Effects of dose-related levels of powdered *Stachytarpheta jamaicensis* Vahl leaves on body weight and liver functions of albino rats

E.A Ogie-Odia[1]*, M.N Ilechie[2], A.H Erhenhi[3] and E. F Oluowo[4]

[1]*Department of Botany, Ambrose Alli University, PMB 14, Ekpoma , Edo State

[2] Department of Biology Education, Federal College of Education,PMB 1044 Asaba, Delta State

[3] Department of Botany, Delta State University, PMB 1, Abraka, Delta State

[4] Department of Animal and Environmental Biology, University of Benin, PMB 1154, Benin City, Nigeria

*Email: effexing@yahoo.com

ABSTRACT: Potential dose-related effect of powdered *S. jamaicensis* L. leaves known for treating different ailment was investigated for changes in the body weights and its effects on the liver of albino rats. In the study, twenty albino rats (male and female) after due acclimatization, were fed different graded mixtures of pellet feedmash i.e 25g, 50g, and 75g mixed with different concentrations of powdered S. *jamaicensis* leaves in the ratio 75g, 50g, and 25g while the control was fed pellet feedmash only. The albino rats were weighed, grouped into fives and divided into four groups of three treatment groups and a control group. The results obtained showed slight variation in the agility, food intake and physical appearances of the rats with mild congestion, fatty changes and necrosis in the liver. Bilirubin levels in all the groups showed slight variation ($p>0.05$). From the results obtained, it would appear that *S. jaimaicesis* does not cause large variations in body weights ($p>0.05$) but causes a few changes in the liver of albino rats which is not significantly different ($p>0.05$) from that of the control group. [Researcher. 2009; 1(4):50-55]. (ISSN: 1553-9865).

Keywords: Dose-related, *Stachytarpheta jamaicensis*, body weight, liver function, albino rats.

INTRODUCTION

Many societies respond to their environment in the interpretation of various aspects of life especially concerning ill-health. The fear of illness and death as well as the necessity to feed, of health and protection have led men of all times and under all skies to resort to anything that nature can offer them (Koumare,1985). *Stachytarpheta jamaicensis* is a common herb of field crops, bush, roadsides and disturbed places in the higher rainfall forest zones of West Africa, occurring from Sierra Leone to Nigeria. It comes from the large Verbanaceae family which comprises about 100 genera and 2,600 species and is widely used by various indigenous people throughout the world. Various researches on *Starchytarpheta jamaicensis* include works carried out by Coimbra (1994)., Cruz (1995)., Schapoval *et al*., (1998)., Ramos *et al.*, (2001) and Antoun *et al*, (1999).

The potency of various plants has long been known and recognized from ages past. Some of these plants that exhibit medicinal properties have been known to help in stabilizing different internal organs in animals, while others have had side effects on the organs probably due to the varying amounts or quantity of toxic matter present in such plants.

Toxicity testing in animals is carried out on a new drug to identify potential hazard. It helps in determining the upper limits of administration (Sofowora, 1993). The effect of the toxic material is to test the usefulness in human thereafter. If the effect is low, then there is a chance of possible introduction of such drug material for consumption with a view to effect cure to a potential disease condition. This proves the drug material to be non-toxic and therapeutically safe. The basic premise is that toxic effect caused by a drug is similar in man and other animals (Range *et al*, 1995). If a chemical (or drug material) produces injury to a tissue, the capacity of the tissue to regenerate or recover will largely determine the reversibility of the effect. Most toxic effects of drugs occur at a predictable (usually short) time after administration (Curtis, 2001). Toxic effects can range from negligible to so severe as to preclude further development of the compound (Range *et al*, 1995). It should however be noted that the target organ of toxicity is not necessarily the site of accumulation of the chemical (Curtis, 2001).

This study is with a view to test whether the effects of different dose treatments of powdered leaves of *Stachytarpheta jamaicensis* would have any changes in the body weights and liver of albino rats.

METHODOLOGY

Preparation of plant extract.
The plant was harvested from Ugbowo area in Benin City, Edo state and identified using texts like Hutchinson and Dalziel (1968) and Handbook on West African weeds" (Akobundu and Agyakwa, 1987). The leaves were washed and air dried under the sun for three (3) days. After drying, it was cleaned off debris and kept in the oven to dry at 40^{o}C for 18 hours. The leaves were plucked off the dried branches and pounded in a mortar to obtain the powdered form. About 3kg of the powdered leaves was weighed and stored in a moisture free airtight container for use.

Experimental Rats
Twenty albino rats were randomly sampled and kept individually in various cages to curb cannibalism and to allow for close observations. They were allowed to acclimatize for two weeks, during which they were fed with mash before commencement of the experiment. After acclimatization, the rats were divided into four (4) main groups of three (3) treatment groups and one (1) control group .The weights of the rats were taken and tabulated (Table 1).

Table1. Grouped experimental rats with initial weights.

Cage	Animal	Weight (gms)
Control	C1 a	151
	C1 b	130
	C1 c	134
	C1 d	169
	C1 e	215
Treatment group 1	T1 a	162
	T1 b	122
	T1 c	150
	T1 d	160
	T1 e	161
Treatment group 2	T2 a	128
	T2 b	131
	T2 c	191
	T2 d	151
	T2 e	141
Treatment group 3	T3 a	170
	T3 b	141
	T3 c	140
	T3 d	171
	T3 e	171

Table 2. Food intake of experimental rat.

	NO. OF WEEKS					
TREATMENT GROUPS	**1**	**2**	**3**	**4**	**5**	**6**
CONTROL	← Feed Mash only →					
TRTM 1	← Feed Mash only → ←			75g mash +25g powdered *S.jamaicensis*		→
TRTM 2	← Feed Mash only → ←			50g mash + 50g powdered *S.jamaicensis*		→
TRTM 3	← Feed Mash only → ←			25g mash + 75g powdered *S.jamaicensis*		→

During the course of treatment, behavioural signs and general appearance such as agility, food consumption, and water consumption were observed. Body weight was measured weekly. The animals were sacrificed under diethyl ether anesthesia (100mg/kg body weight) and the excised liver was stored in sample bottles containing 10% formal saline and Boehing solution. Each bottle was labeled for easy identification.

Statistical analysis

The data obtained was expressed as mean +S.D and analyzed as analysis of variance (ANOVA). Statistical significances of the difference of the mean was evaluated using the Students t-test and the differences were considered statistically significant if the p values were less than 0.05 ($p<0.05$).

Table 3. Mean body weight of rats.

Treatment	Dose level (g)	No. of animals	Initial body weight	Final body weight
Control	Feedmash only	5	159.80 ± 15.43	231.25 ± 18.46
Treatment 1	25g *S .jamaicensis* + 75g feedmash	5	151.00 ± 7.56	190.80 ± 13.17
Treatment 2	50g *S.jamaicensis*+50g feedmash	5	148.40 ± 11.39	159.00± 11.81
Treatment 3	75g *S. jamaicensis*+25g feedmash	5	158.60 ± 7.39	157.67 ± 11.55

Mean ± S.E (standard error) for 5 determinations.

Table 4. Analysis of food consumption during experimental period

Treatment groups	No of animals	Concentration(g) (Feedmash)	Concentration(g) (*S. jamaicensis*)	Food consumption
T1	5	75.0	25.0	+ + +
T2	5	50.0	50.0	+ +
T3	5	25.0	75.0	+
C1	5	100.0	0	+ + +

+ + + = Good, + + = Average, + = Fair

T1= 25g powdered *S. jamaicensis* + 75g feedmash
T2= 50g powdered *S. jamaicensis* + 50g feedmash
T3= 75g powdered *S. jamaicensis* + 255g feedmash
C1= 100g Feedmash only

Table 5: Effect of *Starchytarpehta jamacensis* on bilirubin levels in treated rats.

Parameter tested	Treatment group 1	Treatment group 2	Treatment group 3	Control
Total Bilirubin (mg/dl)	0.6 ± 0.08	0.6 ± 0.12	0.5 ± 0.1	0.45 ± 0.06
Conjugated bilirubin (mg/dl)	0.3 ± 0.04	0.3 ± 0.06	0.25 ± 0.05	0.63 ± 0.15

Mean ± S.E (standard Error) for 5 determinations.

Table 6. Physical characteristics/observations of Experimental rats

Treatment Groups	Agility	Hair loss	Food intake	Eyes
Treatment 1	Normal	None	Normal	Normal
Treatment 2	Slightly reduced in 2nd week	None	Slightly reduced but normal 2nd week	Normal
Treatment 3	Reduced in 2nd and 3rd week	None	Reduced	Normal
Control	Normal	None	Normal	Normal

Table 7. Observations on the liver.

PARAMETERS TESTED	CONTROL GROUP	TREATMENT GROUP 1	TREATMENT GROUP 2	TREATMENT GROUP 3
Histology of the liver	Normal	Normal except that T1A had congested blood vessel and T1C had necrosis	Normal	Normal except where T3C showed area of fatty acid change

Treatment group 1 = 25g powdered *S. jamaicensis* + 75g feedmash
Treatment group 2 = 50g powdered *S. jamaicensis* + 50g feedmash
Treatment group 3 = 75g powdered *S. jamaicensis* + 25g feedmash
Control group 1 = 100g Feedmash only

RESULTS AND DISCUSSION

From the various tables above viz 1, 2, 3, 4, 5, 6, 7 the different results can be clearly seen. Table 1 shows the initial weights of the rats before they were fed the powdered leaves of *Stachytarpheta jamaicensis* while Table 2 shows the feeding mode and pattern administered to the different groups of albino rats. In the course of the experimental periods, four rats in treatment group 3 (T3) were noticed to have loss of agility (Table 6). Increased concentrations of active compounds in plant extracts are not always beneficial and can even promote adverse biological effect (Pepato *et a*l., 2001). Rats in T3 lost some weight probably due to the high dose of powdered leaves given to them (Table 3). It was also noticed that two rats in treatment group 1 and one in treatment group 2 gave birth during the experimental period and also gained weight. Most times, increase in weight can be as a result of pregnancy, which affects the levels of oestrogen and progesterone known to affect both uterine receptivity (Wand and Dey, 2006) influence food intake and energy expenditure (USEPA, 1996). Body weight provides some indication of the general health status of animals. A decrease may be due to the rejection of food or water caused by reduced palatability, treatment induced anorexia or systemic toxicity (Abdulazeez *et al*, 2009). Possible reasons for the loss in agility and weight may be due to the feeding mode of the experimental rats in question as regards the taste of the powered concentration. Reduced agility is an indication of disease condition (Brigid *et al*., 1980). There was no hair loss observed in the rats and the eyes were all normal. Water intake was also normal in all groups (Table 6).

From the results obtained in Table 7, there were generally no significant changes in the liver when compared with the control. The liver of all the groups were normal and within the same range with no significant differences between them ($p>0.05$). Congested blood vessel and areas of hemorrhage was noticed in the liver of Treatment group I (T1) rat. Fatty change of the liver was present in T3 (Table 7)
The Bilirubin level all the rats were within normal range (Table 5) although there was slightly marked variation, as high value of bilirubin is an indication of red blood cell destruction which may consequently result into jaundice. Bilirubin reduction indicates improvement in health conditions (Beck *et al*, 1994)

CONCLUSION

It can be concluded from the results that while *Stachytarpheta jamaicensis* may be found to be very useful in the treatment of certain disease conditions, systemic sensitivity is also of note. It would appear that specific tissue sensitivity of *S. jamaicensis* on the liver is opposed to related toxicity as often associated with therapeutic agents. This remark is plausible as the tissues of the liver cells are susceptible to slight damage with the use of the plant.

Further research work would be needed to test the effect of the plant extract on more organs and also to isolate the active ingredients and such possible toxicants that may be present in the plant.

REFERENCES

Abdulazeez, M.A., Ameh A.D., Ibrahim S., Ayo J.O and Ambali S.F (2009) Effect of fermented seed extract of *Carica papaya* on litters of female wistar rats (*Rattus norvegicus*) *African journal of Biotechnology* **8 (5)**: 854-857

Akobundu, I.O and Agyakwa, C.N (1987) A Handbook on West African Tropical Weeds, I.I.T.A Publication, Ibadan, Nigeria 420pp.

Antoun M.D, Martinez E, Caballero R, Oquendo T, Proctor, G.R., Weislow, O.S., McCloud, T.G., Kiser, R., Stanley. P, Clanton D., (1999). Evaluation of the flora of Puerto Rico for the *in vitro* Cytotoxic and Anti-HIV activities, *Pharmaceutical Biology*. **37(4):** 277 – 280.

Beck J.R., Kattan M.V. and Miles B.J. (1994). A critique of the decision analysis for clinically localized prostate cancer. *Journal of Urology*,**152:** 1894 – 1899.

Brigid .G.L, Curt I.C and Gregory .R (1980) Markers in Human Lymphoid Tumour *In* :Sell S (ed.) Cancer Markers , Humana press, Clifton ,New Jersey pp 90-113

Cruz, G.L (1995) *Dicionario Das plantas Uteis Do Brasil* ,*5th* Edn. Bertrand; Rio de Janeiro, Brazil. 11p

Curtis, D.K (2001). Principles of Toxicology and Treatment of Poisoning: In Good and Gilnan,. "The Pharmacological Basic of Therapeutics", *10th* Edn. McGraw Hill pp67 – 71.

Hutchinson, J. and J.M. Dalziel (1968) Flora of West tropical Africa. Vol III Part 1. Crown Agents for Overseas Government and Administrations, Mill bank, London. 828p

Koumare M (1985). Research into African medicinal plants. Newsletter, *J P* 27.No 11 p1

Pepato M.T, Folgado V.B.B, Kettlehust I.C and Brunetti I.L (2001) Lack of antidiabetic effect of *Eugenia jambolan* leaf decoction on streptozotocin diabetic rats. *Brazil Journal of Medicine and Biological Research*, **34:**389-395

Ramos A, Piloto J, Visozo A, Garcia A, Lastra H, Ponce de Leon H. (2001). Mutagenic and antioxidant assessment of *Stachytarpheta jamaicensis* (L) Vahl. *Phytotherapeutic Research*. **15:** 360-363.

Range H.P., Dale M.M. and Ritter J.M. (1995). Pharmacology, *3rd* Edn.,Churchill Livingstone; USA, 800p.

Schapoval E.E, Vargas M.R, Chares C.G, Bridi .R, Zuancozzi J.A, Henriques. A.T. (1998) Anti inflammatory and anti-nocieptive activities of extracts and isolated compound from *Stachtarpheta cayennensis*. *Journal of Ethnophamacology*, **60 :** 53-59.

Sofowora ,A (1993) Medicinal Plants and Traditional Medicine in Africa. Spectrum Books Ltd, Ibadan pp58-196

United States Environmental Protection Agency (USEPA) (1996) Guidelines for reproductive toxicity risk assessment. *Federal register* **61(212);** 56274-56322

Wang H and Dey S.K (2006) Roadmap to embryo implantation: clues from mouse models. *Nat. Rev. Genet*. **7**: 185-199