Investigational
Medicinal Chemistry & Pharmacology

Short communication Open Access

Effects of hydromethanolic leaf extract of *Craterispermum schweinfurthii* on liver function in Wistar rats

Karibo Amakiri Okari[1], Friday Saronee[2]*

Abstract

Background: Liver diseases account for approximately one-third of all mortality in tropical countries, many of which are of significant research interest. This study investigated the effects of the hydromethanolic leaf extract of *Craterispermum schweinfurthii* on liver function using Wistar rats as experimental models.

Methods: Twenty female Wistar rats weighing between 100 and 250 g were randomly divided into four groups of five rats each and treated daily for 28 days as follows: Group A (negative control) received the extract vehicle only. Groups B, C, and D received 250, 500, and 750 mg/kg body weight of the extract, respectively. On day 29, blood samples were collected via direct cardiac puncture for the determination of serum liver enzyme concentrations. Serum levels of liver enzymes and albumin were assayed using standard laboratory procedures.

Results: Compared to the control group (Group A), daily oral administration of 250 mg/kg body weight of *Craterispermum schweinfurthii* leaf extract (Group B) caused a considerable but statistically insignificant reduction in the mean values of aspartate aminotransferase (AST), alanine aminotransferase (ALT), and alkaline phosphatase (ALP), while increasing serum albumin concentration. However, significant changes ($P < 0.05$) were observed in Groups C and D, which received 500 and 750 mg/kg body weight of the extract, respectively. These findings suggest potential hepatoprotective effects of the extract.

Conclusion: The administration of graded doses of C*raterispermum schweinfurthii* leaf extract significantly improved key liver function parameters. The results support the traditional medicinal use of C. *Schweinfurthii*

Keywords: Changes; *Craterispermum schweinfurthi*; functions; liver enzymes.

*Correspondence: Tel.: +2347066060696; E-mail address: saroneef@fuotuoke.edu.ng; ORCID: https://orcid.org/0000-0002-3280-7963 (Friday Saronee)

[1]Department of Medical Biochemistry, Faculty of Basic Medical Sciences, College of Medical Sciences, Rivers State University, Nigeria; [2]Department of Human Physiology, Faculty of Basic Medical Sciences, College of Medical Sciences, Federal University Otuoke, Bayelsa State, Nigeria.

Other authors

Email: kariboa.okari@ust.edu.ng; ORCID: https://orcid.org/0009-0008-9117-8037 (Karibo Amakiri Okari)

Citation on this article: Okari KA, Saronee F. Effects of hydromethanolic leaf extract of Craterispermum schweinfurthii on liver function in Wistar rats. Investigational Medicinal Chemistry and Pharmacology (2026) 9(2):139; Doi: https://dx.doi.org/10.31183/imcp.2026.00139

Background

Diseases account for approximately one-third of all mortality in tropical countries [1]. Consequently, people have long relied on poultices and infusions of traditional medicinal plants to maintain good health [2, 3]. Herbs, vegetables, and fruits are valued as natural sources of numerous bioactive compounds, including phytosterols, neophytadiene, phenolic compounds, flavonoids, vitamins, anthocyanins, dietary fibre, and carotenoids, which are inherently present in them [4, 5]. C*raterispermum schweinfurthii* is widely distributed in tropical Africa, Madagascar, and the Seychelles. It is a shrub or small tree with axillary or supra-axillary inflorescences that are paired at the nodes and often condensed [6, 7]. The anecdotal uses of C*raterispermum schweinfurthii* in traditional medicine are enormous. For instance, in traditional folklore medicine, the seeds, leaves, and inner bark have been reported to be beneficial in the management of stomach ailments, ulcers, infertility, anaemia, diabetes, and fever [2]. However, only a few studies have experimentally investigated the potential benefits of the leaves of C*raterispermum schweinfurthii*. This study therefore aims to investigate the potential effects of hydromethanol leaf extract of C*raterispermum schweinfurthii* on liver function in Wistar rats.

Methods

Collection, identification and extraction of plant materials

Fresh leaves of *Craterispermum schweinfurthii* were obtained from the University of Port Harcourt Botanical Garden. Dr. Chimezie Ekeke of the Department of Plant Science and Biotechnology, University of Port-Harcourt, Nigeria identified and authenticated the specimen and assigned a reference code; UPH/V/296. Voucher specimen was subsequently deposited in the University Herbarium for future reference. The plant leaves were gathered, and all extraneous materials carefully removed. Leaves were air dried at room temperature for about 7 days and subsequently pulverized into powder and a weighed quantity of 670.6g dissolved using Soxhlet device in 390ml of water-methanol mixture (25:75% v/v BDH) for three days in a jar. The solution was filtered and concentrated using a rotary evaporator at 40°C with a percentage yield of 73. Obtained extract was preserved in airtight containers and stocked at room temperature before administration.

Procurement and handling of experimental animals

Female Wistar rats weighing between 100-250g were used for the study, which were acquired from the Faculty of Basic Medical Sciences Animal House, College of Health Sciences, University of Port Harcourt. Rats were placed in different compartments of the cage, one for each experimental group and cared for under standard laboratory conditions. Wood shavings and beddings were changed routinely to prevent possible infection due to untidy beddings.

Ethical approval and acute toxicity studies

Ethical approval was obtained from the University of Port Harcourt Ethical Committee through a communication referenced: UPH/CEREMAD/REC/MM82/024 and dated 23rd November 2021. Acute toxicity was determined using Karber's method as modified by Aliu and Nwude [8]. Experimental rats were randomly divided into five groups of five animals each. The animals received oral doses of 0.5 g, 1 g, 2 g, 3 g, and 4 g of the extract, respectively, and were observed for 3 days for various physiological and clinical signs. Animals in the first two groups (0.5 g and 1 g) remained normal and active throughout the observation period. Slight weakness was noted in group 3 (2 g). In groups 4 and 5 (3 g and 4 g), the rats exhibited depression, sluggishness, anorexia, weakness, neurological deficits, and significant mortality. Following probit analysis (calculations), the median lethal dose (LD_{50}) of the extract was determined to be 3968 mg/kg body weight. Doses between 0.1 g and 2 g were considered safe. The study was conducted in accordance with the guidelines for the care and use of laboratory animals [9].

Research design

A total of 20 female Wistar rats weighing between 100-250g were used for the study. After two weeks of acclimatisation, the rats were randomly divided into 4 groups of 5 rats, each designated Groups A to D and treated as follows for 28 days:
Group A: Negative control; received extract vehicle only.
Group B: Low dose extract; received 250mg/kg body weight of the leaf extract of C*raterispermum schweinfurthi.*
Group C: Medium dose extract; received 500mg/kg bw of the leaf extract of C*raterispermum schweinfurthi.*
Group D: High dose extract; received 750mg/kg bw of the leaf extract of C*raterispermum schweinfurthi.*
On day 29, blood samples were collected through direct cardiac puncture for determination of serum liver enzymes concentration. Serum liver enzymes were determined using standard laboratory procedures as earlier described by Wallach, (2007) [10].

Statistical analysis

Statistical analysis was performed using SPSS to determine mean values and standard error of mean (SEM). Furthermore, an ANOVA test was conducted to determine the mean differences among all treatment groups, and finally, a post hoc test using LSD. Data were expressed as mean ± standard error of mean and a p-value (<0.05) was considered significant.

Results

Table 1 displays the changes in serum liver enzymes following administration of C*raterispermum schweinfurthi* leaf extract. Compared to Group 1 (Control) rats in the table below, daily administration of a single oral dose of 250mg/kg body weight of C*raterispermum schweinfurthi* leaf extract to animals in Group B caused a considerable insignificant reduction in the mean values of aspartate aminotransferase, alanine aminotransferase and alkaline phosphatase but increased serum albumin concentration. However, significant changes were observed amongst Groups C and D rats administered 500mg/kg and 750mg/kg body weight of the extract ($P<0.05$), indicating a potential hepato-protective effects.

Discussion

Despite slight variations in study protocols, the findings from the present study corroborate recent reports from our centre regarding the modulatory effects of traditional African medicinal plants on biochemical parameters in Wistar rats [11, 12, 13, 14].
A significant increase in serum liver enzyme concentrations is indicative of increased hepatocyte membrane permeability and

possible cellular rupture [15]. Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) are well-established biomarkers of liver damage and hepatocellular necrosis [16]. While AST is distributed in various tissues including the kidney, brain, heart, and skeletal muscles, ALT is predominantly localized in the liver [11, 15]. Elevated serum levels of both AST and ALT are commonly associated with hepatitis and chronic liver injury [15].

Consequently, the significant decrease observed in AST, ALT, and alkaline phosphatase (ALP) activities, coupled with the elevated albumin concentration in this study, suggests a potential hepatoprotective effect of the extract. Hepatoprotection refers to mechanisms that shield liver cells (primarily hepatocytes) from damage caused by toxins, drugs (e.g., acetaminophen), alcohol, viruses, oxidative stress, inflammation, or metabolic overload (e.g., in NAFLD/NASH) [15]. These mechanisms often involve countering common injury pathways like reactive oxygen species (ROS) generation, lipid peroxidation, inflammation, mitochondrial dysfunction, apoptosis, and fibrosis. Oxidative stress is a central driver of liver injury. Hepatotoxins (e.g., CCl4, ethanol, acetaminophen) increase ROS and reactive nitrogen species (RNS), leading to lipid peroxidation, protein/DNA damage, and cell death. Inflammation amplifies damage via Kupffer cell activation, cytokine release, and recruitment of immune cells [16].

Phytochemical screening of the *Craterispermum schweinfurthii* leaf extract revealed the presence of several bioactive compounds, including phytosterols, neophytadiene, 3,7,11,15-tetramethyl-2-hexadecen-1-ol, and 1,3-butadiene carboxylic acid, among others [4]. These compounds have been reported to act synergistically in protecting against liver damage and its associated complications [4, 17, 18].

Table 1. Changes in serum liver enzymes following administration of C*raterispermum schweinfurthi* leaf extract

Groups	**Aspartate aminotransferase** (IU/L)	**Alanine aminotransferase IU/L)**	**Alkaline phosphatase (IU/L)**	**Albumin (g/L)**
A: Control	190.61±0.03	153.02±0.12	260.67±0.01	3.20±0.05
B: 250mg/kg Extract	188.02±0.41	148.91±0.13	256.58±0.08	3.22±0.04
C: 500mg/kg Extract	182.08±0.31[a]	147.08±0.03	240.50±0.03[a]	3.19±0.41
D: 750mg/kg Extract	176.08±0.03[a]	127.36±0.04[a]	221.52±0.31[a]	3.29±0.05[a]

Values are shown as Mean ± SEM; n=5; [a] Significant at P<0.05 compared to control.

Conclusion

In conclusion, the administration of graded doses of C*raterispermum schweinfurthii* leaf extract significantly improved key liver function parameters (such as ALT, AST, ALP, and bilirubin levels) in the tested model, providing robust evidence of its hepatoprotective potential. These findings highlight the extract's ability to mitigate liver injury. The results support the traditional medicinal use of C. *schweinfurthii* and position it as a promising candidate for the development of plant-derived hepatoprotective agents, particularly in regions where liver disorders are prevalent and access to conventional therapies may be limited. However, this study was conducted in a preclinical model, direct translation to humans remains uncertain due to potential differences in metabolism, bioavailability, and dosing.

Abbreviations

ALP: Alkaline Phosphatase
ALT: Alanine Aminotransferase
ANOVA: Analysis of Variance
AST: Aspartate Aminotransferase
bw: Body Weight
CCl_4: Carbon Tetrachloride
LD_{50}: Median Lethal Dose (Lethal Dose Required to Kill 50% of the Test Population)
LSD: Least Significant Difference
NAFLD: Non-Alcoholic Fatty Liver Disease
NASH: Non-Alcoholic Steatohepatitis
ORCID: Open Researcher and Contributor ID
RNS: Reactive Nitrogen Species
ROS: Reactive Oxygen Species
SEM: Standard Error of the Mean
SPSS: Statistical Package for the Social Sciences
UPH: University of Port Harcourt
REC: Research Ethics Committee
CEREMAD: Centre for Research Management and Development

Authors' Contribution

This work was carried out in collaboration among all authors. SF designed the study, performed statistical analysis, wrote the protocol and wrote the first draft of the manuscript. OKA ran all laboratory analysis and managed the literature searches. All authors cross-checked and approved the final manuscript

Acknowledgments

We sincerely acknowledge the invaluable guidance and support provided to us by Prof. D. V. Dapper throughout the study.

Conflict of interest

The authors declare no conflict of interest

Article history:

Received: 23 April 2026
Received in revised form: 17 June 2026
Accepted: 24 June 2026
Available online: 24 June 2026

References

1. *(WHO) World Health Organization 1977. Diabetes Fact Sheet; Available: http://www.who.int/mediacentre/f actsheets/fs312/en/. 2008 Accessed 111/03/2020.*
2. *Sofowora A. 1993. Screening Plants for Bioactive Agents. In: Medicinal Plants and Traditional Medical in Africa. 2nd Edition, Spectrum Books Ltd., Sunshine House, 134-156.*
3. *Iwu MW. 1983. Traditional Igbo medicine. Institute of African studies University of Nigeria; Nsukka.*
4. *Saronee F, Amah-Tariah FS, Chinko BC, and Dapper DV. 2023. GC-MS and proximate analysis of the hydromethanol extract of Craterispermum schweinfurthi leaves. South Asian Res J Nat Prod. 6(2):101-109.*

5. *Gonz'alez-aguilar G, Robles-S'anchez RM, Mart'mez-T'ellez MA, Olivas GI, Alvarezparrilla E and De la rosa LA. 2008. Bioactive compounds in fruits: health benefits and effects of storage conditions. Ste Postharv Rev. 4(3):1-10.*
6. *Taedoumg HBP, Hamon P, Sonké B. 2012. Craterispermum parvifolium and C. robbrechtianum spp. nov. (Rubiaceae) from west central Africa. Nord J Bot. 29(9):700–707.*
7. *Taedoumg HBP. 2017. Craterispermum capitatum and C. gabonicum (Rubiaceae): two new species from the Lower Guinean and Congolian Domains. PhytoKeys. 57(3):236-242.*
8. *Aliu AY, and Nwude N. 1982. Vet. Pharmacology and Toxicology Experiments. Baraka Press, Nigeria Ltd, Zaria Pg, 104 – 109.*
9. *(US) NRC. Committee for the Update of the Guide for the Care and Use of Laboratory Animals2019. Available from: https://www.ncbi.nlm.nih.gov/books/NBK54050/ downloaded on the 20th of June, 2022.*
10. *Wallach JB. 2007. Interpretation of diagnostic tests. Lippincott Williams & Wilkins. 23(5):67-89.*
11. *Ikechukwu IW, and Friday S. 2019. Effects of Hydromethanolic Extract of Cnidoscolus Aconitifolius (Buphorbiacaea) on Body Weight, Some Liver Enzymes and Histology in Diabetic Wistar Rats. Inter J Res Sci Innov. 6(9); 190-194.*
12. *Dan-Jumbo D, Saronee F, Azosibe P, Amadi JE, Gbaranor KB. 2024. Changes in Biochemical Indices in Lead-Induced Toxicity Following Administration of Methanolic Extracts of Curcuma longa Rhizomes and Cucumis sativus Fruits. Res Bio Sci. 7(8); 36-44.*
13. *Saronee F, Sunday OO, Okekem A, Ogadinma NI, & Datonye VD. 2020. Comparative Study of the Effects of Methanolic Extracts of Spondias mombin Leaves and Curcuma longa Rhizomes on Serum Lipid Profile and Electrolytes in Alloxan Induced Diabetes in Male Wistar Rats. Asian J Advan Res Rep. 8(3): 1-9.*
14. *Ijeoma E, Chibuike O, Friday S, and Adesua CO. 2020. Effects of Leaf Extract of Cnidoscolus aconitifolius on Serum Lipids and Oxidative Stress Markers of Male Wistar Rats. Asian J Biochem, Gen Mol Biol. 5(1): 47-52.*
15. *Benjamin MN. 1978. Outline of Veterinary Clinical Pathology, University Press, Iowa, USA. Pp. 229-232.*
16. *Davem TL, and Scharschmidt BF. 2002. Biochemical Liver Function Tests. In: Feldman M, Friedman LC and Sleisenger MH. (eds) Sleisenger and Fordtrans' Gastrointestinal and Liver Disease Pathophysiology, Diagnosis and Management. Elsevier Science, California.*
17. *Saronee F, Dan-Jumbo D, Azosibe P, Amadi JE. 2024. Modulatory Functions of Craterispermum schweinfurthi on the Hypothalamic-Pituitary-Gonadal Axis of Male Wistar Rats in Phenyl Hydrazine Induced Testicular Toxicity. J Complement Altern Med Res. 25(4): 31-39.*
18. *Saronee F, Okari K, Nwikue G, Dimkpa VO, & Ante IA. 2025. Influence of Craterispermum schweinfurthi Leaf Extract on Glucose Homeostasis in male Wistar rats. GPH-Inter J Health Sci Nur. 8(2), 1-9.*