

The Glucosatiety Index: A tool for nutritional planning in diabetes and obesity

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Abstract

Indices such as the glycaemic index and satiety index help to classify foodstuffs according to their glucose-raising and hunger-suppressing effect. This assists in appropriate choice of meals, and ensures concordance of nutritional and medical therapy, as well as physical activity patterns. We suggest the use of an integrated glucosatiety index (or ratio) to help inform nutritional choices in a comprehensive manner. Calculated as the ratio of satiety index to glycaemic index, this metric can help in person-centred choice of nutrition, as well as choice and monitoring of anti-obesity medications and supplements.

Keywords: Diabetes, glycaemic index, metabolic care overweight, obesity, satiation, satiety index.

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Glycaemic Index

The glycaemic index has long been used as a marker of rise in glucose caused by ingestion of a particular foodstuff. The benchmark taken is pure glucose (with a glycaemic index of 100). Usually, 50 grams of carbohydrate food is ingested, and area under curve checked for over 2 hours. Foods with a glycaemic index of 0 to 55 are considered low, 56 to 69, medium, and 70+, high glycaemic index. Glycaemic load incorporates the amount of carbohydrate being consumed and is calculated as (glycaemic index x weight of food) /100.¹

While the glycaemic index and load are useful for planning meals in persons with diabetes, and those seeking a healthy lifestyle, they do have limitations. These indices are limited to carbohydrate foods, do not reflect total caloric intake, and do not address acceptability, palatability and hunger resolution.

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Satiety Index

The satiety index aims to resolve some of these issues. This index measures how effective various foods are in reducing hunger. The reference framework is white bread (satiety score =100). All foods, irrespective of their macronutrient composition, can be assessed. There is no standard weight of serving, unlike for glycaemic index calculation; rather, a serving that provides 240 calories, irrespective of weight or volume, is used.²

The satiety index helps in planning meals for people seeking to control hunger and reduce weight. In general, natural foods, rich in complex carbohydrates and protein, promote satiety, while ultra processed items are associated with low satiety.³

It must be noted that satiation (immediate fullness) and satiety (prolonged satisfaction) are different phenomena.⁴ Technically speaking satiation is assessed in this index. Satiety may vary according to cooking style and other aristologic variables, in person of different ethnic groups, and in individuals on anti-obesity medication.

One Plus One Equals Eleven

Though both these indices have limitations and shortcomings, they are useful tools for nutritional and dietary therapeutics. Diabetes care has, over the past few decades, moved from a glucocentric to a comprehensive metabolic approach, including focus on weight optimization. Obesity, too, has been recognized as a disease.⁵ Keeping this in mind, we suggest a glucosatiety (or more accurately, satio-glycaemic) index or ratio to reflect impact on both glucose and weight management. This can be calculated as:

Glucosatiety index (ratio) = Satiety index ÷ glycaemic index

While the words 'satio-glycaemic' and 'ratio' are technically more accurate, for ease of use, we prefer the term glucosatiety index.

Table shows glycaemic and satiety indices of some common foods. Table also lists the glucosatiety index of commonly used foods. We may define foods with an index ≥ 2.0 as having high, those with ≥ 1.0 as moderate, and those with ≤ 1.0 as low glucosatiety. This classification, albeit arbitrary, serves as a guide for people

Table: Glycaemic and satiety indices of some common foods

Food	Satiety Index	Glycaemic Index	Glucosatiety Ratio
Boiled Potato	323	78	4.14
Porridge (oatmeal)	209	79	2.64
Orange	202	43	4.70
Apple	197	36	5.47
Whole meal bread	157	74	2.12
Eggs	150		Infinite
Cheese	146		Infinite
White rice	138	73	1.89
Lentils	133	32	4.16
Banana	118	51	2.31
French fries	116	63	1.84
White bread	100	75	1.33
Ice cream	98	51	1.92
Yoghurt	88	35	2.51
Peanuts	84	63	1.33
Cake	65	67	0.97
Croissant	47	70	0.67

seeking healthy nutrition choices. It can be used for people living with obesity/overweight and/or diabetes, as well as healthy individuals. Ideally, glucosatiety index should be calculated, in a standardized manner, at the same time, using food cooked in various manners, in persons of a specific ethnicity.

Variables such as use of anti-obesity and glucose lowering medications may alter results. This is especially true for glucagon-like peptide 1 receptor agonist (GLP1RA) based drugs. Other factors, including frame of mind, social environment, style of cooking (use of condiments and spices), and ingestion of beverages may influence results.

We strongly call for global attention, and research, on the concept of glucosatiety index. Each country and region should be able to calculate this index in commonly used foodstuffs. The ideal approach would be to measure area under curve of glucose, and satiation/satiety, for ≥ 2 hours, after ingesting a standard isocaloric food portion (perhaps 240 calories), in laboratory conditions. A prespecified amount of room temperature still water (perhaps 250 ml) may be allowed.

This will assist in improving the quality of our nutritional counselling, as well as culinary care that we offer our

patients. It may also open the doors for personalized choice and titration of anti-obesity medications and supplements, helping enhance both efficacy and tolerability of prescribed therapy.

Summary

Successful management of diabetes and obesity depends upon accurate nutritional therapy. Indices such as the glycaemic index and satiety index help us classify foodstuffs according to their glucose-raising and hunger-suppressing effect. This assists in appropriate choice of meals, and ensures concordance of nutritional and medical therapy, as well as physical activity patterns.

We suggest the use of the gluco satiety index (or ratio), the ratio of satiety index to glycaemic index, in nutritional care.

While we have existing data sets for our calculations, we strongly recommend assessment of glucosatiety index across the world, in a cuisine-specific and ethnospecific manner. We acknowledge the seminal work of David J Jenkins et al (1981) and Susanna Holt et al (1995) in formulating the concepts of glycaemic and satiety indices respectively.

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