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Histopathological Evaluation of Toxic Effect of Oral Administration of African Black Soap (*Sabulun salo*) on the Kidney of Albino Rats

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Author for Correspondence*: scientistmom910@gmail.com<https://dx.doi.org/10.4314/sokjmls.v9i2.14>**Abstract**

African traditional black soap (*Sabulun salo*) is commonly used in many local settings in Nigeria. The aim of this study was to determine the histopathological evaluation of toxic effect of oral administration of the African traditional black soap (*Sabulun salo*) on the kidney of Albino rats. The albino rats were divided into four groups of five per test groups and a control group. The test groups (AC, BC and FC) were administered with the different concentration (2000mg/kg, 3000mg/kg and 4000mg/kg) of African traditional black soap (*Sabulun salo*) for the period of two weeks respectively. The control group received normal saline. At end of the intervention, the animals were sacrificed, and the kidneys were processed for paraffin embedding. The blood samples were collected for biochemical and haematological analysis. The kidney presented a normal histo-morphology across all the groups. The haematological and biochemical analysis showed some significant changes in the entire groups. There was a reduction in water and food consumption as the concentrations increased. There was a significant increase in white blood cell, haemoglobin and packed cell volume in the entire groups except in group FC when compared to the control. There were haphazard changes in the blood biochemical parameters. The results of this research have shown that the African traditional black soap (*Sabulun salo*) is histologically non-toxic to the kidney of the albino rats exposed.

Keywords: Toxic effect, Kidney, Biochemical, Histopathological changes**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* (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 pod, palm oil, palm kernel 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 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). 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 excellent for cleaning up oily skin and acne due to its antiseptic properties. It is also used to prevent skin rashes, ring worm measles, eczema and body odor. It is used in the treatment of many infectious diseases caused by micro-organisms. 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 appears 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). An atomic absorption spectrophotometric analysis (AAS) conducted on a given sample of Sabulun salo in the central laboratory of Usmanu Danfodiyo University, Sokoto State, revealed the presence of mineral elements which are potassium, Sodium, Calcium iron, selenium copper and lead. Potassium and Sodium elements were present in high quantitative. This finding is also in agreement with the finding of Abdullah and Ibrahim (2013). An LD₅₀ using Lorke's method was also conducted on the sample, and it was found to be greater than 5000mg/kg body weight. It has been said that the 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 other trace elements which includes 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). The aim is to determine the histopathological evaluation of toxic effect of oral

administration of the African traditional black soap (Sabulun salo) on the kidney.

Materials and Methods

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

Animal husbandry: Albino rats (About 3 weeks old) of either gender, 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. 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 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 placed in cage C and were given ordinary water. The exposed rats in cage AC, BC and FC were given 2000, 3000 and 4000mg/kg of the sabulun salo, respectively. The experiment commenced on 4th 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 14th day, the albino rats were sedated with chloroform in the laboratory and 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 an 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 emptied into the EDTA bottle. The blood samples in the EDTA bottles were used for the blood parameters (PCV, Hbg, WBC, Platelets and Differential Leucocytes) using Sysmex auto-analyzer. While that in plain bottles were used for the biochemical parameters including urea (Monica, 1998), sodium, potassium (Ochei, 2000) and bicarbonate (Van *et al.*, 1924). The kidney organs were removed, processed

histologically and stained with haematoxylin and eosin in the histopathology laboratory.

Results

The total numbers of twenty albino rats were used for the study. The animals were divided into 3 experimental groups of five animals and the control group of five animals. The experimental group was divided group AC, AB and FC. And the groups were administered 2000, 3000 and 4000mg /kg of sabulun salo respectively. 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. Figures 2, 3, 4 and 5 show

the normal histology of kidney. The figure 6 indicated a significant increase in the potassium in the entire ($p < 0.05$) group except in the group AC which shows no significant difference in potassium when compared to the control. The sodium is significantly increased in group BC and FC ($p < 0.05$) and significantly decreased in group AC when compared to the control. The urea increases significantly ($p < 0.05$) in the group BC and FC when compared to the control and decrease significantly in group AC when compared to the control. The bicarbonate shows no significant difference in the entire groups ($0.05 < p$) when compared to the control.

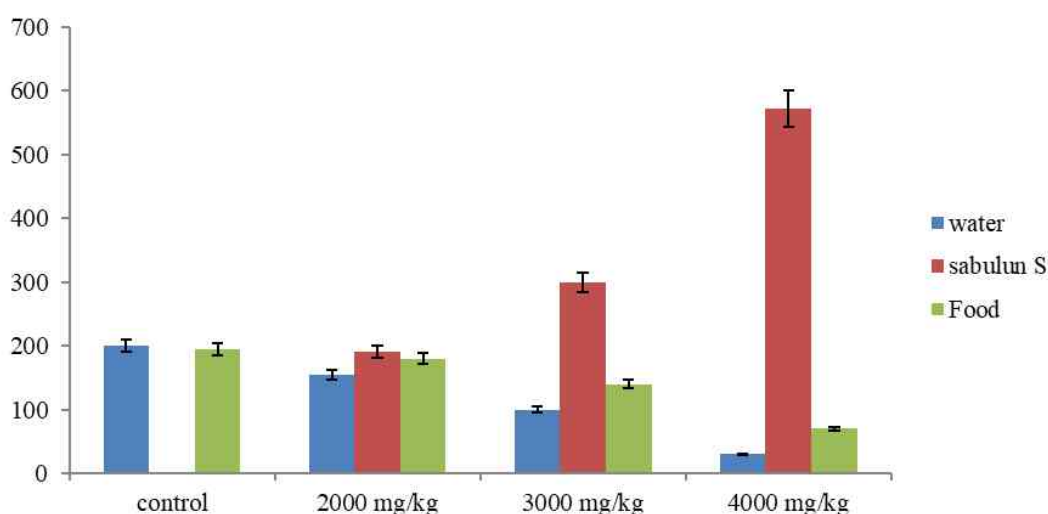


Figure1: Effect of sabulun salo on food and water consumption

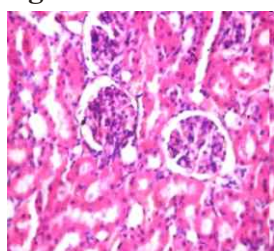


Figure 2: Control group (C) of kidney histology showing glomeruli exhibiting round configuration with normal cellularity (short arrow) and compact arrangement of the tubules (short arrow) and the limited amount of interstitial tissue. H & E X 100

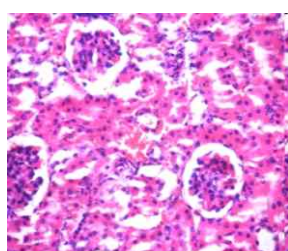


Figure 3: Group AC of kidney histology showing some glomeruli exhibiting round configuration with normal cellularity (short arrow) and compact arrangement of the tubules (long arrow) and the limited amount of interstitial tissue. H & E X 100.A

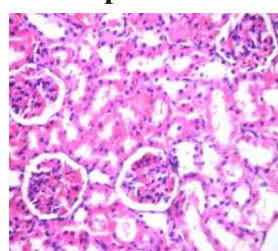


Figure 4: Group BC of kidney histology showing glomeruli exhibiting round configuration with a relatively normal cellularity and compact arrangement of the tubules and the limited amount of interstitial tissue. H & E X 100.

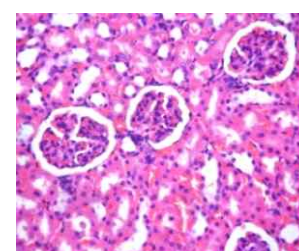


Figure 5: Group FC of kidney histology showing glomeruli exhibiting round configuration with a relatively normal cellularity (short arrow) and compact arrangement of the tubules(long arrow) and the limited amount of interstitial tissue. H & E X 100.

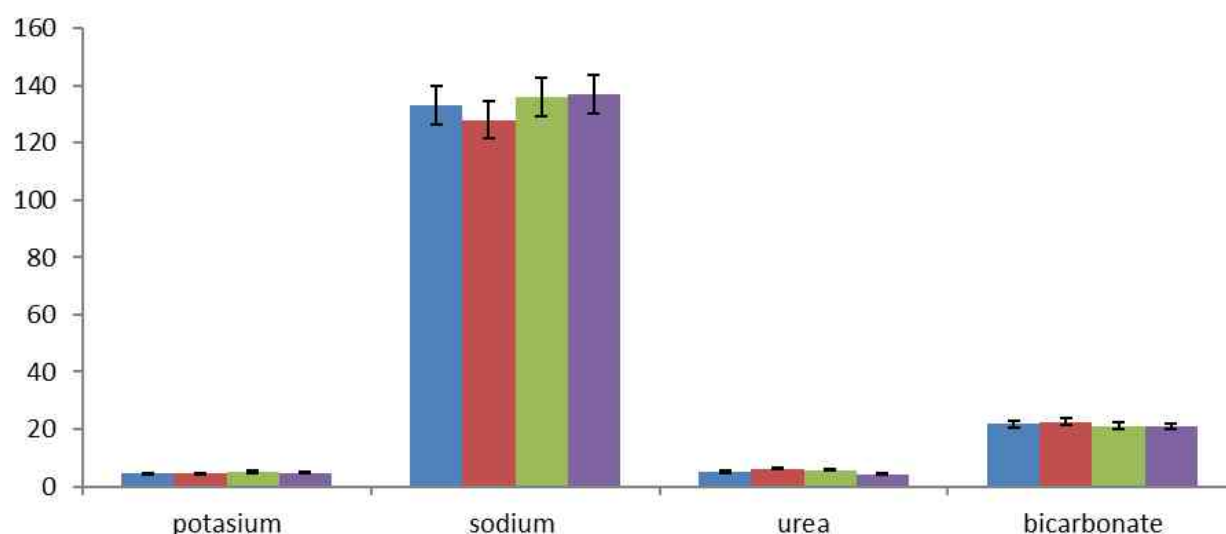


Figure 6: Effect of sabulun salo on some biochemical parameter.

Key

Group AC= 2000mg/kg
 Group BC=3000mg/kg
 Group FC =4000mg/kg

The haematological values obtained for animals fed with different doses of Sabulun salo are presented in Table 1. The results indicated that WBC, HBG and PCV increased significantly ($p < 0.05$) in the entire groups except 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 differences 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 showed no significant difference when compared to control. The granulocytes show no significant difference in the entire groups except in group FC (on the highest dose) which increases significantly ($p < 0.05$) when compared to control.

Table 5: Haematological parameters of the experimental groups

Parameters	Groups			
	Control	Group A _C	Group B _C	Group F _C
WBC ($\times 10^{-3} \mu\text{l}$)	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 ($10^3 / \mu\text{l}$)	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 current study indicates that there is reduction of water and food reduction in the exposed rats. 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. Similarly, 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 the report of Faremi and Oloyede (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 in kidney and even cancer which has been suspected by some researchers (Kassem, 2010), probably due to the short duration of the study. Sodium silicate and potassium hydroxide, a major component 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 antibacterial because they do so by killing cells. The increase in the WBC of the exposed albino rats may be as a result of immune response of the albino rat to the toxic components of the soap solution. There was a general increase in the body electrolytes (potassium and sodium). This could be due to the presence of about 98% of the mineral elements of Sabulun salo including potassium and sodium (Onyegbado, 2002). Finally, there was a

haphazard change in body serum urea. This could be due to the fact that there are some factors that interfere with the serum urea and this includes the dietary status of the experimental rats.

Conclusion

The Sabulun salo (African black soap) is one of the African traditional herbs used in northern, Nigeria as herbal medicine. The results of this research have shown that the Sabulun salo (African traditional black soap) is histologically non-toxic to the kidney of albino rats exposed but have some biochemical and haematological effect on the albino rats exposed.

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