Breaking the White Poison Cycle: How Ancient Stevia rebaudiana is Revolutionizing Modern Sweetening Practices

M Ramanjineyulu[1]*, L Nagi Reddy[2] and M Sainath Rao[3]

[1]Assistant Professor, Dept. of Agronomy, [2]Assistant Professor, Dept. of Environmental Sciences, [3]Assistant Professor, Dept. of Spices, Plantation, Medicinal and Aromatic crops, Sri Krishnadevaraya College of Horticultural Sciences, Ananthapuramu, Andhra Pradesh, India

Corresponding Author
M Ramanjineyulu
Email: rramanjineyulu58@gmail.com

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ABSTRACT

Contemporary refined white sugar consumption has reached alarming levels in India, contributing to rising diabetes and obesity rates. Stevia rebaudiana Bertoni, traditionally known as "kaa-hee" by indigenous Guaraní people for over 1,500 years, offers a revolutionary zero-calorie alternative. This natural sweetener provides 200-400 times the sweetness of table sugar without compromising health. Recent clinical studies demonstrate stevia's potential in weight management, blood glucose control, and cardiovascular health improvement. With the Indian stevia market projected to reach ₹4,200 crores by 2025, value-added products including stevia sugar blends, liquid extracts, and pharmaceutical formulations are gaining momentum. This review examines the detrimental effects of refined sugar, explores stevia's ancient medicinal heritage, and analyzes its contemporary therapeutic applications and commercial prospects.

INTRODUCTION

India's sugar consumption crisis has reached unprecedented levels, with the average Indian consuming approximately 19 kg of sugar annually compared to the WHO-recommended maximum of 7.3 kg (Sharma *et al*., 2024). This excessive intake of refined white sugar, increasingly labeled as "white poison" by health experts, contributes significantly to India's diabetic population of 77 million individuals. The economic burden of diabetes-related healthcare costs India approximately ₹97,000 crores annually, highlighting the urgent need for healthier alternatives.

Stevia rebaudiana Bertoni emerges as a promising solution, offering natural sweetness without the metabolic consequences of refined sugar. Indigenous to the Amambay Mountains of South America, this remarkable plant has sustained traditional medicinal practices for centuries while demonstrating exceptional potential in contemporary health applications. Understanding stevia's traditional use, scientific validation, and commercial viability provides crucial insights for addressing India's mounting sugar-related health challenges.

The White Poison: Unmasking Refined Sugar's Health Threats

Refined white sugar, chemically pure sucrose, undergoes extensive processing that strips away all natural nutrients, leaving empty calories that trigger rapid blood glucose spikes. Clinical research reveals that excessive sugar consumption directly correlates with metabolic syndrome, affecting 31% of India's urban population (Patel *et al*., 2024). Each gram of refined sugar provides 4 calories with zero nutritional value, contributing to India's obesity epidemic where 135 million individuals are classified as obese.

The glycemic index of white sugar stands at 65, causing immediate insulin responses that strain pancreatic function over time. Studies demonstrate that consuming just 40 grams of added sugar daily increases type 2 diabetes risk by 18% within five years (Kumar *et al*., 2023). Furthermore, refined sugar consumption triggers inflammatory responses, elevating C-reactive protein levels by 87% and contributing to cardiovascular complications that account for 28% of India's total mortality.

The economic implications are staggering, with sugar-related health conditions costing Indian families an average of ₹45,000 annually in medical expenses. This financial burden disproportionately affects rural communities where 68% of India's population resides, creating a cycle of poverty and poor health outcomes. The urgency for sustainable alternatives becomes evident when considering these multifaceted consequences of refined sugar dependence.

Stevia rebaudiana: Ancient Wisdom Meets Modern Science

The Guaraní people of South America discovered stevia's remarkable properties over 1,500 years ago, calling it "kaa-hee" meaning "sweet herb" (Rodriguez *et al*., 2024). They utilized stevia leaves to sweeten yerba mate tea and employed it medicinally for treating fever, managing diabetes, regulating blood pressure, and promoting digestion. Spanish colonizers documented stevia's use in the 16th century, recognizing its unique sweetening capabilities without adverse health effects.

Traditional preparation involved sun-drying stevia leaves and grinding them into powder, creating a sweetener 30-40 times sweeter than sugar. Indigenous healers prescribed stevia infusions containing 2-3 grams of dried leaves daily for blood sugar regulation, demonstrating

remarkable foresight regarding diabetes management. Archaeological evidence suggests stevia cultivation techniques were passed down through generations, with sophisticated agricultural practices ensuring consistent potency and quality.

The plant's scientific classification by Swiss botanist Moisés Santiago Bertoni in 1899 marked the beginning of formal research into stevia's properties. Bertoni documented stevia's extraordinary sweetness, noting that small leaf fragments could sweeten large quantities of bitter beverages. This historical foundation laid the groundwork for contemporary scientific validation of traditional medicinal claims.

Fig. 1. *Stevia rebaudiana*

Medicinal Benefits and Therapeutic Applications

Stevia rebaudiana contains eight distinct steviol glycosides, with stevioside and rebaudioside A comprising 85% of the plant's sweet compounds. These naturally occurring molecules provide sweetness while delivering remarkable therapeutic benefits validated by extensive clinical research (Singh *et al*., 2024). Stevia's zero-calorie profile makes it invaluable for weight management, with studies showing 12% reduction in body weight over 12 weeks when replacing sugar entirely.

Clinical trials demonstrate stevia's antidiabetic properties, reducing fasting blood glucose levels by 23% and HbA1c levels by 1.1% in type 2 diabetic patients within eight weeks (Gupta *et al*., 2023). The mechanism involves enhanced insulin sensitivity and improved glucose uptake by peripheral tissues. Additionally, stevia exhibits cardioprotective effects, lowering systolic blood pressure by 14 mmHg and diastolic pressure by 8 mmHg in hypertensive individuals.

Stevia's antioxidant properties protect against oxidative stress, with total antioxidant capacity increasing by 34% following regular consumption. The plant's anti-inflammatory compounds reduce tumor necrosis factor-alpha levels by 42%, potentially mitigating chronic disease progression. Preliminary research suggests stevia's antimicrobial properties may combat pathogenic bacteria, offering additional therapeutic advantages beyond sweetening applications.

Hepatoprotective effects include improved liver enzyme profiles, with alanine aminotransferase levels decreasing by 28% in fatty liver disease patients consuming stevia regularly. These multifaceted benefits position stevia as a functional food ingredient rather than merely a sugar substitute, offering comprehensive health advantages that extend far beyond calorie reduction.

Fig. 2. Medicinal Properties of Stevia sugar (https://organicindia.com/)

Value-Added Products and Market Innovation

India's stevia market has witnessed remarkable growth, reaching ₹2,800 crores in 2024 with projected expansion to ₹4,200 crores by 2025, representing 50% annual growth (Verma *et al*., 2024). Commercial stevia products include refined stevia sugar blends containing 98% purity, liquid stevia extracts with 95% rebaudioside A content, and pharmaceutical-grade stevia powders meeting international quality standards.

Innovative product development includes stevia-based confectionery, sugar-free beverages, and diabetic-friendly baked goods. Major Indian manufacturers produce stevia tablets containing 50-100mg steviol glycosides equivalent to 2-4 teaspoons of sugar, retailing at ₹180-250 per 100 tablets. Premium liquid stevia extracts command prices of ₹400-600 per 50ml bottle, demonstrating strong consumer acceptance for quality products.

Agricultural production has expanded significantly, with Karnataka, Gujarat, and Rajasthan leading cultivation efforts covering approximately 15,000 hectares. Farmers receive ₹120-150 per kg of fresh stevia leaves, generating annual incomes of ₹180,000-220,000 per hectare compared to traditional crops yielding ₹40,000-60,000. This economic incentive drives continued expansion of stevia cultivation across diverse agroclimatic zones.

Processing technology advances include spray-drying methods achieving 99% purity levels, ion-exchange purification systems, and enzymatic modification techniques enhancing flavor profiles. These innovations address initial consumer concerns about stevia's bitter aftertaste, creating products with sugar-identical taste characteristics that facilitate widespread adoption.

CONCLUSION

The transition from refined white sugar to *Stevia rebaudiana* represents a critical health intervention for India's sugar crisis. Scientific evidence overwhelmingly supports stevia's superiority as a natural sweetener, offering zero calories, multiple therapeutic benefits, and economic sustainability for farming communities. With traditional knowledge validating contemporary research findings, stevia emerges as a powerful tool for combating diabetes, obesity, and cardiovascular disease. The expanding market for value-added stevia products demonstrates consumer readiness for healthier alternatives. Government support for stevia cultivation, combined with continued innovation in processing technology, positions this ancient plant as a modern solution to India's sweetening needs while preserving agricultural livelihoods and promoting public health.

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