GLOBAL JOURNAL OF BIOLOGY, AGRICULTURE & HEALTH SCIENCES
(**Published By**: Global Institute for Research & Education)
www.gifre.org

THE EFFECT OF *Sida acuta* ON GLYCOGEN PROFILE OF ADULT WISTAR RAT

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ABSTRACT

This study was carried out to assess the effect of ethanolic leaf extract of *Sida acuta* on the glycogen profile of the liver in adult Wistar rats. Thirty (30) rats weighing between 140g were assigned to three groups (A, B and C) with ten animals each. Group A served as the control while groups B and C served as the experimental groups and received 100mg/kgbw and 200mg/kgbw of the extract respectively for fourteen days. All the animals were sacrificed after fourteen days. Then animals were sacrificed, livers removed and processed for Haematoxylin and eosin (H&E) paraffin sectioning and staining method. From the results obtained, the administration of ethanolic leaf extract of *Sida acuta* caused no obvious structural derangement in the organ. There were no adverse effects on glycogen distribution.

Keywords: Liver, Glycogen, Sida acuta, Ethanolic, Wistar rats.

INTRODUCTION

Plants are the basic source of knowledge of modern medicine. The burgeoning worldwide interest in medicinal plants reflects recognition of the validity of many traditional claims regarding the value of natural products in health care (Ahmed M. and Hussain, 2013). Several plants of diverse origins have been exploited by trial and error over many generations for therapeutic purposes. In Africa and in most of the developing countries, plants' properties are empirically appreciated.

The adverse effects of chemical drugs, their increasing costs and greater public access to information on traditional medicine have also led to an increase in interest in alternative treatments. The reason is that traditional medicine is a medicine of proximity, less constraining and non-expensive (Agunbiade *et al.*, 2012).

All over the world, particularly in developing countries of which Nigeria is one, the use of traditional plants for medicinal purposes is fast competing with the use of conventional drugs. More people are relying more and sometimes exclusively on plants for treatment of various illnesses and ailments (Ahmed *et al*., 2006). Sida is traditionally used to cure diarrhoea in Australia. In Mexico, leaves are smoked for its simulative effects and in some parts of India, Sida leaves are used in tea for the same purpose. The plant is traditionally used as an astringent and as antidote for scorpion stings and snake bites. It has been reported that the roots of Sida contained 450ppm alkaloid including ephedrine, saponin, choline, pseudoephedrine, betaphenethytamine, hipaprhorine and related indole alkaloids (FAO, 2002). Kuniata and Rapp 2001 reported that it is because of the presence of different chemicals including alkaloids that arrow leaf Sida is not liked by cattle. This plant provides an excellent example for the elaboration of new simple preparations since its principal active constituent is due to one compound: cryptolepine. In addition, this alkaloid is known to exhibit various pharmacological activities like antitrypanosomal and antifungal effects (Ablordeppey *et al* 1999; Arzel *et al*., 2001), cytotoxic effect on cancerous cells lines probably by a direct DNA intercalating effect (Lisgarten *et al* 2002) and finally an antihyperglycemic activity (Bierrer *et al* 1998). In the Gold Coast, S. acuta plant is used to cure several diseases. The leaves when bruised are shiny and are put in the hands of midwives when they are about to remove death children from the womb and they are frequently used to procure abortion. (Prakash *et al*., 1987). The phytochemical studies of S. acuta leaves have revealed the presence of several constituents in ethanol extracts. Since various flavonoids have been reported to posses contraceptive properties (Anderson *et al* 1972 and Hariharan, 1980), and finally it is now evident that the plant has a good antiplasmodial activity due to its alkaloids cryptolepine the main alkaloid of the plant. It is also demonstrated that the plant is active in several bacterial strains and other compounds with interesting pharmacological properties (Karou *et al* 2007).

Liver is a large solid gland in the right hypochondrium of the abdominal cavity in the living subject. It is reddish brown in colour, soft in consistency and very friable. It weighs about 1600g in males and about 1300g in females.

The liver is the largest gland in the body. It secretes bile and performs various other metabolic functions including: secretion of drugs, toxins, poisons, cholesterol, bile pigments and heavy metals, storage of glycogen, iron, fat, vitamins A and D (Chaurasia, 2010).

Glycogen is a multibranched polysaccharide of glucose that serves as a form of energy storage in animals (Sadava *et al* 2011) and fungi. The polysaccharide structure represents the main storage form of glucose in the body.

In humans, glycogen is made and stored primarily in the cells of the liver and the muscles, and functions as the secondary long-term energy storage (with the primary energy stores being fats held in adipose tissue). Muscle glycogen is converted into glucose by muscle cells, and liver glycogen converts to glucose for use throughout the body including the central nervous system.

Glycogen is the analogue of starch, a glucose polymer and energy storage in plants, having a similar structure to amylopectin (a component of starch), but more extensively branched and compact than starch.

MATERIALS AND METHODS

Thirty healthy Wistar rats with an average weight of 140g were procured from the animal house of the Department of Pharmacology, University of Calabar, Calabar, Nigeria. The rats were kept and maintained under standard laboratory conditions of temperature, humidity and light for a period of two weeks in the animal holdings of the Department of Human Anatomy, University of Calabar, Calabar, before the commencement of the experiments. During this course, the rats freely fed on pellets from Ettems' feed holdings, Calabar and were given distilled water ad libitum.

Experimental design and groupings

In this study, a total of 30 adult Wistar rats were used. They were randomly separated into 3 groups of 10 rats each. Group B and C served as the experimental groups and received ethanolic extract of Sida acuta at varying doses. Group A served as the control group and received the same quantity of distilled water as contained in the experimental doses. Administration of the ethanolic extract of s*ida acuta* was done orally by means of an oral canula. Group B and C received 100 and 200mg/kg body weight for three weeks. Rats in the control group (Group A) received quantity of distilled water as contained in the experimental doses. At the end of the study, the rats were sacrificed by cervical dislocation. The abdomen of each rat was carefully dissected, the liver removed and fixed in 10% formal saline for histological studies.

RESULTS

Control group A: In this group, the microscopic examination of section of the liver from the control group which received 1ml of distilled water showed normal cytoachitecture of the liver with polygonal hepatocytes (H) radiating from the central vein (CV).The sinusoids (S) run in between the cords of the liver cells while the nucleus(N) appeared normal.(Plate 1).

Group B: The photomicrograph of section of the liver from the animals treated with 100mg/kg body weight of leaf extract of *Sida acuta* revealed no observable histological changes compared to the control section (plate 2).

Group C: In this group, the photomicrograph of section of the liver from animals treated with 200mg/kg body weight of leaf extract of *Sida acuta* revealing no observable histological changes when compared to the control section. (Plate 3)

DISCUSSION

From the results obtained, the administration of ethanolic leaf extracts of *Sida acuta* on the liver showed no structural or functional derangement on it, as it presented a normal cytoarchitecture of the liver on both the Low dose group (B) and high dose group (C) with their hepatic venules (HV) appearing distinct. The sinusoids (S) are distinctly seen originating at the lobule margin and coursing between plates of hepatocytes to converge upon the terminal hepatic venule (HV). Kumar (2011) explained that *sida acuta* leaf has hepatoprotective property which protects the liver from any harmful agent.

This result is in agreement with the work of Uruakpa *et al.*, (2014) which stated that administration of ethanolic seed extracts of *Sesamum indicum* on the liver showed no structural or functional derangement on it, as it presented a normal cytoarchitecture of the liver on both Low dose group and high dose groups.

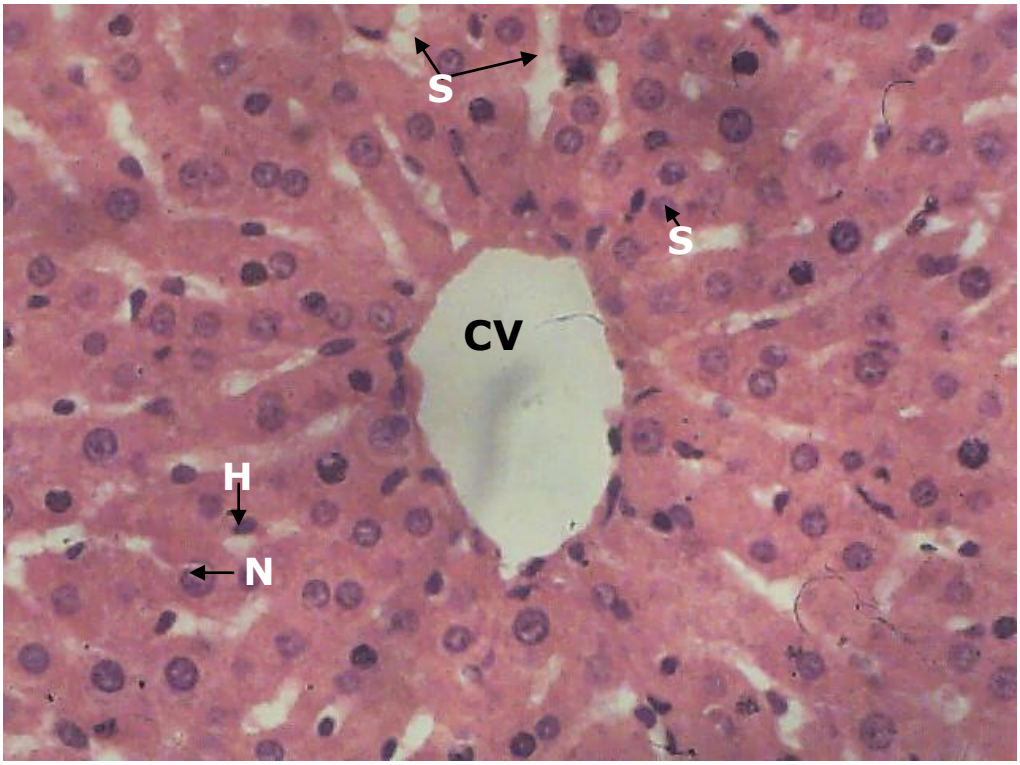

Plate 1: Photomicrograph of the liver from the control group fed with distilled water for 14 days using H&E stain shows well defined central vein (CV), Hepatocytes (H) and sinusoids(S).

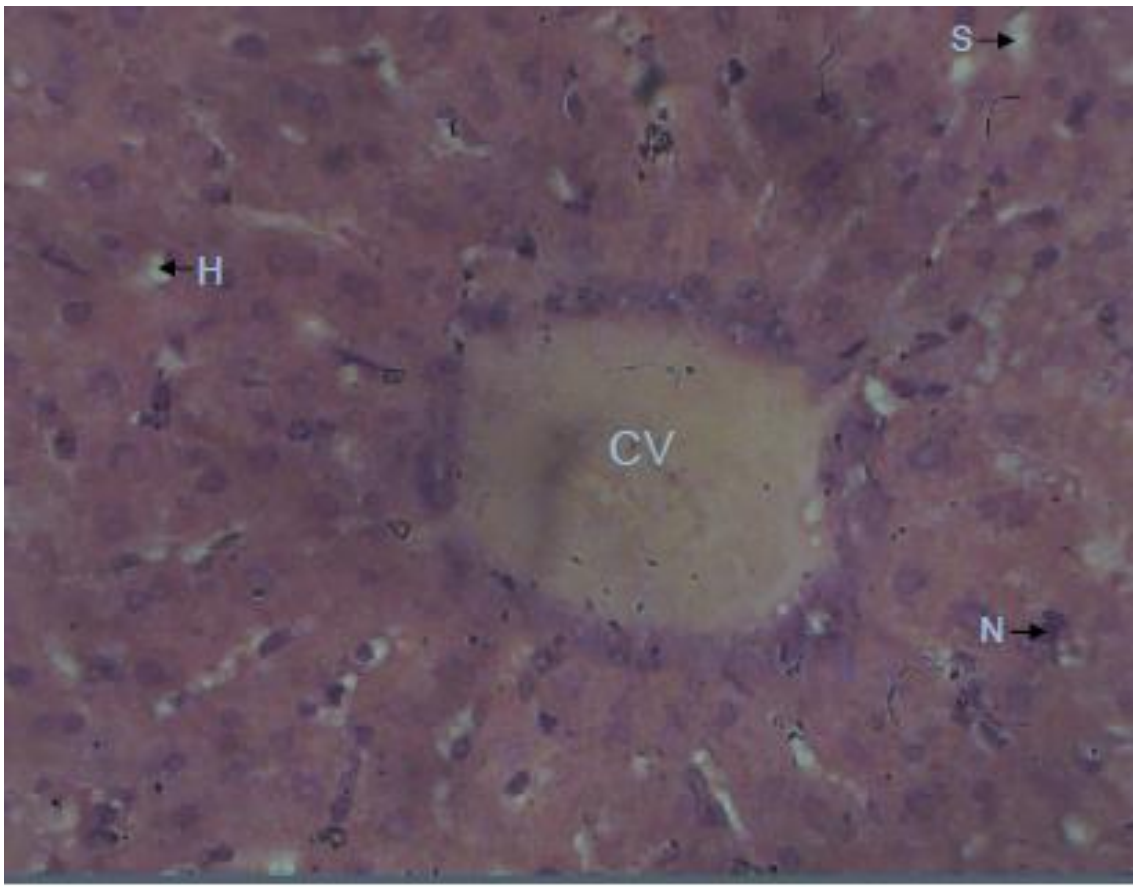

Plate 2: Section of liver from rats treated with 100mg/kgBW of leaf extract of *Sida acuta* for 14 days using H&E stain shows no observable histological difference compared to the control as it presents polygonal hepatocytes (H), central vein (CV), Sinusoids (S) and Nuclei (N)

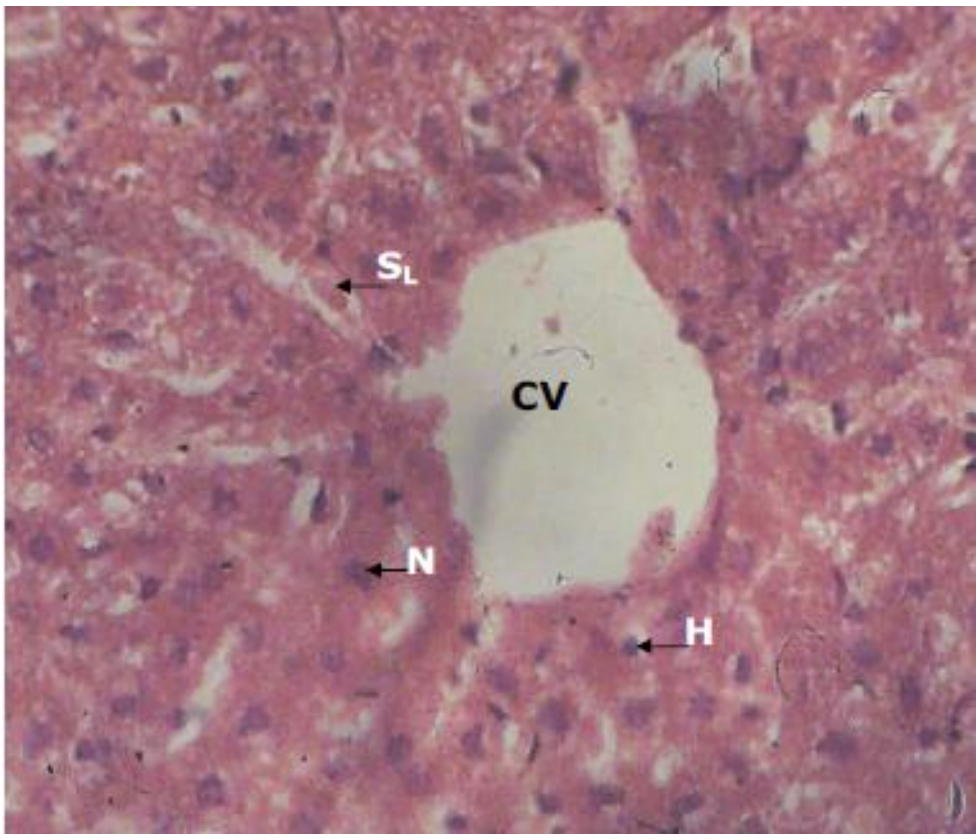

Plate 3: Section of liver from rats treated with 200mg/kgBW of leaf extract of *Sida acuta* for 14 days using H&E stain ,(X400) shows no definite cell outline, nuclei not prominent and slightly dilated sinusoid with poor stain uptake.

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