Coconut Sugar and Non-Nutritive Sweeteners: A Critical Comparison of Glycaemic, Microbiome, and Metabolic Evidence

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Purpose and scope

This review does not propose coconut sugar as a metabolically inert or universally superior alternative to non-nutritive sweeteners (NNS). It examines whether a small, formulation-relevant quantity of a conventional nutritive sweetener can provide acceptable sweetness, flavour, and food functionality while maintaining a low absolute glycaemic exposure and limited direct interaction with the colonic microbiota. The distinction matters because the metabolic and microbiome effects of NNS are heterogeneous, compound-specific, and influenced by individual host and microbial characteristics.

What coconut sugar is

Coconut sugar is a nutritive sweetener made by evaporating the sap of the coconut palm (*Cocos nucifera* L.). Chemically it is dominated by sucrose, reported at roughly 78 to 92 grams per 100 grams, with smaller amounts of free glucose and fructose and trace minerals, amino acids, and antioxidants (Hebbar et al., 2022; Saraiva et al., 2023). Because it is largely sucrose, coconut sugar is, at the level of the monosaccharides ultimately absorbed, similar to cane sugar; it is a conventional caloric sweetener rather than a metabolically distinct one. Its differences from refined cane sugar are ones of degree processing, trace nutrients, and the fine detail of glycaemic response, not of kind.

Glycaemic response: dose matters more than index

Coconut sugar is frequently marketed as "low-glycaemic," and a glycaemic index (GI) of about 35 is widely quoted. That figure originates from a single small study in the Philippines (Trinidad et al., 2010). Subsequent review reports a range of roughly 35 to 54 rather than a settled value (Saraiva et al., 2023), and in-vitro predicted-GI work classifies coconut sugar as medium-GI (Pathirana, 2023, an unrefereed preprint). More decisive is the single direct human head-to-head comparison. In 30 healthy adults given 50-gram loads, coconut sugar, sucrose, and brown sugar produced statistically comparable glucose responses at most time points. coconut sugar was in fact higher than sucrose at 45 minutes (133 versus 106 mg/dL). Leading the authors to conclude that coconut sugar "behaves in a similar way to other sugars" and that its low-GI reputation should be re-evaluated (Ferreira & Mendes, 2021). This study is small and in a low-tier journal, but it is the most direct test available and does not support a meaningful glycaemic advantage.

The more robust and practically relevant point is dose. Glycaemic load (GL) integrates both the quality of a carbohydrate (its GI) and the quantity consumed, and is calculated as GI × available carbohydrate ÷ 100 (Atkinson et al., 2021). GI values are conventionally derived using a 50-gram carbohydrate portion, whereas a single serving of a product may contain only a few grams. For 3.2 grams of coconut sugar at a GI in the reported 35–54 range, the estimated glycaemic load is approximately 1.1 to 1.7, a very small predicted exposure, contributing roughly 13 kilocalories. The defensible statement is therefore "low absolute glycaemic load because of the small serving," not "coconut sugar is intrinsically very low-GI." The postprandial response of the finished product will also depend on its other carbohydrates, protein, fat, and fibre, and requires product-specific confirmation rather than assumption.

Where each sweetener is handled in the gut

A genuine distinction between a nutritive sugar and several non-nutritive sweeteners lies in where they are processed. Sucrose, the bulk of coconut sugar, is hydrolysed by the brush-border enzyme sucrase-isomaltase in the small intestine and absorbed there as glucose and fructose. Under ordinary conditions and small amounts it does not reach the colon intact (Goodman, 2010). By contrast, sucralose is poorly absorbed and passes to the colon largely unchanged (Magnuson et al., 2016), and that colonic delivery underlies its measurable effects on the gut microbiota, including the causal, microbiome-mediated impairment of glucose tolerance shown when stool from affected participants was transferred into germ-free mice (Suez et al., 2022). At 3.2 grams, substantial delivery of intact digestible sugar to the colon would be unlikely in most healthy individuals.

Two honest caveats bound this argument, and the manuscript states them rather than claiming that "all of it is digested." First, individual fructose absorption and sucrase activity vary, and fructose absorption is incomplete and dose-dependent, so larger fructose loads can reach and be fermented in the colon, while absorbed fructose is metabolised in the liver (Jones et al., 2011). Second, coconut sugar may contain inulin or other fructans, which are not digested in the small intestine; if inulin reaches the colon, it partly qualifies the statement that the entire product is absorbed upstream. That same fact, however, disposes of any prebiotic claim at serving size. Coconut sap contains inulin at roughly 4.7 grams per 100 grams (Hebbar et al., 2022; Saraiva et al., 2023), so 3.2 grams supplies only about 0.15 grams, whereas human trials demonstrating prebiotic effects of inulin-type fructans typically use on the order of 3 to 20 grams per day (Hughes et al., 2022). Coconut sugar should therefore be described as not disruptive to the microbiome at typical intakes, not as microbiome-supportive.

Non-nutritive sweeteners: the comparator

The reason a small amount of nutritive sugar is a reasonable default is not that sugar is healthful but that the alternative carries unresolved uncertainty. In a randomised controlled trial, saccharin and sucralose impaired glycaemic responses in a microbiome-dependent, individualised manner, with causality established by faecal transfer into germ-free mice; stevia altered microbial function without impairing glycaemia at the group level (Suez et al., 2022). Reviews reach compound-specific conclusions. NNS are biologically active in the gut, most robustly for the synthetic sweeteners, with genuinely mixed findings for the plant-derived glycosides (Conz et al., 2023; Crakes et al., 2025; Ruiz-Ojeda et al., 2019). This does not establish that NNS are harmful, and for the plant-derived glycosides the human data are mixed; what it establishes is that "sweet without calories" is not the same as "biologically inert."

Formulation and sensory considerations

Beyond metabolism, nutritive and non-nutritive sweeteners differ in food-functional and sensory terms, and these differences are well recognised in food science (Mora & Dando, 2021). A small amount of coconut sugar contributes bulk, mouthfeel, moisture control, and the browning and flavour development of the Maillard reaction, functions that high-intensity NNS cannot provide alone, which is why NNS formulations frequently require bulking agents or sweetener blends to reproduce the texture and temporal sweetness of sugar. Sensorially, coconut sugar supplies caramel, roasted, and nutty compounds, whereas several high-intensity sweeteners can produce bitter, metallic, lingering, or atypical sweetness. Using a small quantity of sugar also allows an intentionally, lightly sweetened product rather than reproducing full sugar sweetness

with high-intensity sweeteners, and supports a recognisable, minimally processed "clean-label" formulation. These are consumer and formulation advantages, not evidence of superior health.

Conclusion

At 3.2 grams per serving, coconut sugar contributes approximately 13 kilocalories and has an estimated glycaemic load below 2, although the postprandial response of the complete food requires product-specific confirmation. Its digestible carbohydrate fraction would be expected to undergo predominantly small-intestinal digestion and absorption in healthy individuals, limiting direct delivery of intact sugars to the colonic microbiota. The evidence does not support the claims that coconut sugar is metabolically superior, intrinsically low-glycaemic, or beneficial to the microbiome. The one direct human comparison found its glycaemic response comparable to ordinary sugar. What the evidence does support is a dose-conscious formulation strategy: a small amount of a familiar, minimally processed nutritive sweetener that carries low absolute glycaemic exposure, is absorbed upstream of the colon, and provides sweetness, flavour, and food functionality, chosen in preference to non-nutritive sweeteners whose metabolic and microbiome effects remain heterogeneous, compound-specific, and host-dependent. This is a defensible ingredient decision, not a claim of microbiome protection or intrinsic metabolic superiority.

References

Atkinson, F. S., Brand-Miller, J. C., Foster-Powell, K., Buyken, A. E., & Goletzke, J. (2021). International tables of glycemic index and glycemic load values 2021: A systematic review. *The American Journal of Clinical Nutrition, 114*(5), 1625–1632. https://doi.org/10.1093/ajcn/nqab233 (PMID: 34258626)

Conz, A., Salmona, M., & Diomede, L. (2023). Effect of non-nutritive sweeteners on the gut microbiota. *Nutrients, 15*(8), 1869. https://doi.org/10.3390/nu15081869

Crakes, K. R., Questell, L., Soni, S., et al. (2025). Impacts of non-nutritive sweeteners on the human microbiome. *Immunometabolism, 7*(2), e00060. https://doi.org/10.1097/IN9.0000000000000060

Ferreira, F. da S., & Mendes, M. (2021). Glycemic response of coconut sugar, sucrose and brown sugar in healthy subjects. *Brazilian Journal of Health Review, 4*(4), 14427–14437. https://doi.org/10.34119/bjhrv4n4-005

Goodman, B. E. (2010). Insights into digestion and absorption of major nutrients in humans. *Advances in Physiology Education, 34*(1), 44–53. https://doi.org/10.1152/advan.00094.2009

Hebbar, K. B., Ramesh, S. V., Ghosh, D. K., et al. (2022). Coconut sugar—A potential storehouse of nutritive metabolites, novel bio-products and prospects. *Sugar Tech, 24,* 841–856. https://doi.org/10.1007/s12355-021-01047-w

Hughes, R. L., Alvarado, D. A., Swanson, K. S., & Holscher, H. D. (2022). The prebiotic potential of inulin-type fructans: A systematic review. *Advances in Nutrition, 13*(2), 492–529. https://doi.org/10.1093/advances/nmab119 (PMID: 34555168)

Jones, H. F., Butler, R. N., & Brooks, D. A. (2011). Intestinal fructose transport and malabsorption in humans. *American Journal of Physiology–Gastrointestinal and Liver Physiology, 300*(2), G202–G206. https://doi.org/10.1152/ajpgi.00457.2010

Magnuson, B. A., Carakostas, M. C., Moore, N. H., Poulos, S. P., & Renwick, A. G. (2016). Biological fate of low-calorie sweeteners. *Nutrition Reviews, 74*(11), 670–689. https://doi.org/10.1093/nutrit/nuw032

Mora, M. R., & Dando, R. (2021). The sensory properties and metabolic impact of natural and synthetic sweeteners. *Comprehensive Reviews in Food Science and Food Safety, 20*(2), 1554–1583. https://doi.org/10.1111/1541-4337.12703 (PMID: 33580569)

Pathirana, D. T. H. (2023). *Prediction of glycemic indices of coconut (Cocos nucifera L.) jaggery products value-added with selected ingredients* [Preprint]. SSRN. https://ssrn.com/abstract=4499976

Ruiz-Ojeda, F. J., Plaza-Díaz, J., Sáez-Lara, M. J., & Gil, A. (2019). Effects of sweeteners on the gut microbiota: A review of experimental studies and clinical trials. *Advances in Nutrition, 10*(Suppl 1), S31–S48. https://doi.org/10.1093/advances/nmy037

Saraiva, A., Carrascosa, C., Ramos, F., Raheem, D., Lopes, M., & Raposo, A. (2023). Coconut sugar: Chemical analysis and nutritional profile; health impacts; safety and quality control; food industry applications. *International Journal of Environmental Research and Public Health, 20*(4), 3671. https://doi.org/10.3390/ijerph20043671

Suez, J., Cohen, Y., Valdés-Mas, R., et al. (2022). Personalized microbiome-driven effects of non-nutritive sweeteners on human glucose tolerance. *Cell, 185*(18), 3307–3328.e19. https://doi.org/10.1016/j.cell.2022.07.016

Trinidad, T. P., Mallillin, A. C., Sagum, R. S., & Encabo, R. R. (2010). Glycemic index of commonly consumed carbohydrate foods in the Philippines. *Journal of Functional Foods, 2*(4), 271–274. https://doi.org/10.1016/j.jff.2010.10.002