

# Differentia Effects Of Calabash Chalk On The Histology Of The Liver Of Adult Wister Rats

M Ekong, A Akpantah, O Ibok, M Eluwa, T Ekanem

## Citation

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## Abstract

The environment we live contains different chemicals we consume oblivious of its detrimental effects. One of such is calabash chalk. This study was to ascertain the effect of two commonly available preparation of this chalk on the histology of the liver of adult Wistar rats. Twenty-four adult female Wistar rats of weight 90-110g were assigned into two groups (1, 2, and 3). Group 1 was the control and the animals received distilled water, while groups 2 and 3 were treated by oral gavage each with 40mg/kg of non-salted and salted calabash chalk respectively for 14 days. The liver sections of the non-salted group showed sinusoids enlargement and fragmented parenchyma, while the salted group presented no obvious pathology compared to the control. Besides liver histological and may be functional damage, this may prone the liver to susceptibility to other form of toxins. We thus infer that the non-salted calabash chalk is detrimental to health unlike the salted calabash chalk.

## INTRODUCTION

Calabash chalk also known as Calabar stones is not a conventional food though consumed by a wide range of communities. In Nigeria, pregnant and breast feeding women patronized it the most <sup>1,2</sup>.

This chalk which is natural and made up of fossilized seashells may be prepared artificially from clay and mud. This combination may then be mixed with other ingredients including sand, wood ash and sometimes salt. The resulting product is molded and then heated to produce the final product <sup>3</sup>.

Different names have been ascribed to this chalk depending on which part of the world it is found. It is known as La Craie or Argile in French, Nzu and Ndom by the Igbo and Efiks/Ibibios respectively of Nigeria, and Mabele by the Lingala of Congo. It is sold in blocks, pellets and powder forms <sup>2</sup>. This chalk is composed of Aluminum silicate hydroxide from the kaolin clay group with the possible formula:  $Al_2 Si_2 O_5 OH_4$ . This has been tested to contain lead and arsenic <sup>1,3,4,5</sup>. The quantity of lead is reported to be approximately 40 mg/kg with other organic pollutants being alpha lindane, endrin, endosulphan 11 and P, P<sup>1</sup> - DD <sup>4</sup>. Lead and arsenic are poisonous substances which may result in death to the consumer <sup>2,4</sup>.

Exposure to this higher levels of lead by pregnant and breast

feeding women poses a risk to the mental development of their developing unborn babies and breast feeding infants <sup>1,5</sup>. Reports such as these and others including; cancers of the urinary bladder, lungs and skin <sup>5</sup> lead us to investigate the effect of both salted and non-salted preparations of calabash chalk on the histology of the liver of adult female Wistar rats.

## MATERIALS AND METHODS

After approval by the Ethics Committee of the University of Calabar, Calabar-Nigeria of the research proposal, twenty-four adult female Wistar rats with weight of 90-110g were used for this study after acclimatization for two weeks in the Animal house of the Department of Anatomy, University of Calabar, Calabar-Nigeria.

The animals were equally divided into 3 groups (A, B and C). Group A served as the control and they received distilled water, while groups B and C were treated with a solution each of 40mg/kg of non-salted and salted Calabash chalk respectively.

The two forms of Calabash chalk were bought as blocks from a local market in Calabar, Nigeria. They were grounded into powder. One gram each of the powder was dissolved in 100ml of distilled water. Then 40mg/kg equivalent of the chalk solutions were administered to the experimental animals. The treatment was by oral gavage,

once every day in the mornings with the administration lasting for 14 days.

On the 15<sup>th</sup> day, the animals were sacrificed by humane killing with chloroform anaesthesia and the livers were excised and preserved in Bouins fluid and subsequently routine haematoxylin and eosin method was applied for staining the liver sections.

**RESULTS**

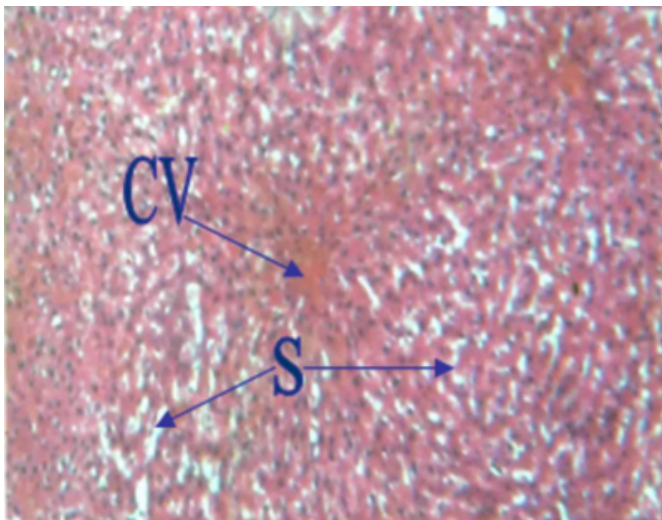
The control presented normal liver sections. A preserved cytoarchitecture with hexagonal lobules consisting of central veins and radially arranged hepatocytes. The sinusoids lined with endothelial cells were also present.

Group B treated with 40mg/kg of non-salted Calabash chalk showed fragmentation of the parenchymal cells, with few hexagonal lobules and dilated sinusoids compared to the control.

Group C treated with 40mg/kg of salted Calabash chalk showed no remarkable pathology compared to the control.

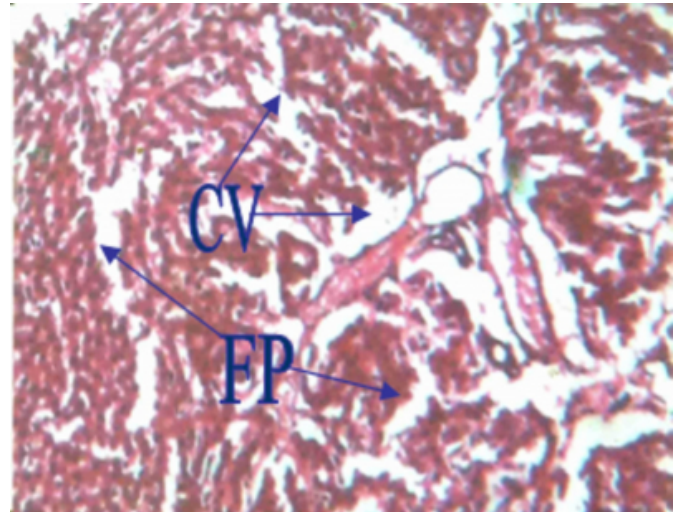
**Figure 1**

Plate 1: Photomicrograph of the control presented normal liver sections. A preserved cytoarchitecture with hexagonal lobules consisting of central veins (CV) and radially arranged hepatocytes. The sinusoids (S) lined with endothelial cells were also present.



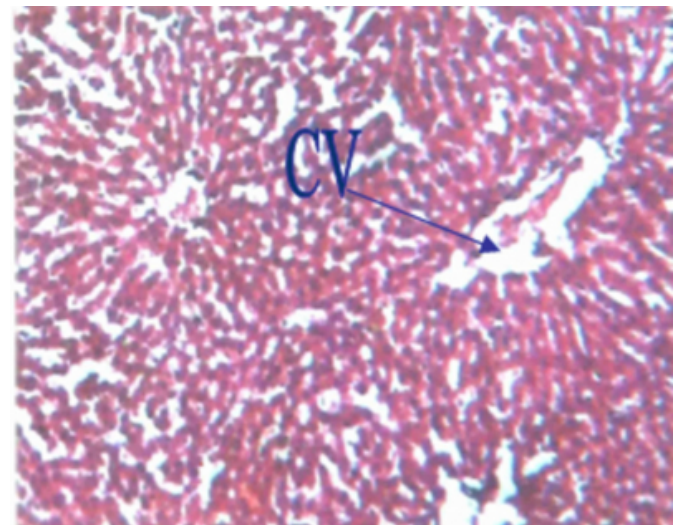
**Figure 2**

Plate 2: Group B treated with 40mg/kg of non-salted Calabash chalk showed fragmentation of the parenchymal cells (FP), with few hexagonal lobules and dilated sinusoids (DS) compared to the control.



**Figure 3**

Plate 3: Group C treated with 40mg/kg of salted Calabash chalk showed the central vein (CV) with no remarkable pathology compared to the control.



**DISCUSSION**

The result revealed slight lesion in the liver section of the group treated with 40mg/kg of non-salted calabash chalk. The liver is a very important organ in the body which serves in the detoxification of metabolic waste products, various drugs and toxins. It also destroys spent red cells and reclaims their constituents<sub>6</sub>. Absorbed substances in the portal vein enter the liver sinusoids. If these substances are toxic, they may cause changes in the sinusoids and other parts of the liver<sub>7</sub>. This may be a reason for the pathological changes

observed in this study because calabash chalk contains harmful substances like lead and arsenic<sup>1,3,4,5,8</sup>. This is in line with a report of Alexakis et al<sup>9</sup>. They reported that after carbon dioxide pneumoperitoneum pig livers presented portal and intralobular inflammation, edema and sinusoidal dilation. Eweka and Om'Iniabo<sup>10</sup> reported dilatations of the central veins, which contained lysed red blood cells and cyto-architectural distortions of the hepatocytes, centrilobular hemorrhagic necrosis, atrophic and degenerative changes in the liver treated with monosodium glutamate.

The group treated with 40mg/kg of salted calabash chalk presented no obvious pathology. This may be that the additional salt constituent may have had a modulatory effect on the other toxic components of the calabash chalk.

Calabash chalk contains lead in high amount<sup>4</sup>. This has been implicated in the disruption of the biosynthesis of hemoglobin and anemia, rise in blood pressure, kidney, liver and brain damage<sup>10,11</sup>. Another report also confirms that lead damages the liver<sup>12</sup>, and Adegbesan and Adenuga<sup>13</sup> suggested that lead hepatotoxicity may be through the release of free radicals. Free radicals usually cause tissue damage. These may have been the reasons for the pathology presentation seen in the group treated with 40mg/kg of non-salted Calabash chalk. This may likely result in functional damage to the liver and may also prone the liver to susceptibility to other form of toxins, further causing more damage.

In conclusion, our investigation revealed that non-salted calabash chalk is detrimental to the liver and thus may be detrimental to health.

### References

1. Campbell H. Calabash chalk (Calabar stone, La Craie, Argile, Nzu, Mabele). Chief Medical Officer, CB upper

Newtownards Road, Belfast. 2002.

2. Northumberland Country Council Press Release Archives. Product warning: Excess lead in Calabash chalk. Country Hall. Morphet Assessed on December 2, 2008.

3. Food Standards Agency. Lead contamination of Calabash chalk category B: For Action. 2002. Url: [www.food.gov.uk](http://www.food.gov.uk). Assessed December 2, 2008.

4. Dean JR, Deary ME, Gbefe BK, Scott WC. Characterization and analysis of persistent organic pollutants and major, minor and trace elements in Calabash chalk. *Chemosphere* 2004; 57(1): 21-25.

5. Health Canada. Calabash chalk may pose health risk for pregnant and breastfeeding women. 2007. Advisory 2007-136 in [www.hc-sc.gc.ca](http://www.hc-sc.gc.ca) Assessed on December 2, 2008.

6. Young B, Heath JW. The evidence glands. In Young B, Heath JW (eds.) *Wheater's Functional Histology: a text and color atlas*. 4th ed. Churchill Livingstone, Edinburgh Pp.310-327. 2004.

7. Kane AB, Kumar V. Environmental and Nutritional pathology In: Kumar V, Abbas AK, Fausto N (eds). *Robbins and Cotran Pathologic Basis of Disease*. 7th ed. Saunders-Elsevier: New Delhi. pp 415-468. 2007

8. Annabi BA, Nehdi A, Hajjaji N, Gharbi N, El-Fazaas. Antioxidant enzymes activities and bilirubin level in adult at treated with lead. *C R Biol* 2007; 330(8): 581-588.

9. Alexakis W, Gokiopoulou H, Dimitriou C, Albanopoulosk, Fingerhut A, Skalistira M, Patsouris E, Bramis J, Leandros E. Liver histology alterations during carbon dioxide pneumoperitoneum in a porcine model. *Surgical Endoscopy* 2008; 22(2): 415-420.

10. A.O. Eweka & F.A.E. Om'Iniabo: *Histological Studies Of The Effects Of Monosodium Glutamate On The Liver Of Adult Wistar Rats*: *Internet J Gastroenterol*. 2008; 6(2).

11. Centre for Disease Control and Prevention. Managing elevated blood lead levels among young children. Recommendations from Advisory Committee on Childhood lead poisoning prevention. Atlanta, Georgia: US. Dept of Health & Human Services. 2002.

12. Lenntech. Chemical Properties of lead-Environmental effects of lead. Url:[www.wikipedia.com](http://www.wikipedia.com). Assessed December 2, 2008.

13. Sipos P, Szentmihályi K, Fehér E, Abaza M, Szilágyi M, Blázovics A. Some effects of lead contamination on liver and gallbladder bile. *Acta Biologica Szegediensis* 2003; 47(1-4):139-142.

14. Adegbesan BO, Adenuga GA. Effect of lead exposure on liver lipid peroxidative and antioxidant defense systems of protein-undernourished rats. *Biol Trace Element Res* 2007; 116(2): 219-225.

**Author Information**

**Moses B. Ekong, M.Sc.**

Department of Anatomy, Faculty of Basic Medical Sciences, University of Calabar

**Amabe Akpantah, Ph.D.**

Department of Anatomy, Faculty of Basic Medical Sciences, University of Calabar

**Ofon S. Ibok, B.Sc.**

Department of Anatomy, Faculty of Basic Medical Sciences, University of Calabar

**Mokutima A. Eluwa**

Department of Anatomy, Faculty of Basic Medical Sciences, University of Calabar

**Theresa B. Ekanem, Ph.D.**

Department of Anatomy, Faculty of Basic Medical Sciences, University of Calabar