African Journal of
Clinical Medicine and Pharmacy Research

ISSN : 3434-2990

Index: Harvard, Boston, Sydney University, Dimensions, Lens, ResearchGet Scilit, Semantic, Google Scholar, Base etc

https://doi.org/10.58578/AJCMPR.v1i1.3975

Histological Assessment of Aqueous Solution of *Hibiscus sabariffa* calyx (Zobo drink) on the Frontal Cortex and Hippocampus of Albino Wistar Rats

Williams Oche Ujah[1], Ozzioma Praise Acha[2], Charles Ayara[3], Victor Makanjuola[4], Eric Agim Agaba[5], Queen Uyo Williams[6], Tensaba Andes Akafa[7], Isaac John Umaru[8]

[12,3,4,6]Bingham University Karu, Nasarawa State, Nigeria

[5]University of Calabar, Calabar, Nigeria

[7,8]Federal University Wukari, Taraba State, Nigeria

umaruisaac@gmail.com

Article Info:

Submitted:	Revised:	Accepted:	Published:
Sep 15, 2024	Oct 1, 2024	Oct 16, 2024	Oct 21, 2024

Abstract

Zobo drink which is consumed by many Nigerians, is a non-alcoholic beverage with phytoactive properties. This study investigated the histological outcome of *Hibiscus sabdariffa* calyx aqueous solution (Zobo drink) on the frontal cortex and hippocampus of albino wistar rats. Twenty (20) albino wistar rats were used, and grouped into a control group A, B, C, D and E. Group A was the control group. 0.5ml of Zobo drink was administered at different time interval to the experimental groups for 21 days. Zobo drink was administered to group B once a day, two times a day to group C, three times a day to group D and throughout the duration of administration to group E. In the end, the rats were sacrificed and the brain was removed and fixed in 10% formal saline solution. The frontal cortex and hippocampus were stained with Haematoxylin and eosin. Results show that no adverse effect on the frontal cortex of group B, C, D and E but shows effect on group E which is the high dose.

Keywords: Zobo drink; Eosin; Haematoxylin; Histology

AJCMPR Journal is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License

INTRODUCTION

The *Hibiscus sabdariffa* plant, a member of the Malvaceae family, is a nutritious food source and medicinal. The calyces are used as a common ingredient in cuisine and are also used as traditional medicine in many countries, where they are used to treat a variety of illnesses and improve general health.[1] *Hibiscus sabdariffa* is grown for its leaves, seeds, fleshy calyx, or fiber. In Nigeria, *Hibiscus sabdariffa* calyces are majorly grown in states such as Kano, Jos, Maiduguri, Kastina and Kwara.[2-3] *Hibiscus sabdariffa* is known as roselle in Australia, bissap in Senegal, Guinea Bissau, Mali, Burkina Faso, Ghana, Benin, Niger, Congo, and France in Chinese, luoshen hua, and in Nigeria, zobo.[4] Popular across Nigeria, the nonalcoholic Zobo drink is made from dried calyces of the *Hibiscus sabdariffa* plant by steaming and filtration, which has a sour flavor. In the tropics, Zobo drink is used to quench thirst during hot weather. Most people in society with low incomes consume it.[5] The application of Zobo drink in phytomedicine is growing in popularity. This is explained by the fact that it naturally contains phytochemicals that have anti-oxidant, anti-hypertensive, anti-neurodegenerative, and other medicinal properties. [6-7]

MATERIALS AND METHODS

Twenty albino wistar rats were purchased from National Veterinary Research Institution Vom, Plateau State were used for the experiment. Plastic cages with iron wire netting, saw dust, animal feed, latex laboratory gloves, weighing balance, dissecting set and board, measuring cylinder, sample bottles, cotton wool, glass slides and slide rack, cover slips, light microscope and microtome. The animals were grouped by their weight into five (5) groups and administered Zobo drink at various concentrations. Group A (control) were given only food and water. Group B (Morning) were given Zobo drink once a day. Group C (Morning and afternoon) were given Zobo drink two times a day. Group D (Morning, afternoon and evening) were given Zobo drink three times a day, while Group E were given Zobo drink throughout the 21 days of the experiment.

Animal Sacrifice and Tissue Collection

At the end of the administration, the rats were sacrificed applying the chloroform inhalation technique in a closed chamber and then the brains were removed. The brains were then fixed in 10% formal saline fluid for Hematoxylin and Eosin staining. Afterwards the organs were histologically analyzed.

RESULTS

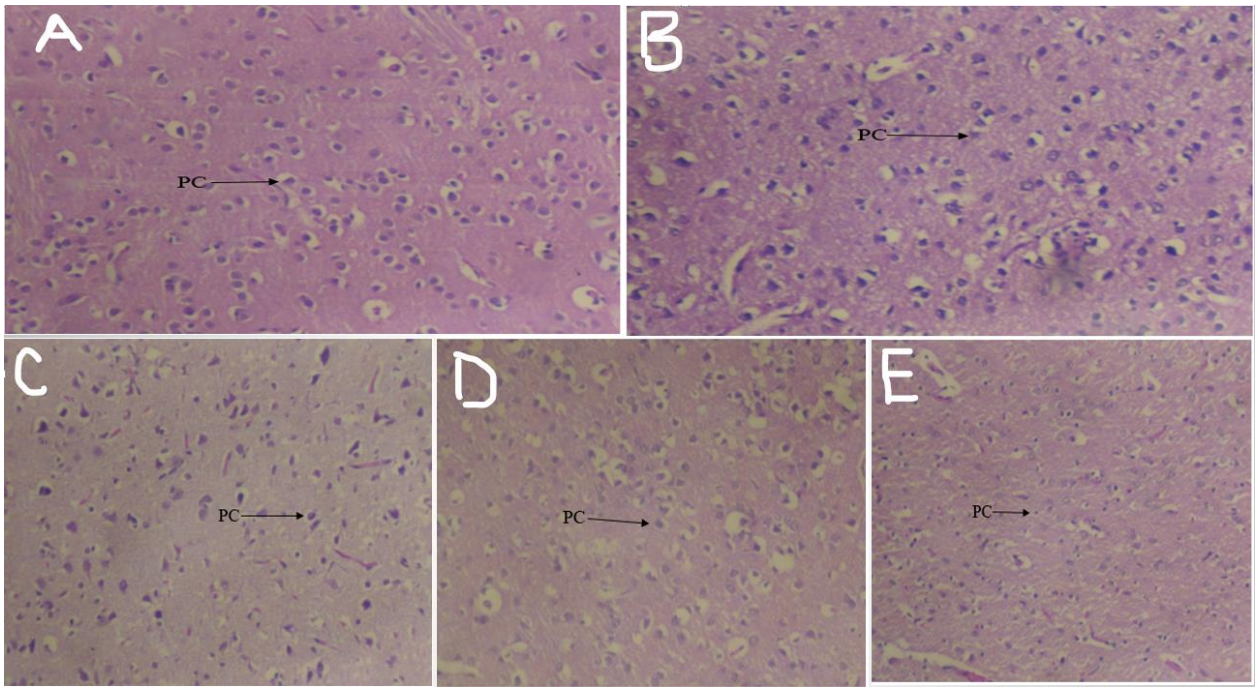

Figure 1: Photomicrograph (A) Histology of the frontal cortex from control group. Showing normal pyramidal cells (black arrow). Photomicrograph (B) shows histology of the frontal cortex from the group given Zobo drink once a day with normal distinct pyramidal cells (black arrow). Photomicrograph (C) of the histology of the frontal cortex from the group given Zobo drink twice a day (black arrow). Photomicrograph (D) of the histology of the frontal cortex from the group given Zobo drink three times a day showing distinct pyramidal cells.

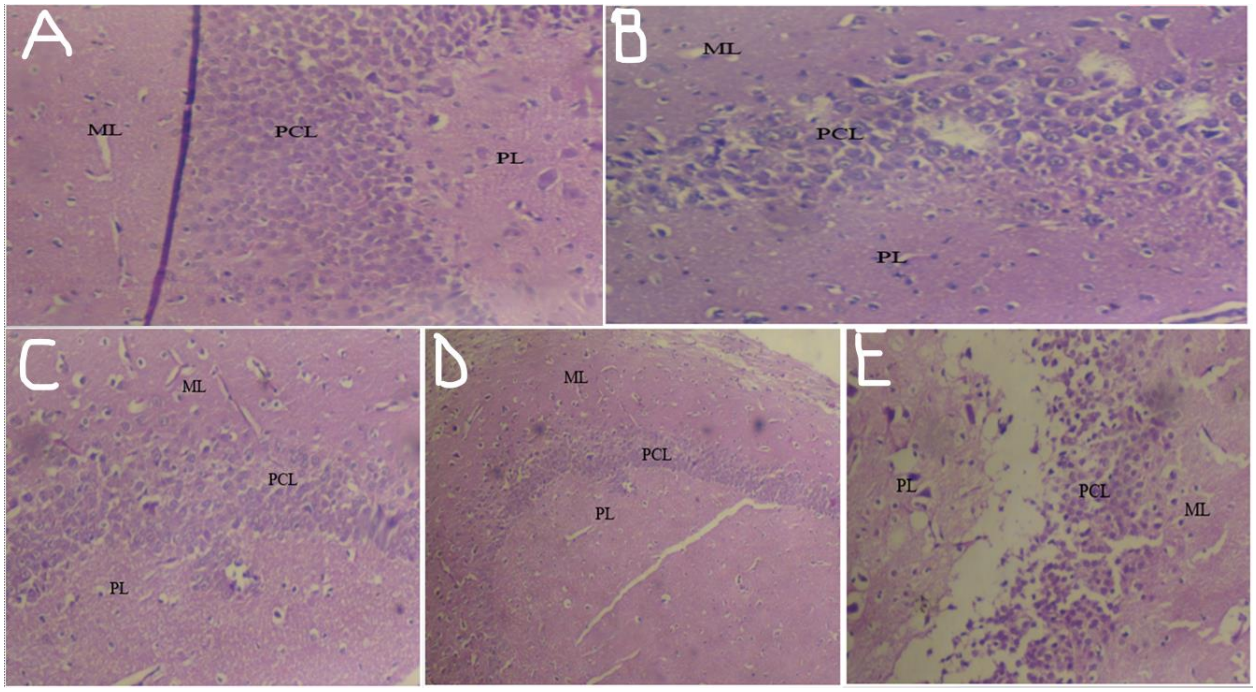

Figure 2: Photomicrograph (A) Histology of the hippocampus from control group showed regular distinct layers of the hippocampus. ML = Molecular layer, PCL = Pyramidal cell layer, PL = Polymorphic layer. Photomicrograph (B) from the group given Zobo drink once a day show regular distinct layers of the hippocampus. Photomicrograph (C) from the group given Zobo drink twice a day shows regular distinct layers of the hippocampus. Photomicrograph (D) from the group given Zobo drink three times a day shows regular distinct layers of the hippocampus. Photomicrograph (E) shows alteration and degeneration of pyramidal cells of the pyramidal layer of the hippocampus.

DISCUSSION

The histological result of the photomicrograph of this study revealed that the administration of 0.5ml of Zobo drink for 21 days showed a normal morphology of the frontal cortex, with distinct pyramidal cells, just like that of the control group. This implies that the consumption of Zobo drink has no histological effect on the frontal cortex.

The photomicrograph of group A (control), group B, C and D revealed a regular distinct molecular layer, pyramidal cell layer, and polymorphic layer of the hippocampus but group E shows an alteration and degeneration of the pyramidal cells of the hippocampus pyramidal cell layer. This shows that at high dose, Zobo drink has an adverse effect on the hippocampus.

CONCLUSION

In conclusion, from the histological slides analysis in this research, Zobo drink shows no damage on the frontal cortex, but shows to have an adverse effect on the hippocampus at high dose concentration. Damage to the morphology of the hippocampus disrupts its primary functions such as learning, memory and emotion.

REFERENCES

1. Edo, I. G., Samuel, O. P., Jikah, N. A., Oloni, O. G., Ifejika, N. M., Oghenegueke, O., Ossai, S., Ajokpaoghene, O. M., Asaah, U. E., Uloho, O. P., Akpoghelie, O. P., Ugbune, U., Ezekiel, U. G., Onoharigho, O. F., Agbo, J. J. & Essaghah, A. E. (2023). Proximate composition and health benefit of Roselle leaf (*Hibiscus sabdariffa*). Insight on food and health benefits. Food Chemistry Advances. Vol 3
2. Islam, M. M. (2019). Varietal Advances of Jute, Kenaf and Mesta crops in Bangladesh: A review. Int J Bioorganic Chem. 4(1), 24-41
3. Ekanem, J. O., Daniel, U. J., Akpan, B. C. & Akpan, E.A. (2018). Microbiological assessment and proximate composition of sorrel (Zobo) drinks sold in IkotEkpene metropolis, AkwaIbom State, Nigeria. Journal of Research in Forestry, Wildlife & Environment Vol. 10(4):92-99
4. Okereke, C. N., Iroka, F. C. & Chukwuma, M. O. (2015). Phytochemical analysis and medicinal uses of *Hibiscus sabdariffa*. International Journal of Herbal Medicine. 2(6). 16-19.
5. Onabanjo, K. S. & Airaodion, A. I. (2022). Fortification of 'Zobo' (*Hibiscus sabdariffa*) Drink with Pineapple and Watermelon enhances its Nutritional Qualities and Phytochemical Compositions. 6(7)
6. Efosa, J. O., Omage, K. & Azeke, M. A. (2023). *Hibiscus sabdariffa* calyx protect against oxidative stress and aluminium chloride-induced neurotoxicity in the brain of experimental rats. Toxicology Reports, 10, 469-480.
7. Nerdy, N., Barus, B. R., El-Matury, H. J., Ginting, S., Zebua, N. F. & Bakri, T. K. (2022). Comparison of flavonoid content and antioxidant activity in calyces of two roselle varieties (*Hibiscus sabdariffa L.*). 11, 956