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Effect of *Stachytarpheta jamaicensis* L. (Vahl.) on Wistar Rats: Serum Biochemistry and Ultrasonography

[1]M. Idu, [2]J.E. Ataman, [3]A.O. Akhigbe,
[4]E.K.I. Omogbai, [4]F. Amaechina and [5]E.A. Odia

Effect of powdered *Stachytarpheta jamaicensis* L. leaves known for treating different ailments was investigated for toxicity. In the study, twenty Wister rats (male and female) after due acclimatization, were fed with different graded mixtures of feed mash and the treatment plant. The animals were weighed and divided into four groups of three treatment groups and one control group with each group consisting of five rats. The rats were administered different concentrations of powdered *S. jamaicensis* leaves mixed with different amount of feed mash. i.e., 75, 50 and 25 g of *S. jamaicensis* was mixed with 25, 50 and 75 g of normal feed mash. The control was fed only with feed mash all through the period of experiment. The results revealed levels of Alkaline Phosphatase (ALP), Serum Glutamate Oxaloacetate Transaminase (SGOT) and Serum Glutamate Pyruvate Transaminase (SGPT) were slightly elevated ($p>0.05$). Bilirubin levels in all the groups showed slight variation ($p>0.05$) when compared with control. The ultrasound picture of heart, liver, kidney and spleen showed no significant difference from control. From the results obtained, no significant alteration in the normal serum biochemistry as well as in the echogenic pattern was identified between the control and experimental rats thus suggesting wide therapeutic safety margin in the use of *S. jamaicensis*.

Key words: *Stachytarpheta jamaicensis*, serum biochemistry, ultrasonography

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For further information about this article or if you need reprints, please contact:

M. Idu
Professor,
Department of Basic Sciences,
Benson Idahosa University,
PMB 1100, Benin City, Nigeria

Tel: +2348023455669

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[1]Department of Basic Sciences, Benson Idahosa University, PMB 1100, Benin City, Nigeria
[2]Department of Anatomy, [3]Department of Radiology,
[4]Department of Pharmacology and Toxicology, [5]Department of Botany,
University of Benin, PMB 1154, Benin City, Nigeria

INTRODUCTION

It has been stated by WHO that the most critical assessment of herbal medicine is safety evaluation. Although Farnsworth indicated that phyto-toxicity is very low, nonetheless, from scientific, professional and moral viewpoints toxicological assessment must be conducted on all herbal medicines intended for either veterinary or human use. Most herbal medicines are obtained from genuine practitioners have been used in ethno-medicine for many centuries. Thus, it can be assumed that only the safe herbal medicines have withstood the test of time. Nonetheless, standard toxicological protocols should be employed for acute, sub-chronic and chronic toxicity tests. Such data is mandatory for the registration of the product with National Health Authorities. It would also enhance the confidence of Health Professionals in the use of herbal medicines (WHO, 1991, 1992).

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 (Curtis, 2001). Toxic effects can range from negligible to so severe as to preclude further development of the compound (Range *et al.*, 1995). However, the target organ of toxicity is not necessarily the site of accumulation of the chemical (Curtis, 2001).

Several studies have shown the relative effect of plant extracts, alcohol, water or acid extracts etc. and therapeutic efficacy. In some of these studies, there has been varying changes in the composition of the animal tissues due to the effect of such extract on it. Some prove to be active on them, while others prove inactive hence making no marked difference.

The Plant *Stachytarpheta jamaicensis* (Verbanaceae), commonly called Bastard vervain or Brazilian tea, is an erect or straggling perennial herb about 60-90 cm high. The leaves often covered with flowers, gives it a bluish green color. The leaves are opposite and whorled; ovate or oblong, elliptic about 4-11 cm long and 2-4.5 cm wide, rounded to broadly acute at the apex, widely toothed at the margins, smooth on both surfaces with short petioles. In this study, the effect of powdered leaves of *Starchytarpheta jamaicensis* on serum biochemistry and echogenic pattern on some specific organs was investigated for therapeutic assessment.

MATERIALS AND METHODS

The leaves of *Stachytarpheta jamaicensis* were collected around the premises of the University of Benin, Benin City, Edo State, Nigeria in October, 2004 and was identified by Mr. Henry Akinnibosun using a Handbook on West African Weeds (Akobundu and Agyukwa, 1998) and authenticated by Prof. MacDonald Idu, both of Botany Department, University of Benin, Benin City, Nigeria. The herbarium specimen (No. B103) has been deposited at Botany Department, University of Benin, Benin City. Nigeria. The leaves were washed and air dried, cleaned off debris and kept in the oven to dry at 40°C for 18 h. The leaves were plucked off the dried branches and pounded in a mortar to obtain the powdered form. Three kilogram of the powdered leaves was weighed and stored in a moisture free airtight container for use.

Twenty Wister rats were randomly sampled and kept one per cage. They were allowed to acclimatize for two weeks, during which they were fed with Pfizer feed mash and water *ad libitum* before commencement of the experiment. After acclimatization, the rats were divided into three treatment groups and one control group of five rats each. The duration of experiment was six weeks, conducted from October 16 to November 30, 2004. The control group received only feed mash throughout the period. The treatment groups were fed with mash only for the first three weeks and thereafter received mash/leaf powder mixture in the following ratio weight/weight: 75/25, 50/50 and 25/75, respectively.

Methods for serum biochemical assay of Alkaline phosphatase (ALP), serum glutamatate oxaloacetate transaminase (SGOT), serum glutamate pyruvate transaminase (SGPT), total and conjugated bilirubin were adopted following methods outlined by Idu *et al.* (2002) and Ataman *et al.* (2002). Using the Ultrasound machine sonographic assessment of vital organs-Liver, kidney and heart was done for anesthetized rats in the various groups to detect if they are any significant change.

RESULTS AND DISCUSSION

Table 1 shows the results of radiological observations of the scanned rats. The various results of

Table 1: Radiological observations of scanned rats

Treatments	Heart beat (b/m)	Kidney size	Liver size
C_1 Control	150±0.32 Normal heart rate	Dimensions of 24x11 mm (right) and 30x11 mm (left) normal heart rate	Dimension of 23x15 mm
T_1	158±1.02 Mild increase in heart rate	Appeared larger than control with dimensions of 33x11 mm (right) and 37x14 mm (left)	23x14 mm within normal range
T_2	162±2.41 Moderate increase in heart rate	Dimensions of 29x11 mm (right) and 27x8 mm (left) within normal limit.	20x17 mm, within normal range
T_3	182±1.59 Significant tachycardia	Dimensions of 29x10 mm (right) and 29x11 mm (left) within normal limit.	25x16 mm within normal range

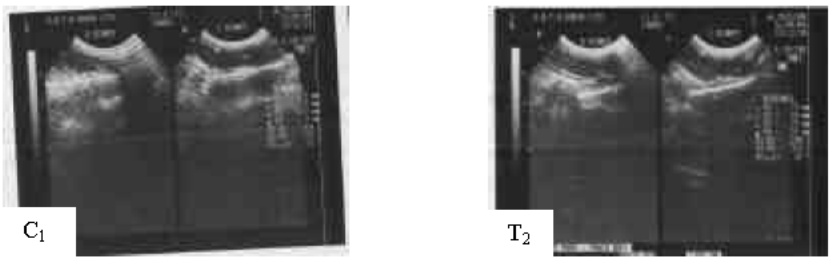

Fig. 1: C_1 and T_2 showing sonographic records of kidney sizes of treated rats with no significant difference in their measurements between the control and treated group 2 (T_2) rats

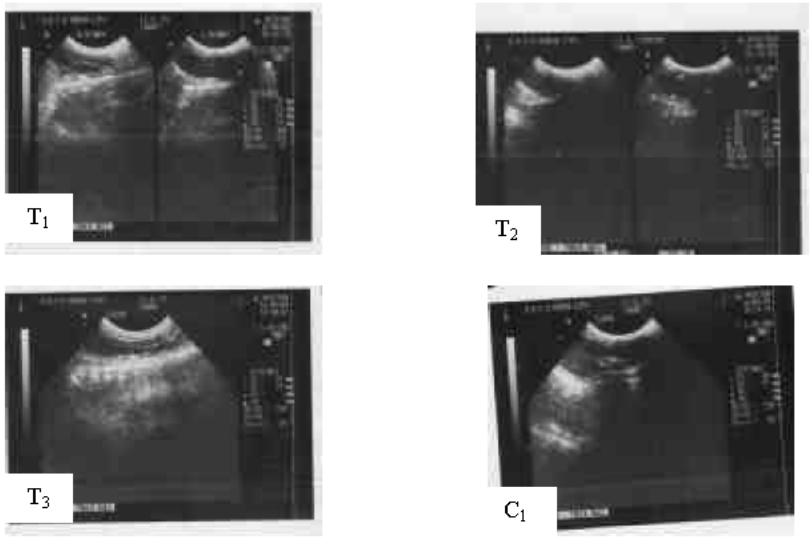

Fig. 2: T_1, T_2, T_3 and C_1 showing sonographic records of the Liver sizes from the various treatment groups illustrating no significant difference in the two-dimensional measurement of the Liver compared with control

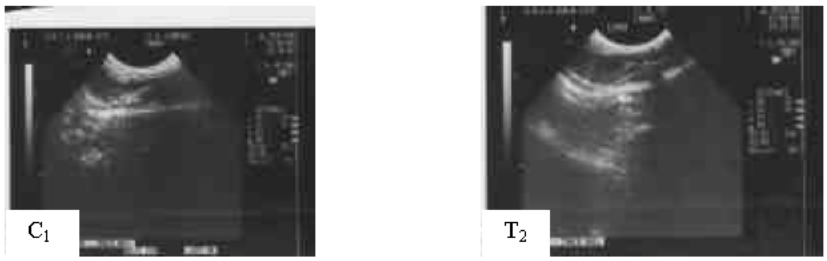

Fig. 3: C_1 and T_2 showing the sonographic record of the heart sizes between the treated and the control group rats with no significant difference

the ultra sound scan is summarized in Fig. 1-3. The only notable remark from the results of the ultrasound assessment is that the heart rate seems to increase, with increased dose of the extract. The kidney size of T_1 rats appeared larger than the control, but this cannot be correlated with the low concentration of the extract.

From ultra sound scan of the rats, there was generally no significant change in the liver and kidney when compared with the control. In T_2, the liver appeared slightly shrunken with increase in the echogenic pattern. The heartbeat of the treatment groups was normal with rats in T_3 having a higher value than that of the control

Table 2: Effect of *S. jamaicensis* on biochemistry of rat serum

Parameter tested	Treatment			
	Control	T_1	T_2	T_3
Alkaline Phosphatase (IU L^{-1})	137.50±5.48	165.25±4.44	157.00±25.17	270.00±1.3
Glutamate Oxaloacetate Transaminase (IU L^{-1})	21.00±3.87	27.00±2.65	31.00±1.53	25.00±1.0
Glutamate Pyruvate Transaminase (IU L^{-1})	19.00±2.38	13.00±1.29	9.67±1.76	10.00±1.0
Total Bilirubin (mg dL^{-1})	0.45±0.06	0.60±0.08	0.60±0.12	0.50±0.1
Conjugated Bilirubin (mg dL^{-1})	0.63±0.15	0.30±0.04	0.30±0.06	0.25±0.05

Mean±SE (Standard Error)

group. The rats in T_3 showed mild tachycardia with heart rate of 182 beats per minutes compared with the control with 150 beats per minute. The increase in heartbeat might probably be due to the high concentration of the powdered leaves of *S. jamaicensis* in T_3. The difference in heartbeat rate between the treatment groups and the control group is similar to studies carried out by Idu *et al.* (2002). The liver of all the groups were normal, all within the same range with no significant difference between them ($p>0.05$).

The different serum enzymes assayed (Table 2), revealed Alkaline Phosphatase in T_1, T_2 and T_3 to have high values when compared to the control. Increase in Alkaline phosphatase has been reported to be an indication of bone or liver disease (Price and Stevens, 1993). The indication of the increase in the values of Alkaline Phosphatase in T_3 may be due to the dysfunction of the liver as seen in this treatment group. David (1978) reported that ALP increase might be an indication of liver disease.

Though there was increase in ALP of T_2, this may be due to possible change in the enzyme metabolism, though the liver of T_2 was not affected. The serum glutamate oxaloacetate transaminase values was noticed to be high in T_1, T_2 and T_3 when compared to that of the control. This may be an indication of the involvement of the ducts and the hepatocytes. Earlier studies (Price and Stevens, 1993) had revealed the transaminases (SGOT and SGPT) to be useful in liver disease diagnosis.

The Bilirubin level of all the rats were within normal range though there was slightly marked variation. High value of bilirubin is an indication of red blood cell destruction which may consequently result in jaundice (Table 2). Bilirubin level reduction indicates improvement in health conditions (Beck *et al*., 1994).

It can be suggested from the results that *Starchytarpheta jamaicensis* may be relatively safe in the treatment of certain disease conditions.

Further research would be needed to isolate the active ingredients and such possible toxicants that may be present in this plant.

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