# Histopathological Observations of the Liver of Albino Rats Orally Exposed to the African Black Soap (*Sabulun Salo*)

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**Abstract**

**Aim**: This is to determine the effect of oral administration of the sabulun salo (African traditional black soap) on the liver of albino rats. It is commonly produced and widely used in the Northern part of Nigeria and other parts of the country for herbal medication.

**Methods:** Twenty (20) albino rats were divided into four groups of three test groups and a control group. The albino rats were administered with different concentrations of sabulun salo for the period of two weeks. The groups (AC, BC and FC) received 2000mg/kg, 3000mg/kg and 4000mg/kg of the sabulun salo respectively. And the control group received normal feed.

**Results:** At end of the intervention, the albino rats were sacrificed and the livers were removed and processed for paraffin embedding. The blood samples were also collected for the biochemical and hematological analysis. At the end the analysis, the liver presented a normal histo-morphology across all the groups, the hematological and biochemical analysis showed some significant changes in the entire groups and the reduction in water and food consumption as the concentrations increased. There were also significant increased in white blood cell, hemoglobin and packed cell volume in the entire groups except in group FC when compared to the control and a haphazard changes in the blood biochemical parameters

**Conclusion:** The results of this research have shown that the African traditional black soap (Sabulun Salo) is histologically non toxic to the liver of the albino rats exposed.

**Keywords:** Histopathology, liver, albino rats, African Black Soap, *Sabulun Salo*

## Introduction

African traditional black soap is the type of soap that is widely used among various communities within and outside the African continents (Aliyu *et al*., 2012). The name varies also among various communities in African. It is widely referred to as sabulun salo, ose dudu among the Yoruba and in Igbo as Nchankota (Beauty out of Africa, BOA, 2011). This legend black soap was introduced in Ghana from Nigeria many years ago by Yoruba traders doing business in Ghana (BOA, 2011). Traditionally, African black soap which has in combination of water, roasted plantain skin or cocoa pad, palm oil, palm kerned oil or Shea butter when put together, is collectively referred to as black soap (Aliyu *et al*., 2012). Traditional medicine as described as the combination of knowledge, practice and belief incorporating plant, animal and mineral based medicine whether explicate or not, used in diagnosis, preventing or eliminating a physical, mental or social diseases and which may rely exclusively on past experience from generation to generation either verbally or in writing ( Sofowara, 1982 and David, 2005).

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African Black Soap has numerous benefit and importance (Aliyu *et al*., 2012). The African Black Soap has the ability of improving or eliminating uneven skin tone, razor bumps caused by ingrown hairs and skin rashes. It is an excellent for cleaning up oily skin, acne due to its antiseptic properties. It is also used to prevent skin from the rashes, ring worm measles, eczema and body odor. It is used in the treatment of many infectious diseases caused by micro-organism. Black soap is highly used for African spiritual purification (Karem, 2001). However; Sabulun Salo is special form of African Black Soap mainly used in the northern part of Nigeria. This type is devoid of artificial caustic soda, perfume, color and any other additives used in other types of African Black Soaps (Taiwo and Osinowo, 2001). It is produced from the ash of straw of millet and oil. The oil could be any of palm oil, groundnut oil, palm kernel oil, Shea butter. These types of African Black Soap are highly medicinal as it is used orally for the treatment of various forms of gastrointestinal tract infection. It is generally used in the northern part of Nigeria for, cleaning and washing of stomach of toxic substances. The word soap is derived from the Latin word called sapo which is cognate with Latin called sebum, a tallow appear to have been originally applied to the product obtained by treating tallow with ash. But in its strict chemical sense it refers to a combination of fatty acid with metallic bases (Simmon and Appleton, 2007).

It has been said that use of soap is a gauge of the civilization of a nation, but this may perhaps be a great measure correct at the present day, the use of soap has not always been co existent with civilization (Simmon and Appleton, 2007). The chemical constituents of sabulun salo are potassium hydroxide, sodium hydroxide, fatty acid, glycerol and trace elements (selenium, copper, lead and cadium).

Soap was first introduced into Rome from Germany, having been discovered by the Gaul who used the product obtained by mixing a goat tallow and beech ash for giving a bright hue to the air (Simmon and Appleton, 2007). In Africa, the native, especially the Fanti race have been accustomed to wash themselves with soap prepared by mixing crude palm oil and water with the ash of banana and plantain skin (Simmon and Appleton, 2007).

## Materials and Methods

**Test Substance**: The sabulun salo used in this study was bought from the Shehu Shagari central market, Sokoto, Nigeria.

**Animal husbandry:** Albino rats (About 3 weeks old) of either sex, bred in the animal house of Faculty of Pharmaceutical Sciences, Ahmadu Bello University Zaria, Nigeria, were used for the research. The albino rats were transferred into the animal house of the Faculty of Pharmaceutical Sciences, Usmanu Danfodiyo University, Sokoto, Nigeria where they were housed in a meshed bottom cage and left for about 6 weeks for maturity and acclimatization under continuous 12h light/darkness and fed with pelletized feed from FA feeds, Sokoto.

**Experimentation:** Different concentrations (2000, 3000 and 4000) mg/kg of weight of the sabulun salo solution, were prepared. The albino rats were grouped into four sets of 5 rats each after taking their weight. The control rats were resided in cage C and were given ordinary water. The exposed rats in cage AC, BC and FC were given 2000, 3000 and 4000mg/kg body weight of the sabulun salo, respectively. The experiment commenced on 4$^{th}$ June, 2015, six weeks after the purchase of the albino rats and was allowed to stay for about 14 days. At the end of the 14$^{th}$ day, the rats were sacrificed and the blood and the liver organ were removed, processed, histologically and stained in the histology laboratory.

**Hematological examination*:*** The albino rats were sedated with chloroform in the laboratory and a total death was prevented to allow for continuous flow of blood for proper blood collection. Each rat was pegged down on a work bench and held firmly with office pin. Surgical blades were used to cut through the chest region of the rat in a dorsal-ventral direction.

The blood was then collected from the cardiac puncture using syringe and needle. And it was discarded into plane and EDTA bottle. The EDTA served as anti coagulant. The blood parameters (PCV, Hbg, WBC, Platelets and Differential Leucocytes) were determined using sysmex auto-analyzer.

Biochemical analysis: The biochemical parameters which includes alanine aminotransferase (ALT) (Kaplan *et al.,* 1984), alkaline phosphatase (Monica, 1998), total protein (Kaplan *et al.,* 1984) and albumin (Doumasa *et al.,* 1971) were analyzed.

**Statistical analysis:** The multiple comparison of the weights and biochemical scores were analyzed by ANOVA followed by Tukey's test. The difference between groups was considered significant when $P < 0.05$

## Results

The total number of twenty albino rats, were used for the study. From Figure 1, there are decreases in both food and water consumptions as the concentrations of the sabulun salo increase along the groups when compared to control.

The photomicrographs A, AC, BC and FC show the normal histo- morphology of liver. The Figure 2 shows no significant difference in the total protein in the entire groups ($0.05 < p$) except in group BC where total protein show a slightly significant decrease ($p< 0.05$) when compared to control. The albumin shows no significant difference in the entire groups except in group BC where it shows a slightly significant decrease in the albumin ($p< 0.05$) when compared to control. ALP shows a significant decrease in the entire groups ($p< 0.05$) when compared to the control. ALT shows a significant increase in the entire groups except in group AC where, it decreases significantly ($p< 0.05$) when compared to the control. The AST increase significantly ($p< 0.05$) in the entire groups except in group AC where it shows no significant difference when compared to the control. . The haematological values obtained for albino rats fed with different doses of sabulun salo were presented in Table 1. The results indicated that WBC, HBG and PCV increase significantly ($p<0.05$) in the entire groups except the albino rats in group FC (on the highest dose) when compared with control. The platelets increase significantly ($p<0.05$) in the entire groups when compared with control. The lymphocytes increase significantly ($p< 0.05$) in the group BC, decrease significantly ($p< 0.05$) in the group FC and the results also indicated that there are no significant difference in the group AC when compared to control.

The Monocytes decrease significantly ($p< 0.05$) in the group BC and FC when compared to control and the group AC shows no significant difference when compared to control.

The granulocytes showed no significant difference in the entire groups except those in group FC (on the highest dose) which increase significantly ($p< 0.05$) when compared to control.

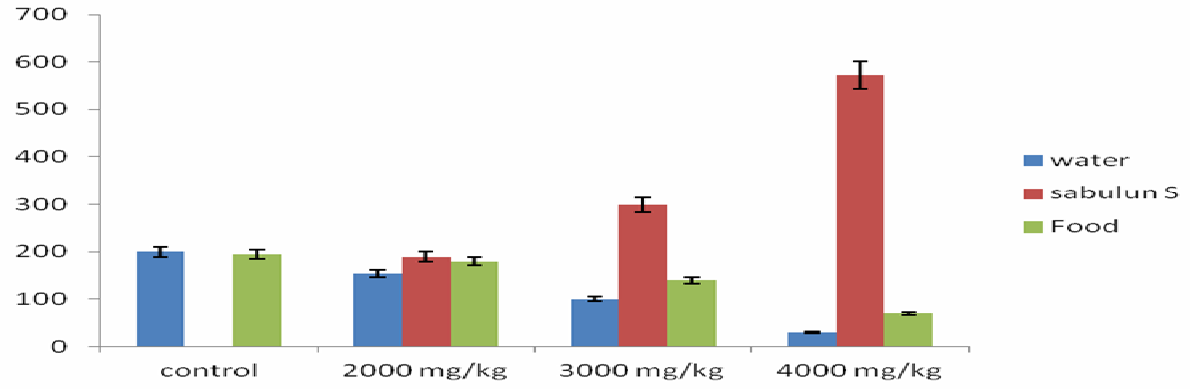


**Figure 1: Effect of sabulun salo on food and water consumption of the albino rats fed with the different concentrations after 14th days of administration**

*Histopathological Observations of the Liver*

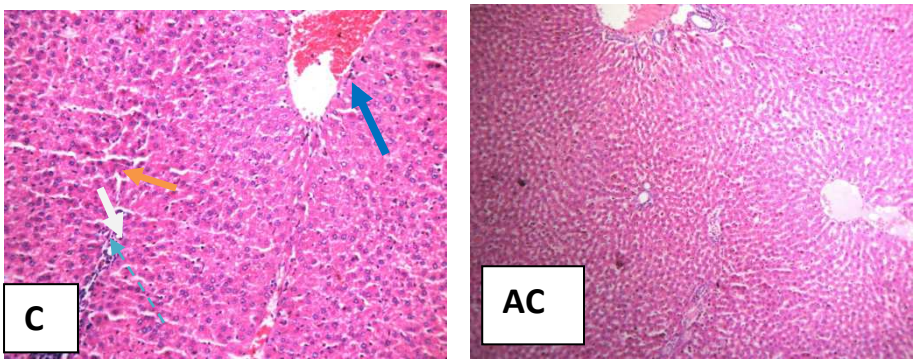


**Plate 1: (Control group = C). Liver histology Showing a normal hepatic artery (green arrow), portal vein (white arrow) and a central (centrolobular) vein (blue arrow). H & E X 200.**

**Plate 2: (Group AC = AC). Liver histology showing a normal Portal triad (black arrow) and a central (centrolobular) vein (blue arrow). Note the hepatocyte plates that limit the space occupied by the sinusoids. H & E X 200**

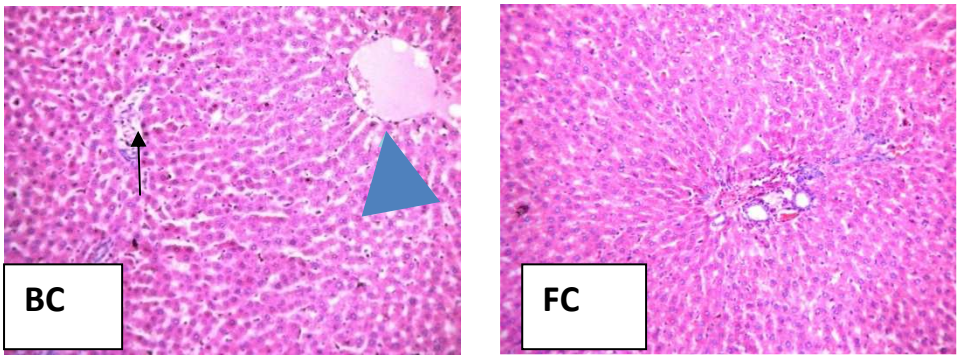


**Plate 3: (Group BC = BC). Liver histology showing a normal Portal triad (black arrow) and a central arrow (centrolobular) vein (white arrow). Note the hepatocyte plates that limit the space occupied by the sinusoids. H & E X 200**

**Plate 4: (Group FC = FC. Liver histology showing a normal Portal triad (black arrow). Note the hepatocyte plates that limit the space occupied by the sinusoids. H & E X 200**

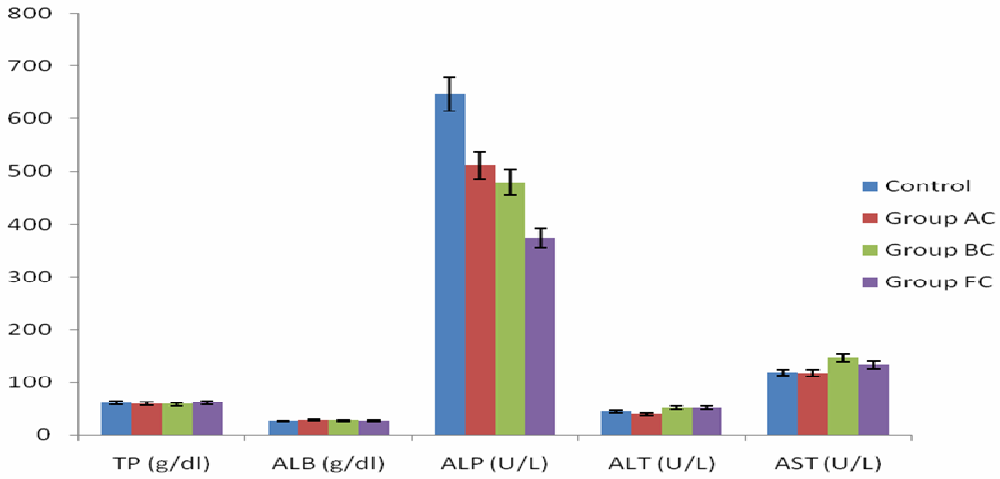


**Figure 2: Showing effect of different concentrations of sabulun salo on some biochemical parameters after 14th days administration**

TP = Total protein, ALB =Albumin, ALP = , Alkaline phosphatase, ALT=, Alanine aminotransferase, AST= Aspartate aminotransferase, Group Ac= 2000mg/kg, GroupBc=3000mg/kg, GroupFc=4000mg/kg

**Table 1: Hematological parameters of the experimental groups**

| Parameters | Groups Control | Group AC | Group BC | Group FC |
|---|---|---|---|---|
| WBC (x $10^{-3}$ µl) | 4.10±0.00$^{a}$ | 4.80±.10 $^{b}$ | 4.74±.11$^{bc}$ | 2.78±.24 $^{d}$ |
| HBG (g/dl) | 11.30±0.00$^{b}$ | 11.82±0.26$^{c}$ | 11.42±0.34$^{ab}$ | 11.24±0.09$^{bd}$ |
| PCV (%) | 45.00±0.00$^{c}$ | 49.60±1.82$^{b}$ | 45.40±0.55$^{ac}$ | 44.82±0.61$^{cd}$ |
| Platelets ($10^{3}$/ µl) | 545±0.00$^{a}$ | 693.2±28.86$^{b}$ | 798.6±116.95$^{c}$ | 611.80±47.97$^{ab}$ |
| Lymphocyte (%) | 88.10±0.00$^{d}$ | 87.48±1.21$^{d}$ | 89.12±0.91$^{cd}$ | 45.76±1.84$^{b}$ |
| Monocytes (%) | 4.60±0.00$^{e}$ | 4.86±0.37$^{e}$ | 4.04±0.21$^{b}$ | 3.00±0.40$^{c}$ |
| Granulocytes (%) | 7.30±0.00$^{a}$ | 7.46±1.15$^{a}$ | 6.80±0.78$^{a}$ | 51.24±2.01$^{b}$ |

Values are presented as mean±SD. Values with different superscripts per row are significantly different ($p<0.05$). WBC=white blood cell, HBG=haemoglobin level, PCV=packed cell volume.

**Discussion**

The reduction of the water and food consumption of the exposed albino rats may be due to the irritation of the gastrointestinal tract of the albino rats caused by the sabulun salo solution ingestion. The reduction of water and food consumption in the exposed group also supports the finding of Esenowo and Ugumba (2010) who reported that sub lethal concentration of soap reduced the food consumption and the weight of catfish. Rejeki *et al*. (2006). Also observed that chronic concentration of soap also reduced food consumption and retard the growth of the sea bass larvae exposed significantly. However, the result contradicts Faremi and Olayede (2010) who did not observe any significant reduction in the growth, food and water consumption in albino rats exposed to the soap and detergents. Poor physiological conditions of the exposed rats can lead to the loss of appetite (Ogunbileje and Akinosum, 2011).

This study did not find histological changes on liver and even cancer which has been suspected by some researchers (Kassem 2011), probably due to the short duration of the study.

Sodium silicate and potassium hydroxide, a major components of soap has been fingered in gastrointestinal irritation leading to nausea , severe digestive tract burns and weight loss in an exposed animal (Warne and Schifko, 1999). Reduction in the blood parameters (WBC, Platelets, PCV, HBG and Differential) of the exposed albino rats compared to the control rat confirm the earlier report of Wadaan and Mubarak (2009) who reported blood parameters reduction in rabbit exposed to the soap. The reduction in the blood parameters was as a result of destruction of the cells of the albino rat by the traces of amounts of heavy metals found in the soap (Abulude *et al.*, 2007). Riaz *et al*. (2009) Reported that blood of an animal may be adversely affected by soap used as anti bacteria because they do so by killing cells. The increase in the WBC of the exposed albino rats was as a result of immune response of the albino rat to the toxic components of the soap solution There was a significant increase in the serum alanine aminotransferase (ALT) and aspartate amino transferase (ASP). This increase in ALT also supported the idea that activities of amino transferase were affected in the stomach membrane. The elevation could be due to the irritation of the liver organ as a result of sabulun salo ingestion.

The decrease in the serum alkaline phosphatas (ALP) may be due to the inhibition or inactivation of ALP production insitu in the body by the sabulun salo ingestion (Umezawa and Hooper, 1982). The total protein and albumin were not affected by the sabulun salo solution. Probably, the liver from which these proteins were produced was not affected histologically by the soap solution. This may be due to the short duration of the research.

**Conclusion**

The Sabulun salo (African black soap) is one of the African traditional herbs used in the northern part of the country Nigeria as medicinal herb. The results of this research have shown that the sabulun salo (African traditional black soap) is non- toxic to the albino rats exposed. The soap was found out to have no histological effect on the albino rats subjected to an acute application sabulun salo of and the hematological and biochemical tests revealed some significant changes across the groups. It is also presumed that all other animals including man will have similar fate if exposed to the sabulun salo solution.

**Recommendations**

It is recommended that, more researches should be conducted in this area of research because at present very little research has been conducted in this area.

It is also recommend that a further research should be conducted on the chronic 3effect on the vital organs of the body.

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