC EXTRACT ON THE PHYSIOLOGY OF ALBINO RATS

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ABSTRACT

The effects of *Hyptis suaveolens* (Linn) Piot ethanolic extract on the physiology of rats were evaluated. Rats were administered graded doses of air-dried powdered soxhlet ethanolic plant extracts. No mortality was recorded in acute toxicity testing when the animals were given between 100mg/kg and 140mg/kg body weight of the extract. However, rats given doses of 155mg/kg, 165mg/kg and 175mg/kg body weight exhibited some behavioural changes such as aggressive scratching of the body, apparent loss in body weight and drowsiness. The extract at 175mg/kg body weight produced a significant decrease in the level of packed cell volume (PCV), heamoglobin (Hb) concentration, red blood cell (RBC) and an increase in white blood cell (WBC). There was a significant dose dependent decrease in the values of cholesterol, triglyceride, creatinine and urea level of the tested rats compared to the control. The extract, apart from possessing anemic property also caused mild dilation and minimal congestion of central vein of the liver of rats administered 175mg/Kg compared to other groups.

Keywords: *Hyptis suaveolens*, ethanolic extract, physiology, albino rats.

Introduction

There is an increasing demand for medicinal plants and plant products as alternative to orthodox medicine especially in developing nations (Murray, 1994) and this has led to the intensive investigation
especially in the field of ethnomedicine. *Hyptis suaveolens* (Linn) Piot is one of the plants used in ethnomedicine and belong to the family *Lamiaceae*, commonly found in the tropics. In traditional medicine, various extract and decoctions of different parts of the plant are used to treat gastrointestinal disorders, headache and treatment of cut fresh wound (Azevedo, *et al.*,2001, Afolayan and Adebola, 1990). In Nigeria, due to its odoriferious nature, its leaves are often hung inside rooms to expel or render mosquitoes inactive. An infusion of the dried leaves is also drunk as a beverage and also to add scent to peppersoup. Recently, Akinloye (2003) reported potential toxic effects of the aqueous extract of the plant in rats. However, most of herbal preparations in Nigeria are done in alcoholic medium. Thus, there is the need to investigate the effects of different doses of ethanolic extract of *Hyptis suaveolens* (Linn) Piot on some physiological parameters in rats. This become necessary to access the potency of organic solvent like ethanol in extracting the plant crude extract and compare this with the aqueous extract findings of Akinloye (2003).

Materials and Methods

Plant sample

The fresh leaves of the plant were obtained from a local garden in Abeokuta, Ogun-state, Nigeria and were authenticated. They were dried and ground into powder.

Preparation of Ethanolic Extract

The plant materials were prepared according to the method described by Kamis *et al.*

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(2000) with slight modification. 30g of air-dried powdered sample were exhaustively soxhlet extracted in ethanol (500ml). The extract was then concentrated by evaporating to dryness and the percentage yield of the extract was determined using the formula:

% Yield (w/w)=Dry weight of extract X 100

Dry weight of powdered plant sample

Animal and Experimental Treatment

White albino wistar strain rats weighing between 120-150g were used for the experiments. The animals were divided into five groups of five rats each and were allowed free access to water and standard diet (Ladokun and Sons Feed, Nigeria) in well-ventilated plastic rat cages. Group 1 served as control while groups 2, 3, 4 and 5 were treated daily with 140, 155, 165 and 175mg/Kg body weight of the extract respectively for four weeks using orogastric tube. Animals were anesthetized 24 hours after the last treatment and blood collected for biochemical analysis. They were then dissected and the liver excised, washed in saline solution and stored in 10% formalin prior to histopatho-logical examination.

Table 1 : Mean Body weight changes in rats administered different doses of ethanolic extract of *Hyptis suaveolens*.

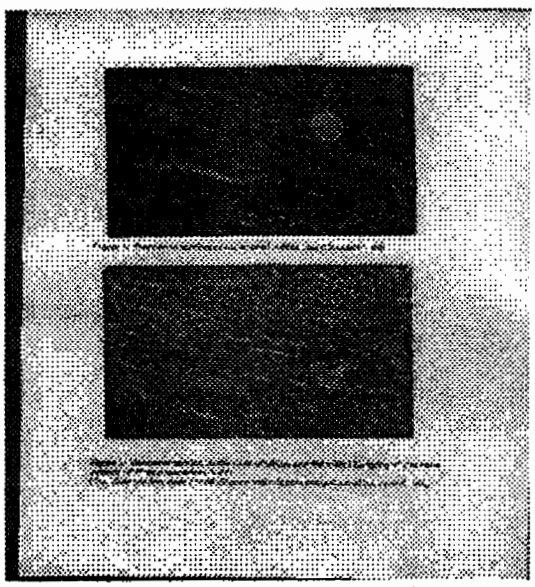
Weeks	No. of Animals	0mg/kg	140mg/kg	155mg/kg	165mg/kg	175mg/kg
1	5	9.0 ± 1.2^a	8.4 ± 0.60^a	8.0 ± 1.2^a	7.0 ± 1.2^a	5.0 ± 0.2^b
2	5	12.6 ± 3.2^a	19.0 ± 1.18^b	18.3 ± 0.70^b	17.3 ± 1.2^b	7.3 ± 0.3^a
3	5	20.0 ± 2.7^a	20.0 ± 1.42^b	17.0 ± 2.30^b	16.0 ± 2.30^b	4.0 ± 0.1^c
4	5	22.0 ± 0.22^a	12.0 ± 2.30^b	10.2 ± 1.30^b	8.0 ± 1.22^a	0.00 ± 0.00^d

a, b, c, d: means within the same row with different superscripts are significantly different ($p<0.05$) mean ± SD (Standard deviation), n=5.

Table 2: Haematological and Blood Chemistry parameters of rats fed with ethanolic extracts of *Hyptis suaveolens* for 28 days.

Parameter/Ref. Values	Control 0.0mg/kg	Group 1 140.0mg/kg	Group 2 155mg/kg	Group 3 155mg/kg	Group 4 175mg/kg
PVC (%) 36-45	43.0± 3.4[a]	42.0 ±4.3	39.1±2.3	36.1 ±1.2	35.4 ±1.2[b]
Hb (g/dl) 12-18	14.3± 1.2[a]	14.0 ±1.4	13.1± 1.4	12.1±1.2	11.7 ±2.4[b]
RBC (ml/mm^3) 4.5-9.0	4.8±0.4	4.8± 0.5	4.4± 0.3	4.0± 0.3	4.0 ±0.1
WBC (no/mm^3) 5000-5500	5200	5200	5400	5400	5400
Glucose (mg/dl) 70-110	80 ±3.15[a]	80 ±3.2[a]	70 ±5.2[b]	70±2.3[b]	65±2.2[b]
Total Protein (mg/dl) 54-77	67±0.01	69±0.02	62±0.04	65±0.02	58±0.01
Cholesterol (mg/dl) 125-270	198±3.4[a]	193.2±5.3	179.0±2.1[b]	166.1±1.2[c]	161.0±1.2[d]
Triglyceride (mg/dl)	127.0±0.29[a]	124.0±0.63	115 ±0.34	106±0.43	103±0.20[b]
Urea Nitrogen (mg/dl) 12-15	16.0±1.3	16.0±1.2	15.0±0.7	15.0±0.1	14.0±0.1
Creatinine (mg/dl) 0.5-1.5	1.4±0.2	1.4 ±0.1	1.4± 0.1	1.3 ±0.2	1.2± 0.1
Phosphate (mg/dl) 2.2-5.5	3.6± 0.2	3.6± 0.02	3.2±0.01	3.9 ±0.01	3.5± 0.1
Urea (nmol/l)	34.24±4.0[a]	34.24±2.3	34.1±2.1	34.29± 1.2	29.96± 1.2[b]
Sodium (nmol/l) 141-153	155± 2.20	155± 2.13	150± 3.3	150± 2.1	140 ± 2.2
Potassium (nmol/l) 3.7-5.8	4.1±0.02	4.0 ±0.02	4.1± 0.03	3.7± 0.1	4.0 ±0.01
Chloride (nmol/l) 101-115	101±2.40	110± 2.84	109± 2.10	94 ±2.10	99±2.30
Calcium (mg/dl) 8.0-11.0	8.3	8.1	7.5	9.6	6.0
SGOT (IU/L) 8-15	9.0	8.6	8.6	8.5	8.3
SGPT (IU/L) 8-10	8.0	7.0	7.0	7.0	6.0
Alkaline Phosphatase (U/L)70-150	73	71	71	71	70

Values with different superscript letters in the same horizontal row are significantly different ($p<0.05$).



Analytical Methods

The serum was analyzed using the reagent kits (Randox Lab, Ltd, Crumlin Co. UK) for total protein, glucose, albumin, cholesterol, triglyceride, Blood Urea Nitrogen (BUN), creatinine, urea, phosphate, serum glutamic oxaloacetate transaminase (SGOT), serum glutamic pyruvic transaminase (SGPT), sodium (Na), potassium (K), chloride (Cl) and calcium (Ca) at a Clinical Chemistry Laboratory. Histopathological examination of the formalin fixed liver was performed by preparing the section for paraffin embedding after which thin (5µl) cryostat sections were stained with heamotoxylin and eosin and periodic acid Schiff reagent without and with diastase respectively. The sections were examined under light microscope at high (x400) objective power magnification.

Statistical Analysis

Tests of significance of difference between treatment means were carried out by Analysis of Variance.

Results

There was statistically significant decrease in the mean body weight changes of the treated rats compared to the control (Table 1).
No mortality was recorded when the animals were given 140mg/Kg, however, rats given doses between 155mg/Kg and 175mg/Kg body weight exhibited some behavioral changes such as aggressive scratching and drowsiness within 5-10min. of extracts administration. The extract at 175mg/Kg boby weight produced a significant decrease in the level of packed cell volume (PCV), haemoglobin (Hb) concentration, red blood cell (RBC) count and an increase in white blood cell (WBC) (Table 2). There was a dose dependent decrease in the values of cholesterol, triglyceride, creatinine and urea of the tested rats compared to the control.(Table 2). The extract also lowered the blood glucose level significantly at the tested doses except at 140mg/Kg.
There was a mild dilation and minimal congestion of central vein of the liver of rats administered 175mg/Kg extract compared to the control rats (Figure 1& 2).

Discussion

The present results on some of the haematological parameters is in agreement with the report of Akinloye (2003), in that the extract, for instance lowered the RBC in a dose dependent manner thereby suggesting that it possess anemic property and thus may not be safe when used as spice for pepper-soup preparation and as beverages for human consumption. The decrease in body weight of the treated rats could be attributed to the presence of antinutritional factors (saponin, tannin e.t.c) in the plant. More so, the decrease in the serum cholesterol observed might be due to prolonged administration of *H. suaveolens* for 28 days. This is because the *H. suaveolens* extract might decrease or lower the release of cholesterol into the blood thereby decrease the serum level. It might also be as a result of the presence of glycoside (saponin) (Usman, 1998), which form complexes with cholesterol and bile in the gastrointestinal tract leading to reduced blood cholesterol levels (Milgate and Robert, 1995). This is in agreement with the report of Afolayan and Adebola (1990), Azevedo *et.al.*, (2001), that *Hyptis suaveolens* contained saponins and could affect some physiological properties of cowpea seed beetle *Callosobruchus maculate* (Idowu and Adedokun, 1991). Lansky (1993) also reported that treatments that lower blood cholesterol prevent myocardial infraction and cerebrovascular accident. The decrease in triglyceride might be attributed probably to an increase lipolysis and oxidation of fatty acids into acetylcoenzyme-A molecules, which could then be channeled into synthesis of other biomolecules. The reason for the observed electrolytes imbalance in the treated group cannot be properly explained. The blood glucose lowering effect of the extract may probably be by potentiating the insulin effect of the plasma by increasing either the pancreatic secretion of insulin from the ß-cells of Langerhans or its release from bound insulin, although this has to be subjected to further investigation. This is in agreement with the reports of other author that some plants possess hypoglycaemic effects (Gupta, 1994., Twaij and Babr, 1988).

There were slight decrease in the serum transaminases (SGOT and SGPT) activities of the treated groups compared to the control, suggesting that there may not be a serious damage to liver or skeletal muscle (Billing, 1978). This is further buttressed by the histological observation of the liver of rats (groups 5), which revealed mild dilation, and minimal congestion of central vein compared to the control group (Fig.1 & 2).

In conclusion, the present study revealed that the extract possess hypoglycemic effects and also affects some physiological functions or properties of rats. Therefore, there is need to isolate the active ingredients of the plant and also investigate the properties of these components that could be responsible for such observable changes before the extract could be safely recommended for use.

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