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.v1i1.3974

Effect of Aqueous Hibiscus Sabdariffa on the Histology of the Testes of Male Albino Wistar Rats

Charles Ayara[1], Williams Oche Ujah[2], Favour Joel Bafai[3], Victor Makanjuola[4], Kingsley Bassey Enang[5], Queen Uyo Williams[6], Tensaba Andes Akafa[7], Peter Ise Uduak[8], Isaac John Umaru[9]

[1,2,3,4,6,8]Bingham University Karu, Nasarawa State, Nigeria

[5]Federal College of Education Technical Ekiadolor Benin, Edo State, Nigeria

[7,9]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

Medicinal plants contain physiological principles that over the years had been exploited in traditional medicine for the treatment of various ailments. *Hibiscus Sabdariffa* is not primarily a medicinal plant, but is used as alternative treatment to a wide variety of medical conditions. It is a plant of various psychoactive properties. This study investigated the histological effect of *Hibiscus Sabdariffa* aqueous solution on the testes of male albino rats. The research used 20 rats weighing 50-100g and were divided into Group A, Group B, Group C, Group D and Group E. Group A was the control group; unexposed to any form of *Hibiscus Sabdariffa*. Group B were exposed to the extract in a dosage of 0.5ml only in the morning. Group C were exposed to the extract in a dosage of 0.5ml in the morning and afternoon after (6) six hours. Group D were exposed to the extract in a dosage of 0.5ml in the morning, afternoon and by evening after six-hour intervals. Group E were exposed to the extract in an alternating administrative routine. In the end, the rats were sacrificed and the testes were removed and fixed in 10% formal saline solution. The testes were stained with

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

hematoxylin and eosin. Results on the histology show changes to the histology of the testes of the group administered high doses. The results obtained from hormonal profiling shows a series of reduction in the levels of the evaluated hormones at the given dosage. Therefore, *Hibiscus Sabdariffa* can damage the histology of the testes at given dosage.

Keywords: *Hibiscus sabdariffa;* Hematoxylin; Eosin; Histology; Testes

INTRODUCTION

A genus of colorful flowering plants called *Hibiscus* is utilized in medicine, cosmetics, and cooking. *Hibiscus* species range over 200 and are all members of the Malvaceae family. The species of *Hibiscus* most frequently used in medicine is *Sabdariffa.* [1] Hibiscus Sabdariffa is planted for its edible Calyx, in contrast to its other varieties grown for fiber. The nutritional and phytochemical component of the plant makes it versatile in its use as it has many benefits in whichever form it is consumed. [2] The edible red blossoms of *Hibiscus Sabdariffa* have been utilized for ages in both traditional and alternative medicine. [1] Hibiscus is believed to contain a variety of bioactive components that may be beneficial to human health, including as flavonoids, organic acids, phenolic compounds, and anthocyanins. [3] Hibiscus Sabdariffa poses a number of medical claims such as: diabetic control, cardiovascular improvements, liver health, weight loss, appetite suppression and lowering blood pressure. [4] Ethno botanical data suggests that Hibiscus Sabdariffa calyx extracts of varying types have been utilized in traditional medicine to treat a variety of illnesses by decoction, infusion, or maceration methods. [1] According to research, Hibiscus Sabdariffa calyx is frequently said to be an aphrodisiac in West African folk medicine. Nigerian researchers have lately investigated the effect of sub-chronic administration of boiled extracts of the plant on the testes. The body weight steadily decreased at the conclusion of the treatment period, but neither the relative nor absolute weights of the testes changed. [5] [6] The effects of oral administration of Hibiscus Sabdariffa aqueous solution on testicular and epididymal weight as well as blood testosterone level in albino male rats over a fourteen-day period was studied [7] and no significant difference in serum testosterone was seen in groups administered below 600 mg/kg.

MATERIALS AND METHODS

Twenty male albino wistar rats 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 the Hibiscus sabdariffa solution. Group A (control) were not administered the solution, Group B (Morning) were administered the solution in a dose of 0.5ml once in the morning. Group C (Morning and afternoon) were administered the solution in a dose of 0.5ml in the morning and again in the afternoon, Group D (Morning, afternoon and evening) were administered the solution in a dose of 0.5ml for morning, afternoon and evening, while group E (solution and water) were given the solution constantly and had the solution substituted for water in the evening.

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 caudal epididymis was dissected free and suspended in the semen diluting fluid, 0.9% normal saline and the sperm count was done using the Haematocytometer counting chamber of the Neubauer type. The testes were then fixed in 10% formal saline fluid for Hematoxylin and Eosin staining. Afterwards the organs were histologically analyzed.

RESULTS

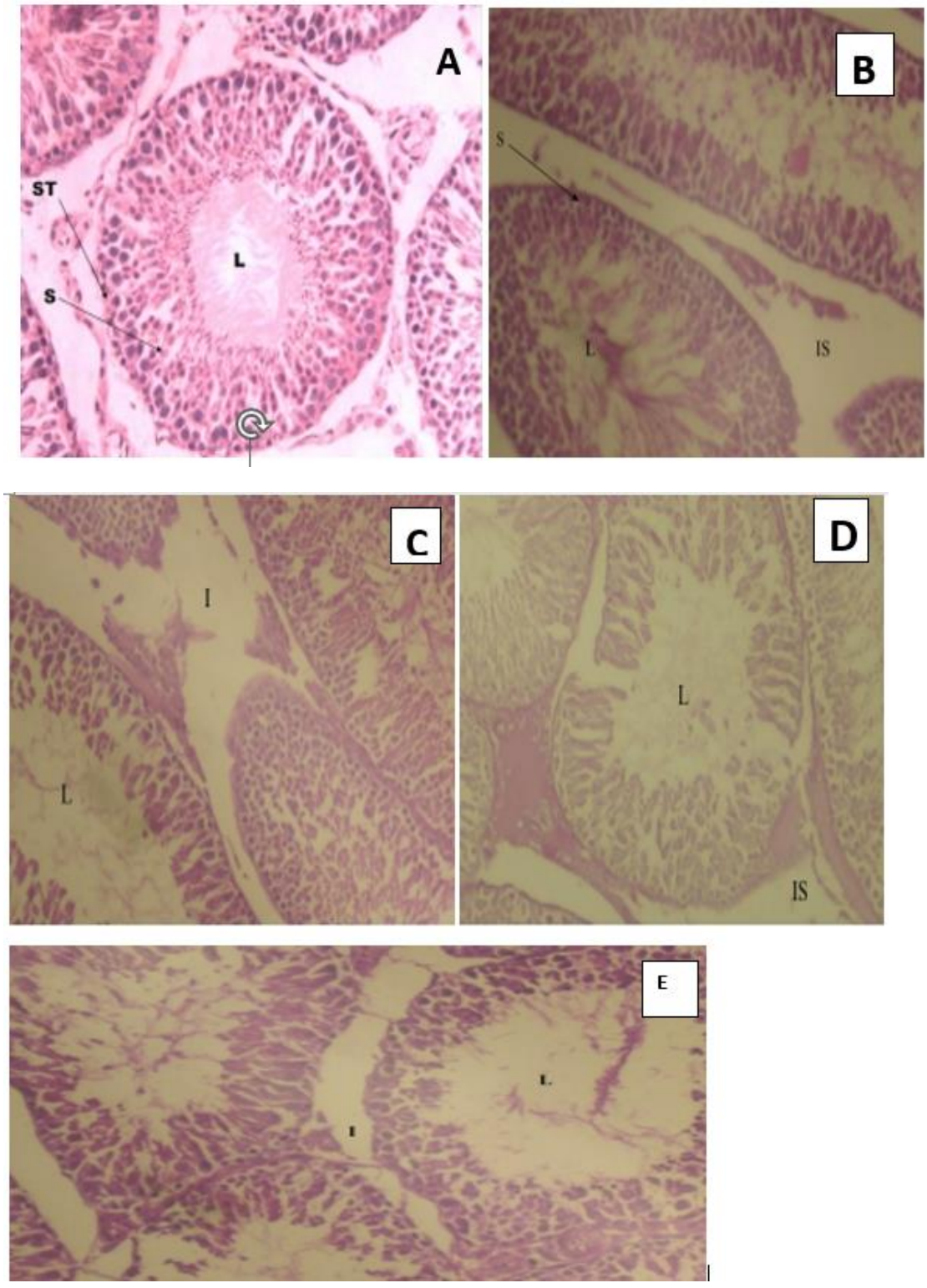


Figure 1: Photomicrograph **(A)** Histology of the Testes from control group. Showing well-arranged seminiferous tubules (ST) with different stages of sperm cells (S) and interstitial tissue (IS) with centrally located lumen (L). Photomicrograph **(B)** given extract once a day

showing elongated seminiferous tubule (ST) containing different stages of sperm cells and interstitial tissue IS the lumen (L) is centrally located with spermatic activities. Photomicrograph **(C)** given extract twice a day showing normal histology of the testes with elongated seminiferous tubule with moderate activities around the interstitial space (IS), the lumen (L) is centrally located. Photomicrograph **(D)** given extract three times a day showing no distortion to the histology of the testes. Photomicrograph **(E)** given extract throughout the duration of experiment with feed and water showing lessen activities around the interstitial space (IS) with fewer Leydig cells.

Table 1: Mean Body Weights in the Different Groups of male rats

Groups	Weight before (g)	Weight after (g)	Change in weight (g)
Group A	100.00±11.93	193.33±20.67	93.33±13.62
Group B	108.00±4.73	202.67±6.01	94.67±5.46
Group C	117.00±10.82	195.67±11.70	78.67±6.23
Group D	113.00±7.82	183.20±48.17	70.20±1.71
Group E	97.67±2.03	147.33±15.93	49.67±17.42

Table 1: Hormonal analysis

Variable	GROUP A	GROUP B	GROUP C	GROUP D	GROUP E	P - value
TST	47.33±0.88	42.33±1.86	42.33±1.45	39.30±0.65	36.67±0.67	0.001*
LH	60.50±0.76	53.67±1.33	51.00±1.00	50.00±0.58	46.33±1.76	<0.001*
FSH	62.33±2.85	54.00±1.53	49.67±0.88	48.13±1.27	48.00±0.58	<0.001*

DISCUSSION

Generally, consumption of hibiscus sabdariffa is considered safe as it is essentially non toxic (Toxicological Studies) making it safe for consumption. [4] The solution produced a physically observable decrease in weight as the dosage increased suggesting that it inhibits weight gain. [8] There were mild histological changes seen in the testes of the group exposed once and twice a day compared to the testes of the control group. And this states that at the particular dosage and exposure to hibiscus sabdariffa has mild effect on the testes. [9] The group exposed to hibiscus sabdariffa three times a day or more at interval of six hours

shows lack of activity within interstitial space and elongated tubules which suggest damage to the structure and function of the testes. The hormones taken into account (LH, FSH, and TST) all showed a decrease along the groups as the doses of the solution administered was increased, suggesting it inhibits reproductive capacity. [6][10]

CONCLUSION

In summary, the analysis of the histological slides used in this study indicates that hibiscus sabdariffa may harm human testicles, particularly when taken in large amounts freely. It also appears to have the potential to cause weight loss, with greater weight loss occurring with increased dosage. Additionally, it decreased the amounts of reproductive hormones in the serum, allowing for the limitation of reproductive function. While consuming an aqueous hibiscus solution is mostly harmless, large amounts might alter the structure of the testes, which may lead to reproductive issues.

REFERENCES

1. Montalvo-González, E., Villagrán, Z., González-Torres, S., et al. (2022). Physiological effects and human health benefits of Hibiscus sabdariffa: A review of clinical trials. Pharmaceuticals (Basel), 15(4), 464.
2. Petruzello, M., Lotha, G., Young, G., Hosch, W., & Tikkanen, A. (2024, March 19). Roselle. Encyclopedia Britannica.
3. Izquierdo-Vega, J. A., Arteaga-Badillo, D. A., Sánchez-Gutiérrez, M., et al. (2020). Organic acids from roselle (Hibiscus sabdariffa L.)-a brief review of its pharmacological effects. Biomedicines, 8(5), 100. https://doi.org/10.3390/biomedicines8050100
4. Patel, K. (2022, September 28). Roselle. Examine.
5. Dalziel, J. M. (1973). The useful plants of West Tropical Africa. London: Crown Agent for Overseas Government and Administrations.
6. Orisakwe, O. E., Husaini, D. C., & Afonne, O. J. (2004). Testicular effects of subchronic administration of Hibiscus sabdariffa aqueous extract in rats. Reproductive Toxicology, 18(3), 295–298.
7. Njoku-Oji, N., Omoloye, A., Sobanke, A. O., Umahi, O., Uchefuna, R., & Ifegwu, N. O. (2018). Effects of Hibiscus sabdariffa calyx extract on male reproductive organ weight and testosterone in normal Wistar rat. World Journal of Pharmaceutical Research, 7, 88-98.
8. Herrera-Arellano, A., Miranda-Sanchez, J., Avila-Castro, P., Herrera-Alvarez, S., Jimenez-Ferrer, J. E., Zamilpa, A., Roman-Ramos, R., Ponce-Monter, H., & Tortoriello, J. (2007). Clinical effects produced by a standardized herbal medicinal product of Hibiscus sabdariffa on patients with hypertension: A randomized, double-blind, lisinopril-controlled clinical trial. Planta Medica, 73, 6-12.

9. Olasehinde, Olusanya & Olajide, Nurudeen & Ibukun, Osebhahiemen. (2020). Ameliorative effects of aqueous extracts of ginger and garlic on Hibiscus sabdariffa-induced testicular damage in male Wistar rats.
10. Abou, A. A. A., S. F. M. Abu and A. E. A. Abou (2011). Physico-chemical properties of natural pigments (anthocyanin) extracted from Roselle calyces (Hibiscus sabdariffa). J.Am. Sci., 7(7) : 445-456.