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Extract of *Sesamum Indicum* Seeds on the Glycogen Profile of the Liver of Adult Wistar Rat

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Abstract
The aim of this work was to evaluate the effect of seeds extract of *Sesamum indicum* on the histology liver of adult Wistar rats. Thirty Wistar rats weighing between 150-180g were divided into three groups of ten each; control group A received distilled water, experimental B and C received 200mg/kg and 400mg/kg of the seed extracts respectively. The extracts were administered for two weeks, at the end of which the animals were sacrificed; livers were removed and processed for Haematoxylin and eosin (H&E) paraffin sectioning and staining method while the serum was used for liver enzyme assay. From the results obtained, the administration of ethanolic seed extract of *Sesamum indicum* caused no obvious structural derangement in the organ There were no adverse effects on glycogen distribution.
Keywords: Liver, Wistar rats, Sesamum indicum, glycogen

INTRODUCTION

Medicinal plants have been identified and used throughout human history. Plants have the ability to synthesize a wide variety of chemical compounds that are used to perform important biological functions, and to defend against attack from predators such as insects, fungi and herbivorous mammals. At least 12,000 such compounds have been isolated so far; a number estimated to be less than 10% of the total. Chemical compounds in plants mediate their effects on the human body through processes identical to those already well understood for the chemical compounds in conventional drugs; thus herbal medicines do not differ greatly from conventional drugs in terms of how they work. This enables herbal medicines to be as effective as conventional medicines, but also gives them the same potential to cause harmful side effects. (Lichterman, 2004; Tapsell, 2006)

Medicinal plants are relevant in both the developed and developing nations of the world as sources of drugs or herbal extracts for chemotherapeutic purposes. Also the use of plant derived herbal compounds as part of herbal preparations as alternative sources of medication continues to play major roles in the general wellness of people all over the world (Farombi, 2003).

In the southwest and middle belt areas of Nigeria, one of these medicinal plants *Sesamum indicum* is widely used as herbal remedies for the treatment of various ailments like infantile cholera, diarrhea and urinary infections (Chakrabrothy *et. al.*, 2008).

Sesame (*Sesamum indicum* L.), is a flowering plant in the genus Sesamum and family padaliaceae. It is a diploid (2n = 26) dicotyledon and one of the oldest oil seed crops, growing widely in tropical and subtropical areas (Ashri, 2010). Sesame seeds are an important source of oil (44-58%), protein (18-25%), and carbohydrates (13.5%), and are traditionally consumed directly. Among the primary edible oils, sesame oil has the highest antioxidant content (Cheung et al., 2007) and contains abundant fatty acids such as oleic acid (43%), linoleic acid (35%), palmitic acid (11%), and stearic acid (7%).

Sesamum indicum has numerous wild relatives in Africa and smaller number in India. *Sesamum indicum* (SI) is commonly known as Sesame in English, Benne seed in Bantu, Isisa in Igbo, Ridi in Hausa, Ekuku in Yoruba and Kana in Obudu. It is a plant known for its therapeutic values (Morebise *et. al.*, 2002). It is an important oil seed crop cultivated for its edible seeds which grow in pods in variety of colors from cream white to charcoal black. The word “Sesame” is from Latin “Sesamum” borrowed from Greek “Sesamon” seed or fruit Sesame plant. It is also believed to have come from the Arabic world “Simsim” and it’s known in the Arab countries to account for the magic words “open Sesame” a famous phrase from Arabian night which reflects the distinguishing feature of sesame seed pod which burst open when it reaches maturity

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.

Glycogen is found in the form of granules in thecytosol/cytoplasm in many cell types, and plays an important role in the glucose cycle. Glycogen forms an energy reserve that can be quickly mobilized to meet a sudden need for glucose, but one that is less compact than the energy reserves of triglycerides (lipids).

In the liver cells (hepatocytes), glycogen can compose up to 8% of its fresh weight (100–120 g in an adult) soon after a meal. (Campbell *et al.*, 2006). Only the glycogen stored in the liver can be made accessible to other organs. In the muscles, glycogen is found in a low concentration (1-2% of the muscle mass). The amount of glycogen stored in the body, especially within the muscles, liver, and red blood cells (Miwa & Suzuki 2002) mostly depends on physical training, basal metabolic rate, and eating habits such as intermittent fasting. Small amounts of glycogen are found in the kidneys, and even smaller amounts in certain glial cells in the brain and white blood cells. The uterus also stores glycogen during pregnancy to nourish the embryo. (Campbell *et al.*, 2006)

MATERIALS AND METHODS

Sample Collection

The extract used for this research was got from fresh *Sesamum indicum* seeds got from Yala Local government area of cross river state, Nigeria. The seeds were harvested, washed to remove debris and air-dried at a room temperature of about 27^{o}C for three weeks. They were blended to a fine powder using a Qlink blender with Model number QBL- 18L40. The blended sample of *Sesamum indicum* (seed) powder was weighed using digital weighing balance and was found to weigh 105g. The ethanolic extraction of the *Sesamum indicum* (seed) was done using soxhlet extractor. The weight of the extract was found to be 19.7g.The extract so obtained was stored in the refrigerator for preservation.

Then from the yield of 19.7g of *Sesamum indicum* seed extract, the stock solution was prepared by dissolving 6.8g of the extract in 100mls of distilled water. Then the different dosages were calculated depending on animals' body weight. Therefore, every 1ml of the extract administered contained 68mg/ml of the extract for the high dose while the 0.5ml of it contained 34mg/0.5ml for the low dose but animals received according to their body weights. The extracts were administered orally by gavage once every day for fourteen days.

Experimental animals

Thirty adult Wistar rats weighing about 150-180g were used for this research work. They were housed in cages made of wire gauze in the animal house of the department of Human Anatomy, Faculty of Basic Medical Sciences, University of Calabar. They were brought from the animal house of Zoology department, university of Calabar and acclimatized in their various cages for a period of two weeks before commencement of the treatment. The animals were housed under standard conditions with 12 hours light /12 hours dark cycle throughout the duration of the experiment. The animal house was kept in good sanitary condition so as to enhance the wellbeing of the animals. They were fed with rat chow produced by vital feeds Nig. Ltd, Lagos and bought from Calabar main market and water was provided *ad libitum*. The animals were weighed using a beam balance (OHAUS- PAT.No.2.729.439) before and after the experiment. The animals were randomly assigned to the different groups.

Termination of experiment

At the end of the two weeks period, animals in all the groups were sacrificed the day after under chloroform anesthesia. The liver of these animals were removed, evaluated to ascertain the effect of the extract on the glycogen distribution using PAS method.

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 200mg/kg body weight of seed extract of *Sesamum indicum* 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 400mg/kg body weight of seed extract of *Sesamum indicum* revealing no observable histological changes when compared to the control section. (Plate 3)

DISCUSSION

From the results obtained, the 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 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 sesamum indicum seed has hepatoprotective property which protects the liver from any harmful agent.

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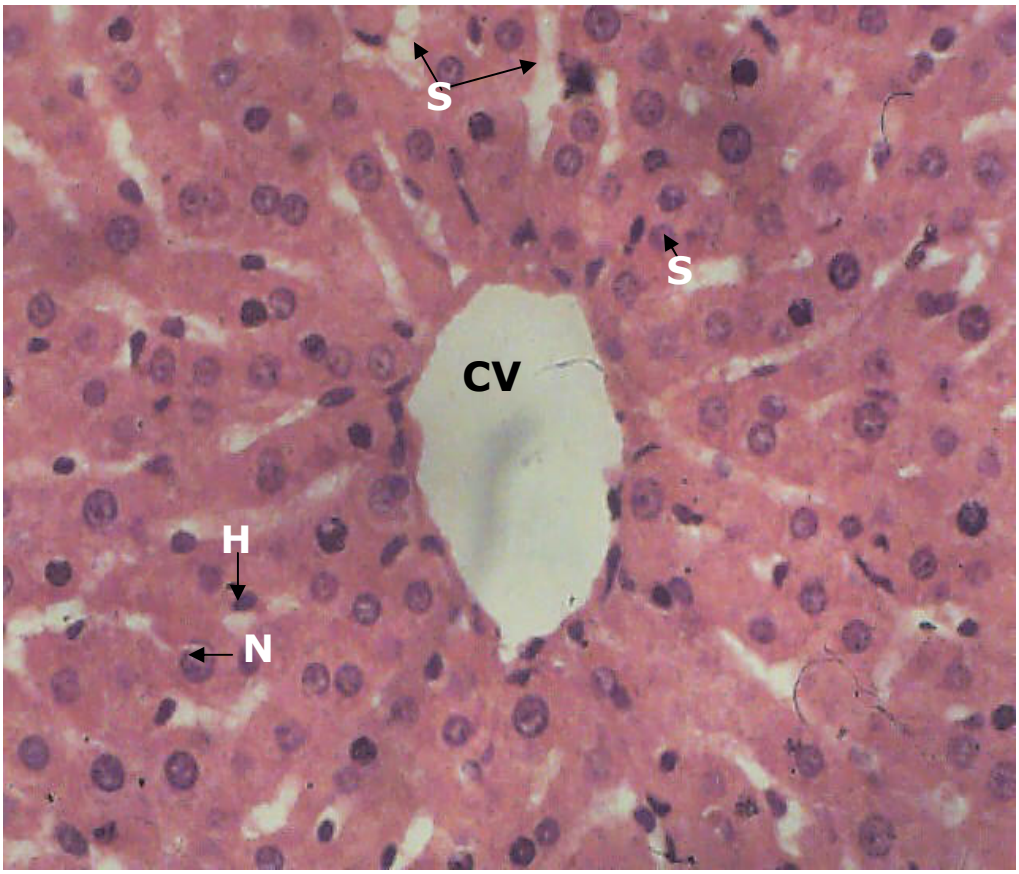

Plate 1: Photomicrograph of the liver from the control group fed with distilled water for 14 days using H&E stain shows well defined central vein (CV), Hepatocytes (H) and sinusoids (S).

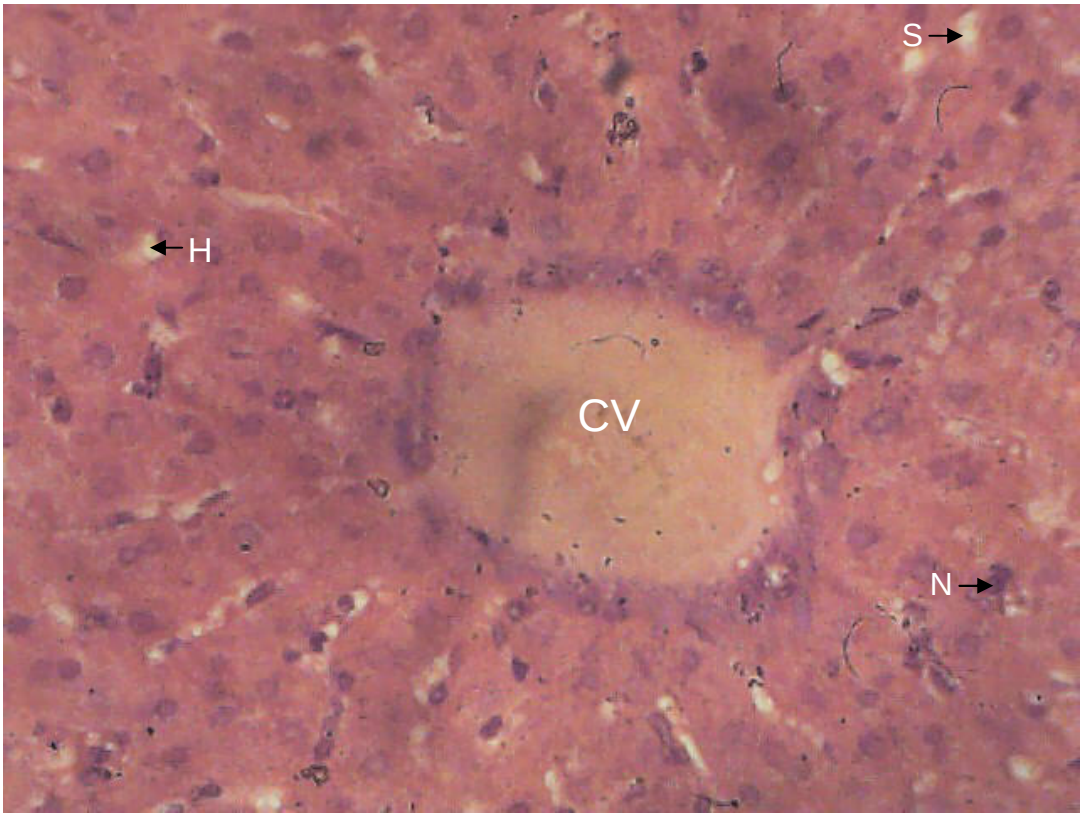

Plate 2: Section of liver from rats treated with 200mg/kgBW of seed extract of SI for 14 days using H&E stain shows no observable histological difference compared to the control as it presents polygonal hepatocytes (H), central vein (CV), Sinusoids (S) and Nuclei (N)

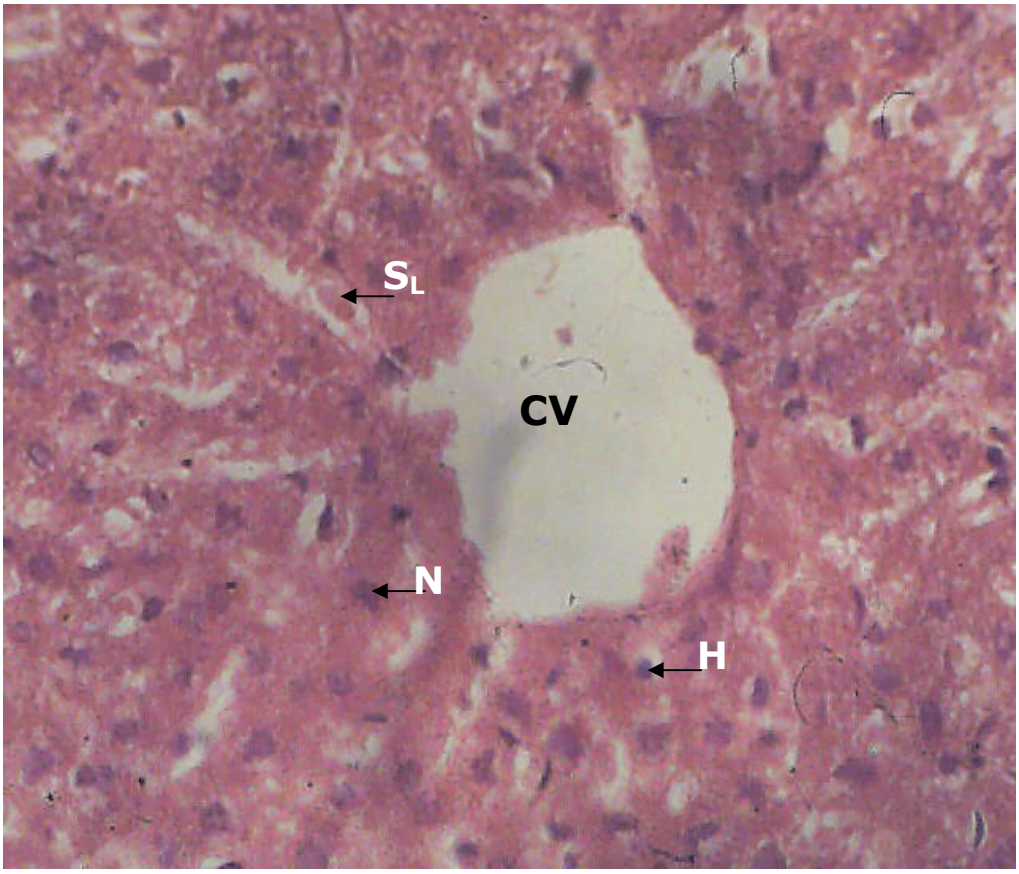

Plate 3: Section of liver from rats treated with 400mg/kgBW of seed extract of SI for 14 days using H&E stain ,(X400) shows no definite cell outline, nuclei not prominent and slightly dilated sinusoid with poor stain uptake.

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