



Non-Nutritive Sweeteners: We Need To Balance The Scales

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ABSTRACT

Non-nutritive sweeteners (NNS) are used as a low-calorie sugar substitute in food and beverages. With rising levels of obesity, metabolic syndrome and diabetes mellitus, NNS have potential to be a key dietary strategy, reducing sugar and caloric intake, ultimately reducing morbidity and mortality.

However, there is a debate in current literature with a suggestion that NNS may promote weight gain, with alternative mechanisms of increased energy intake. This anti-NNS rhetoric has gained momentum, propelled by correlational support and naturalistic fallacies. In this editorial piece, the authors provide evidence in support of a balanced view of NNS to underscore caution in interpreting and communicating NNS research findings.

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Introduction

The top ten global causes of mortality include a marked prevalence of non-communicable diseases, such as diabetes mellitus and ischaemic heart disease [1]. Combined with the prevalence of obesity [2] and other modifiable risk factors (such as smoking and sedentary lifestyles), these trends emphasize a need for effective lifestyle modifications and a proactive approach to healthcare.

One method to reduce caloric and sugar intake is non-nutritive sweeteners (NNS) such as acesulfame K, aspartame and saccharin. These are additions to food and beverages that replace the sweet taste of sugar, but with negligible calories. Despite the theoretical application, a unified consensus is lacking regarding their use for weight management. On their own, NNS do not reduce weight [3], but an energy reduction can be achieved when used as a sugar substitute. This potential is undermined by an increasingly inflammatory rejection of NNS, complicated by the extrapolation of animal studies and conflation of correlation with causality.

Evidence for use in weight loss

Several meta-analyses and systematic reviews using human subjects identify significant differences in

body weight when comparing the outcomes of NNS to sugar [4-6]. These reviews assess randomised controlled trials (RCT) and prospective cohort studies and are among the highest quality evidence available. The findings are not yet conclusive and further research is warranted to resolve variable outcomes between observational and RCT data and across diverse NNS types [7], but most intervention studies report NNS benefits when substituted for sugar.

Three points are commonly mentioned regarding NNS [8]. First, the sweet taste confusion hypothesis posits that NNS uncouple sweetness from energy intake in a way that may be unfavorable as suggested by brain imaging studies [9,10]. Second, the sweet tooth hypothesis indicates that exposure to NNS may increase desire for more sweetness, though this has not been supported by direct studies on the topic [11]. Third, the conscious overcompensation hypothesis suggests that consumers take in more energy due to perceived “saved” calories when they select NNS-sweetened items [12,13].

This third point may explain why energy-reduction benefits are not always realized when “diet” products are selected instead of sugar-containing versions, as NNS may represent a permissive signal to eat

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more for some individuals. It also suggests that dietary adjustments require behavioral support, such as how to handle cravings and how to select nutrient-dense foods that the patient enjoys. Taken together, these hypotheses do not negate the potential weight control benefits of NNS when substituted for sugar [6], even if NNS are not ideal strategies for all individuals.

Those responsible for quality patient care must read beyond the anti-NNS headlines that have become increasingly popular on blogs and social media. A foundation of evidence exists to support the safety and use of NNS in weight maintenance and reduction, so this merits consideration when broaching the controversial question of their utility.

Understanding potential study limitations

Anti-NNS rhetoric is often driven by the link between NNS and weight gain. In animal studies this is attributed to increased food palatability, thereby increasing energy intake and body weight [14]. The obvious caveat is that rodent and human physiology and eating behaviour differ, so the higher quality evidence (human RCTs) should be weighted accordingly.

Observational studies in humans have linked NNS with unfavorable health outcomes, though these studies have a limited ability to establish causality and can reflect reverse causality and residual confounding. While RCTs attempt to reduce these distortions during participant selection, epidemiological studies are less restrictive. Few prefer NNS-sweetened products based on taste preference alone; instead, it is likely that those with a less stable body weight, a history of binge eating or overeating, and those with greater visceral adiposity tend to favor “diet” products. Consequently, they may be sought by individuals who already have cardiometabolic risk factors or who are at higher risks for diabetes.

Concluding remarks

Although the evidence for NNS for weight loss is not conclusive in free-living individuals, the highest quality evidence indicates a potential role in a wider weight management plan. Indeed, this notion is emphasized by the American Heart Association’s recommendation [15] for the prudent use of diet beverages; they consider them “a useful replacement strategy to reduce intake of sugar” noting that “this approach may be particularly helpful for those who are habituated to a sweet-tasting beverage and for whom water, at least initially, is an undesirable option.” In addition, it may be premature to take a strong stance, either for or against NNS, given that the

heterogeneous effects of different NNS warrant further research [16] as well as how each of these interacts with the gut microbiome [17].

Our opinions about NNS require a balanced, evidence-based approach that minimizes bias. The efficacy and safety of using NNS to reduce sugar intake holds promise for addressing obesity [18] and should not be compromised by a shallow understanding of the literature. This approach enables us to remain open to any potential benefits or contraindications, minimizing the influence of inflammatory headlines and placing the needs of our patients at the forefront of the discussion.

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