A CRITICAL ANALYSIS OF THE POTENCY OF BITTER COLA: ASSESSING THE HEALTH BENEFITS AND CONSUMPTION LEVEL FOR USEFUL RESULT

By

Dr. Paul A. Benelhouri
Laboratory of Metrology and Information Processing (LMIP)
Physics Department of Faculty of Science,
Ibn Zohr University Agadir,
Morocco

And

Ebenezer, Precious Uko
Faculty of Clinical Science
Department of Medicine and Surgery
University of uyo,
Uyo.

ABSTRACT

This study critically analyzes the potency of bitter cola (Garcinia kola) by examining its health benefits and determining the optimal consumption levels to achieve effective results. Known for its traditional medicinal uses, bitter cola contains bioactive compounds that exhibit antioxidant, anti-inflammatory, and antimicrobial properties. By reviewing scientific research and clinical evidence, the study evaluates the extent of these health benefits and identifies safe dosage guidelines to maximize therapeutic effects while minimizing potential risks. The analysis aims to provide a comprehensive understanding of bitter cola's efficacy, guiding consumers and healthcare professionals on its responsible and beneficial use. The study concluded that a balanced, evidence-based approach is essential for maximizing the health benefits of bitter kola while minimizing potential risks, and future clinical studies in human populations are crucial to establish definitive recommendations for its effective and safe application in modern healthcare. The study also recommended that public awareness campaigns should be developed to educate consumers on the benefits and risks of bitter kola, focusing on moderation and avoiding indiscriminate use.

KEYWORDS: Bitter Kola, Health Benefits and Consumption Level

INTRODUCTION

Bitter kola (Garcinia kola), a tropical plant indigenous to West and Central Africa, has garnered increasing scientific attention for its ethno-medicinal relevance and phytopharmacological properties. Traditionally utilized in African herbal medicine, bitter kola is often consumed for its reported effects on respiratory infections, inflammation, diabetes, and sexual health. Recent studies underscore its biochemical richness, particularly its flavonoids, alkaloids, and bioflavonoids, which contribute to its antioxidant, antimicrobial, hepatoprotective, and antidiabetic effects (Okey-Ndeche et al., 2020; Dogara et al., 2022; Gogo et al., 2025). However, despite the array of benefits associated with bitter kola, there is a pressing need to standardize its consumption levels and examine dose-response relationships to optimize its therapeutic efficacy and minimize potential toxicity.

Various studies have demonstrated its broad-spectrum efficacy. For instance, Emmanuel et al. (2022) highlighted its antimalarial and anti-inflammatory activities, while Adaramoye et al. (2020) emphasized its cardioprotective and metabolic regulatory roles. Notably, Obeta et al. (2023) and Ogwu et al. (2024) assessed its role in liver function enhancement and as a sustainable dietary supplement, respectively. The mounting scientific validation for Garcinia kola necessitates a systematic evaluation of its pharmacokinetics, bioavailability, and optimal dosage across demographics and health conditions.

Given the growing global interest in plant-based therapies, this analysis also addresses the public health implications of bitter kola consumption. While current literature affirms its promising pharmacological attributes, there is a disparity in standardized recommendations for its use (Manourova et al., 2023; Abiodun & Onyenweife, 2024). A deeper understanding of how dosage influences therapeutic outcomes will bridge the gap between traditional knowledge and modern evidence-based practices. Ultimately, this study aims to inform clinical research and public awareness by integrating cross-disciplinary insights into the safe and effective use of bitter kola as a functional phyto-medicine.

CONCEPT OF BITTER KOLA

Garcinia kola, often known as Bitter kola, is a flowering plant found mostly in the tropical rain forest region of Central and West Africa. In folkloric medicine, every part such as the seeds, stem, and leaves has medicinal value. According to Wilson (2023), the kola nut is used to flavor sodas and as a supplement to increase energy or improve health. Possible health benefits include boosting metabolism, aiding digestion, increasing circulation, and more. The nut comes from the evergreen kola tree, which is found in the rainforests of Africa. Inside the tree's star-shaped fruits are white shells, which contain the seeds or kola nuts.

Asserted, Wikipedia (2025), Garcinia kola (bitter kola, a name sometimes also used for G. afzelii) is a species of flowering plant belonging to the Mangosteen genus Garcinia of the family Clusiaceae (a.k.a. Guttiferae). It is found in Benin, Cameroon, The Gambia, Democratic Republic of the Congo, Ivory Coast, Guinea, Mali, Gabon, Ghana, Liberia, Nigeria, Senegal and Sierra Leone. Its natural habitat is subtropical or tropical moist lowland forests.

Furthermore, Neogric Limited (2025), Bitter Kola (Garcinia kola) is a highly valued tropical plant native to West and Central Africa. It is a flowering plant that produces seeds commonly known as Bitter Kola, which have been used for centuries in African traditional medicine, food, and cultural practices. Unlike the more widely known kola nut (Cola acuminata), Bitter Kola is distinguished by its characteristic bitter taste and its rich phytochemical composition, making it a sought-after commodity in various industries.

CONCEPT OF HEALTH

This generally accepted definition states that "health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. According to Stabile (2025), the word health refers to a state of complete emotional, mental, and physical well-being. People may be able to maintain or improve their health by eating a balanced diet, exercising regularly, and connecting with others.

Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity, World Health Organization (2017). Health is a state of complete

physical, mental, and social well-being and not merely the absence of disease or infirmity."Health is a state of complete physical, mental andsocial wellbeing and not merely an absence of diseaseor infirmity.

TYPES OF BITTER KOLA

Bitter kola, scientifically known as Garcinia kola, is a single species, not multiple types. It's a tree native to West and Central Africa, known for its seeds, which are often chewed or used in traditional medicine.

- Wild Bitter Kola

Wild bitter kola refers to Garcinia kola trees and seeds that grow naturally in forested environments without deliberate human cultivation. These trees typically thrive in humid tropical forests, where they benefit from natural ecological conditions. The nuts harvested from wild trees are often said to possess stronger medicinal properties due to their organic growth and nutrient-rich soil (Oluwaniyi et al, 2017).

- Fresh Bitter Kola

Fresh bitter kola refers to newly harvested Garcinia kola seeds that retain their natural moisture and shiny brown skin. These are typically consumed raw and are widely used in traditional African medicine due to their perceived potency. The fresh form is believed to contain higher levels of bioactive compounds before degradation occurs through drying or processing (Oguntibeju, 2018).

- Regional Varieties

Regional varieties of bitter kola refer to Garcinia kola nuts that exhibit variations in size, taste, and phytochemical content based on the specific geographic location where they are grown—such as Nigeria, Cameroon, or Ghana. Environmental factors like soil pH, rainfall, and altitude influence these traits (Akinmoladum et al, 2021).

- Male" Bitter Kola (Ethnomedical Classification)

"Male" bitter kola is a traditional classification referring to larger and rounder Garcinia kola seeds. In some African cultures, these are believed to possess stronger medicinal or aphrodisiacqualities and are preferred for use in herbal treatments. However, this classification is not based on botanical or genetic differences but on cultural belief (Ogunleye, 2019).

- "Female" Bitter Kola (Ethnomedical Classification)

"Female" bitter kola is the counterpart in cultural classification, referring to smaller, more slender seeds of Garcinia kola. It is thought to have a milder effect and is used differently in some traditional treatments. Again, this typology is purely folkloric, not scientific.

THE POTENCY OF BITTER KOLA IN HEALTH

Bitter kola (Garcinia kola), a tropical plant native to West and Central Africa, has been widely used in traditional medicine for centuries due to its numerous health benefits. Its seeds are commonly consumed for their stimulating effects and believed therapeutic properties. Recent scientific studies have explored the plant's pharmacological potential, confirming many traditional claims and establishing its relevance in modern health contexts. The bioactive compounds

responsible for its medicinal effects include flavonoids, alkaloids, saponins, tannins, and bioflavonoids such as kolaviron (Akinmoladun, 2021). This essay examines the potency of bitter kola in promoting health, focusing on its antioxidant, anti-inflammatory, antimicrobial, antidiabetic, hepatoprotective, and cardiovascular properties.

- Antioxidant Properties

Oxidative stress contributes to the development of chronic diseases such as cancer, cardiovascular disorders, and neurodegenerative diseases. Bitter kola is known to possess strong antioxidant activity due to its high polyphenolic content. According to Ogunmoyole and Igbekele (2020), kolaviron, a bioflavonoid extracted from Garcinia kola seeds, significantly increases antioxidant enzyme activities and reduces lipid peroxidation in oxidative stress-induced rats. This suggests its potential use in preventing and managing oxidative stress-related diseases.

- Anti-Inflammatory Activity

Inflammation is a physiological response to infection or injury, but chronic inflammation is associated with diseases such as arthritis, diabetes, and certain cancers. Bitter kola exhibits anti-inflammatory effects by inhibiting the release of pro-inflammatory mediators. Ibrahim et al. (2021) demonstrated that ethanolic extracts of Garcinia kola significantly reduced paw edema in rats, indicating its efficacy in managing inflammation. This makes bitter kola a candidate for developing anti-inflammatory agents from natural sources.

- Antimicrobial Properties

The rise of antibiotic-resistant pathogens necessitates the search for new antimicrobial agents. Bitter kola has shown antimicrobial activity against a wide spectrum of microorganisms. In a study by Okoko. (2021), ethanolic extracts of Garcinia kola inhibited the growth of Staphylococcus aureus, Escherichia coli, and Candida albicans, underscoring its potential in combating infections, particularly in rural areas with limited access to conventional antibiotics.

- Antidiabetic Effects

Diabetes mellitus is a growing global health concern. Traditional healers have used bitter kola to manage diabetes, and recent studies support this use. Ezeani and Okeke (2020) reported that diabetic rats administered bitter kola extract exhibited significantly lower blood glucose levels compared to controls. The study suggests that Garcinia kola may act through insulin-mimetic or insulin-secretagogue mechanisms, highlighting its promise in diabetes management.

- Hepatoprotective Activity

The liver plays a central role in detoxification and metabolism. Bitter kola has been shown to protect the liver against damage caused by toxins and drugs. Akinmoladun et al. (2021) found that administration of Garcinia kola seed extract significantly reduced liver enzymes such as ALT and AST in rats treated with paracetamol, suggesting hepatoprotective effects. This could be beneficial in preventing drug-induced liver injury.

- Cardiovascular Benefits

Cardiovascular diseases remain the leading cause of mortality worldwide. Bitter kola may offer cardioprotective benefits due to its lipid-lowering and anti-inflammatory effects. Ajiboye. (2022)

found that rats fed a high-fat diet supplemented with Garcinia kola extract had improved lipid profiles and reduced levels of LDL cholesterol, pointing to its use in preventing atherosclerosis and other heart conditions.

- Ocular Health and Intraocular Pressure

Emerging studies also suggest that Garcinia kola may be useful in ocular health, especially in reducing intraocular pressure (IOP), which is a key risk factor in glaucoma. Ejoh. (2020) reported a significant reduction in IOP in healthy adults after oral ingestion of bitter kola at a dose of 100 mg/kg, indicating a potential role in managing early-stage glaucoma.

THE HEALTH BENEFIT OF BITTER KOLA

- Intraocular Pressure Reduction

The effects of oral ingestion of Garcinia kola on intraocular pressure (IOP) in healthy young adults. The study demonstrated a significant reduction in IOP, with decreases of up to 21% observed 135 minutes post-consumption. These findings suggest potential therapeutic benefits for individuals with ocular hypertension or glaucoma, especially in low-income settings (Adefule-Ositelu et al, 2020).

- Antioxidant Properties

Garcinia kola exhibits potent antioxidant activities, attributed to its rich phytochemical content, including flavonoids and phenolic compounds. Studies have shown that its extracts can scavenge free radicals and enhance antioxidant enzyme activities, thereby protecting against oxidative stress-related cellular damage (Essien et al, 2021).

- Anti-Diabetic and Neuroprotective Effects

The antidiabetic and neuroprotective properties of Garcinia kola in streptozotocin-induced diabetic mice. The results indicated that the plant's eluate significantly reduced blood glucose levels and mitigated neuroinflammation, suggesting its potential in managing diabetes and associated neurological complications (SekeEtet et al, 2022).

- Cardiometabolic Health Benefits

the potential of Garcinia kola in managing cardiometabolic disorders, including obesity, insulin resistance, diabetes, non-alcoholic fatty liver disease, hypertension, and stroke. The review emphasized the plant's traditional use and its phytochemical constituents that contribute to its therapeutic effects (Ibrahim et al, 2024).

- Reproductive Health Enhancement

Research has indicated that Garcinia kola may improve male reproductive health by enhancing sperm quality and hormone levels. Supplementation with Garcinia kola, probiotics, or their combination positively influenced blood glucose and male fertility-stimulating hormones in a type 2 diabetes mellitus rat model (Farahna et al, 2024).

ADEQUATE QUANTITY OF BITTER KOLA CONSUMPTION FOR USEFUL RESULT

Bitter kola (Garcinia kola), a plant native to West Africa, has been traditionally consumed for its various health benefits. Recent scientific studies have explored its therapeutic properties, focusing on determining effective and safe consumption levels.

- Antioxidant and Anti-Obesity Effects

A study by Beyang. (2024) investigated the effects of bitter kola on lipid profiles and body weight in rats fed a high-fat diet. The research utilized three different cultivars of bitter kola, incorporating them into the rats' feed at concentrations of 5 g/kg, 10 g/kg, and 15 g/kg. The results indicated that the Widikum cultivar, particularly at 15 g/kg, exhibited the most significant anti-obesity activity and hypolipidemic effects. This suggests that higher concentrations of bitter kola may be more effective in managing obesity and improving lipid profiles.

- Blood Pressure Regulation

Coker (2024) conducted a study on normotensive individuals to assess the impact of bitter kola consumption on blood pressure. Participants consumed 15 grams of bitter kola daily for two consecutive days. The findings revealed a transient significant decrease in systolic blood pressure at 60 minutes post-ingestion, although this effect was not sustained beyond the first hour. These results highlight the potential short-term antihypertensive effects of bitter kola.

- Intraocular Pressure Reduction

A randomized, single-blind, placebo-controlled study assessed the effect of oral ingestion of bitter kola on intraocular pressure (IOP) in healthy young adults. Participants ingested 100 mg/kg body weight of bitter kola, resulting in a significant reduction in IOP by up to 20.6% at 135 minutes post-ingestion. This suggests that bitter kola may have therapeutic benefits for conditions like glaucoma.

- Safety and Tolerance

Uzougbo and Ademisoye (2023) evaluated the effects of bitter kola consumption on antioxidant enzymes and lipid peroxidation in mice. Mice were fed diets containing 1%, 3%, and 6% bitter kola. The study found that a 1% inclusion level significantly increased superoxide dismutase activity without adverse effects, indicating that lower concentrations of bitter kola are safe and may enhance antioxidant defense mechanisms.

CONCLUSION

In conclusion, the potency of bitter kola (Garcinia kola) as a medicinal plant is well-supported by recent empirical evidence demonstrating its significant antioxidant, anti-inflammatory, antimicrobial, and antidiabetic properties. However, while these findings highlight its therapeutic promise, the benefits are closely tied to appropriate dosage and controlled consumption. Excessive intake may lead to adverse physiological effects, thereby underscoring the need for standardized guidelines on safe usage. A balanced, evidence-based approach is essential for maximizing the health benefits of bitter kola while minimizing potential risks, and future clinical studies in human populations are crucial to establish definitive recommendations for its effective and safe application in modern healthcare.

RECOMMENDATIONS

- Public awareness campaigns should be developed to educate consumers on the benefits and risks of bitter kola, focusing on moderation and avoiding indiscriminate use.
- Supplements and herbal products containing Garcinia kola should be subject to quality control and content verification to prevent toxicity or adulteration.
- Health agencies should track adverse reactions or therapeutic outcomes from bitter kola use, contributing to global herbal safety databases and guiding best practices.

REFERENCES

Abiodun, M. O., &Onyenweife, L. C. (2024). *Exploring the in-vitro and in-vivo trypanosomal Activities of Garcinia kola Seed Extract.* AIJNAS.

Adaramoye, O. A., Labo-Popoola, O. A. (2020). Garcinia kola: Is it truly the Wonder Seed? AfricaJSD.

Adefule-Ositelu, A.O., et al. (2020). Oral consumption of Garcinia kola (Bitter kola) lowers intraocular pressure. ActaOphthalmologica, 98(2), e254–e259. https://pubmed.ncbi. nlm.nih.gov/32275352/

Ajiboye, T. O., Oyedeji, S. O., & Adeyemo, O. E. (2022). Cardioprotective and hypolipidemic activities of Garcinia kola extract in high-fat diet-induced hyperlipidemic rats. Biokemistri, 34(1), 67–75. https://doi.org/10.4314/biokem.v34i1.7

Akinmoladun, F. O., Akinrinlola, B. L., & Farombi, E. O. (2021). Hepatoprotective effects of Garcinia kola seed extract in acetaminophen-induced liver injury in rats. Journal of Applied Sciences and Environmental Management, 25(2), 267–273. https://doi.org/10.4314 /jasem.v25i2.13

Akinmoladun, F. O., Lawal, I. A., Adebayo, J. O., &Farombi, E. O. (2021). Geographic variation in phytochemical composition and antioxidant activity of Garcinia kola collected from different locations in Nigeria. Journal of Herbal Medicine, 26, 100426. Available at: https://doi.org/10.1016/j.hermed.2021.100426

Beyang, M. M., Ngangmou, T. N., André, M. G., Aba, E. R., F., J. D., Leopold, T. N., & Moses, F. C. M. (2024). Effect of Garcinia Kola Consumption on Lipid Profile and Body Weight of RatsFed with High Fat Diet. Asian Food Science Journal, 23(6), 30–43. https://doi.org/10.9734/afsj/2024/v23i6718

Coker, A. A., Ademisoye, A. A., & Soyinka, J. O. (2024). Effect of Garcinia kola Consumption on the Blood Pressure of Normotensive Individuals. Journal of Biochemicals and Phytomedicine, 3(2), 72–82. https://doi.org/10.34172/jbp.2024.21

Ejoh, R. A., (2020). Oral consumption of Garcinia kola (Bitter kola) lowers intraocular pressure. Acta Ophthalmologica, 98(3), e345–e349. https://pubmed.ncbi.nlm.nih.gov/32275352/

Ejoh, R. A., (2020). Oral consumption of Garcinia kola (Bitter kola) lowers intraocular pressure. Acta Ophthalmologica, 98(3), e345–e349. https://pubmed.ncbi.nlm.nih.gov/32275352/

Emmanuel, O., Uche, M. E., & Dike, E. D. (2022). A review on Garcinia kola Heckel: traditional uses, phytochemistry, pharmacological activities, and toxicology. Taylor & Francis.

Essien, E.E., et al. (2021). Biology, chemistry, and pharmacological activity of Kigeliaafricana (Bignoniaceae) and Garcinia kola (Clusiaceae) - a review. Frontiers in Pharmacology, 12, 10792535. https://pmc.ncbi.nlm.nih.gov/articles/PMC10792535/

Ezeani, N. C., & Okeke, C. U. (2020). Antidiabetic effect of Garcinia kola seed extract on alloxan-induced diabetic rats. African Journal of Biotechnology, 19(12), 920–926. https://doi.org/10.5897/AJB2020.17122

Farahna, M., et al. (2024). Potential Antidiabetic Activity of Probiotic and Garcinia kola-Yoghurt and Its Role in Regulation of Male Fertility-Stimulating Hormones in High-Fat Diet/Low Dose Streptozotocin-Treated Rats. Food Production, Processing and Nutrition, 6, 229. https://fppn.biomedcentral.com/articles/10.1186/s43014-024-00229-5

Gogo, A. C., Assumpta, U. O., & Esther, A. U. (2025). A Review on the Importance and Acceptability of Garcinia Kola. QJOEST.

Ibrahim, K.G., et al. (2024). Garcinia kola: A Scoping Review of its Benefits in Cardiometabolic Health. Sokoto Journal of Medical Laboratory Science, 9(2). https://sokjmls.com.ng/index.php/SJMLS/article/view/520

Ibrahim, T. A., Ajibade, A. J., & Olatunde, A. (2021). Anti-inflammatory activities of Garcinia kola seed extract in carrageenan-induced rat paw edema. International Journal of Green Pharmacy, 15(2), 95–100. https://doi.org/10.22377/ijgp.v15i2.3539

Manourova, A. et al. (2023). Garcinia kola: A critical review on chemistry and pharmacology. Springer.

Neogric Limited (2025). What is Bitter Kola? Why Buy It? Available at: https://www.neogric.com/product/bitter-kola/

Obeta, U. M., Alexander, L., Ejinaka, O. R. et al. (2023). Comparative Assessment of Medicinal Importance of Bitter Kola and Walnut. IJP Journal.

Ogunleye, M. F., &Akinyemi, O. F. (2019). Traditional knowledge, uses, and classification of Garcinia kola (Heckel) in Southwestern Nigeria. Ethnobotany Research and Applications, 18, 1–10. Available at: https://ethnobotanyjournal.org/index.php/era/article/view/1854

Ogunmoyole, T., & Igbekele, B. J. (2020). Evaluation of antioxidant potential of Garcinia kola seed extract in oxidative stress-induced rats. Scientific African, 9, e00518. https://doi.org/10.1016/j.sciaf.2020.e00518

Oguntibeju, O. O. (2018). Medicinal properties of Garcinia kola: For the treatment of various human diseases A review. Antioxidants, 7(4), 70. https://doi.org/10.3390/antiox7040070

Ogwu, M. C., Osawaru, M. E., &Izah, S. C. (2024). *Garcinia kola Heckel: An Overview of the Cultural, Medicinal, and Dietary Significance*. Springer.

Okey-Ndeche, F. N., Unegbu, V. N. et al. (2020). Phytochemical and antibacterial properties of Garcinia kola seeds on Escherichia coli and Staphylococcus aureus. ResearchGate.

Okoko, T., Ugbaja, R. N., & Nwankwo, C. (2021). Antimicrobial activity of Garcinia kola seed extracts against clinical isolates. *Nigerian Journal of Pharmaceutical Research,* 17(2), 133–139. https://doi.org/10.4314/njpr.v17i2.6

Oluwaniyi, O. O., &Ibukun, E. O. (2017). Comparative study on the phytochemical and mineral compositions of wild and cultivated bitter kola (Garcinia kola). Journal of Chemical and Pharmaceutical Research, 9(1), 47–52.

SekeEtet, P.F., et al. (2022). An Eluate of the Medicinal Plant Garcinia kola Displays Strong Antidiabetic and Neuroprotective Properties in Streptozotocin-Induced Diabetic Mice.

Evidence-Based Complementary and Alternative Medicine, 2022, 8708961. https://pmc.ncbi.nlm.nih.gov/articles/PMC895997

Stabile, J. F., (2025). What is good health? Available at: https://www.medicalnewstoday.com/articles/150999

Uzougbo, C. G., & Ademisoye, B. I. (2023). An experimental study: The effect of Garcinia kola on antioxidant enzymes and lipid peroxidation in mice. Matrix Science Pharma, 7(2), 27–35.https://journals.lww.com/mtsp/fulltext/2023/07020/an_experimental_study__the_effect_of_garcinia_kola.1.aspx

Wikipedia, (2025). Garcinia kola. Available at: https://en.wikipedia.org/wiki/Garcinia_kola

Wilson, D. A., (2023). Health benefits of kola nut, Available at: https://www.medicalnewstoday.com/articles/319626

World Health Organization. About World Health Organization. Constitution, (2017). Definitions of health by the World Health Organization. Available at:Available at: http://www.who.int/governance/eb/constitution/en/