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ORIGINAL RESEARCH

Predicting postprandial glycemia and insulinemia in healthy, young, lean adults: comparing glycemic load and carbohydrate content alone - A review of the evidence

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1. ABSTRACT

The analyzed study evaluated whether glycemic load—the combination of glycemic index and the amount of available carbohydrates—predicts glucose and insulin responses after the consumption of single foods and mixed meals better than carbohydrate content alone. In groups of healthy young adults, 121 foods and 13 mixed meals were examined. Glycemic load explained a greater share of the variability in postprandial responses compared to carbohydrates alone, especially for mixed meals.In the narrative of “The Choice to Live in Health or Illness” by Dr. A. Colonnese and R. Panzironi, this publication contributes to the concept that the quality and quantity of carbohydrates act together in determining the metabolic impact of a meal. Independent crossover studies confirm that meals with a higher glycemic load tend to increase postprandial glycemia and insulinemia more significantly. However, glycemic load remains an estimate: meal composition, portion size, individual characteristics, and the dietary context can modify its accuracy.

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MISSION

LIFE Science Hub – Journal of Science was founded with the aim of making scientific knowledge accessible without giving up methodological rigour, quality of sources and authoritativeness of content. The journal promotes the dissemination of knowledge in the health, nutrition, medical and longevity sciences, building a bridge between the world of research and society.

Through articles, reviews, in-depth analyses and expert contributions, the Journal champions evidence-based medicine and science, fostering a correct interpretation of scientific data and countering misinformation. Every piece of content is developed with the aim of translating the complexity of research into understandable, useful and applicable information, while keeping intact the principles of accuracy, transparency and scientific independence.

Free from political, industrial and commercial influence, the journal stands as an authoritative and independent editorial space, dedicated to promoting scientific culture, professional development and the growth of health awareness among the public.

2. ANALYZED STUDY

The research question was whether the body's response after eating could be better predicted by knowing only the grams of carbohydrates or by also considering their ability to increase glycemia. The hypothesis evaluated was that the glycemic load, calculated by combining the glycemic index and the available carbohydrates in the portion, was a more informative indicator than carbohydrate content alone.The issue is relevant to paragraph 2.1 because the latter correctly distinguishes between two elements: the quantity of carbohydrates ingested and the speed at which they become glucose in the blood. The publication subject to the Evidence Review does not evaluate long-term clinical effects, nor does it demonstrate that the glycemic load can describe every individual response. Instead, it documents, under controlled experimental conditions and in healthy individuals, how the glycemic load is associated with acute variations in glycemia and insulin after foods and meals.

3. MATERIALS AND METHODS OF THE ORIGINAL STUDY

The available material consists only of the abstract; therefore, information not included in the abstract is not present in the available material. The authors conducted two experiments on healthy, young, and lean subjects. In the first, groups of participants consumed 1000 kJ portions of 121 individual foods, belonging to 10 food categories. In the second, healthy subjects consumed 2000 kJ portions of 13 mixed meals.Foods and meals differed widely in terms of macronutrients, dietary fiber, and glycemic load. Postprandial glycemia and insulinemia were evaluated using the area under the curve, a measure that summarizes how much and for how long glucose or insulin levels rise after a meal, and were expressed relative to a reference food set at 100.The abstract does not report the total number of participants, the recruitment period, detailed inclusion and exclusion criteria, the duration of fasting, the exact characteristics of the reference, the laboratory analytical procedures, or the complete statistical models. However, it does report statistical comparisons between the predictive capacity of glycemic load and that of available carbohydrates.

4. RESULTS

For individual foods, the glycemic load proved to be a more powerful predictor than carbohydrate content alone. It explained 85% of the observed variability in the glycemic response and 59% of the variability in the insulin response, with $P < 0.001$ for both associations. In simple terms, for the foods tested, knowing both the quantity and metabolic quality of the carbohydrates allowed for a better estimation of how much blood glucose and insulin would rise.In the 13 mixed meals, which better represent how we typically eat, the glycemic load remained the strongest predictor. It explained 58% of the variability in the glucose response, with $P = 0.003$, and 46% of the variability in the insulin response, with $P = 0.01$. Carbohydrate content alone predicted responses to individual foods, but did not statistically significantly predict responses to mixed meals.These results maintain a clear direction: as the calculated glycemic load increased, the observed postprandial glucose and insulin responses also increased on average. However, this does not mean that the glycemic load explains the entire response: in the case of mixed meals, a significant portion of the variability remained unexplained.

5. INTERPRETATION

The practical implication is that two meals with the same number of grams of carbohydrates are not necessarily equivalent for the body in the hours that follow. If the carbohydrates in a meal tend to be absorbed more rapidly, or if a portion provides a greater quantity of available carbohydrates, the glycemic load increases, which can also increase the glucose and insulin response.The segment of the book's narrative directly documented by the study is: glycemic index plus quantity of available carbohydrates glycemic load better estimate of postprandial glycemic and insulin response compared to carbohydrates alone. The glycemic index describes the response relative to a standardized amount of carbohydrates; the glycemic load also incorporates the actual portion size.The data do not demonstrate that the glycemic load is the only useful parameter, nor that a specific acute response alone causes metabolic diseases. Furthermore, the results come from healthy, young adults and do not allow for the automatic

transfer of the same estimates to people with diabetes, obesity, advanced age, or those on different pharmacological treatments.

6. INDEPENDENT CONFIRMATORY EVIDENCE

Confirmation particularly close to the book's statement comes from a randomized crossover study conducted on 12 women with obesity. Participants received four meals that combined high or low glycemic index and small or large portions. The calculated glycemic load was found to be associated with increases in the area under the glucose curve at both two and five hours, with $r = 0.58$ and $P < 0.01$, and in insulin, with $r = 0.54$ and $P < 0.01$. Crucially, two meals with similar glycemic load, but different quantity and quality of carbohydrates, produced very similar glucose and insulin responses. This directly supports the passage stating that quantity and quality jointly contribute to the metabolic impact of a meal [1]. The main limitation is the very small sample size and the population consisting only of women with obesity.In a further randomized, double-blind crossover study, 10 healthy, lean young adults consumed five breakfasts designed to differ in glycemic index and glycemic load. Compared to low glycemic load breakfasts, high glycemic load breakfasts increased the incremental area of glucose and insulin in the first two hours, with $P < 0.01$ and $P < 0.001$, respectively. They also increased both responses between two and three hours after the meal. The glycemic index, considered separately, was not associated with the glycemic response in the first three hours. The result is consistent with the idea that glycemic load adds information beyond the relative rate of absorption alone, but the study does not allow for the establishment of a universal threshold valid for every person [2].A third randomized crossover study extended the verification to an entire day of eating. Twenty-six adults who were overweight or had obesity consumed, in random order, four mixed meal patterns that varied by glycemic index and carbohydrate content. Compared to the high glycemic index and high carbohydrate content pattern, each of the other three patterns reduced the areas under the glucose and insulin curves over 12 hours, with $P < 0.001$ for all comparisons. This evidence confirms the general direction: reducing the glycemic index, carbohydrates, or both reduced postprandial responses. However, it does not prove that glycemic load is superior to every other measure in any dietary composition, because it compared dietary combinations and not a single isolated indicator [3].

7. CONFLICTING EVIDENCE

No directly conflicting evidence of sufficient relevance has been identified regarding the fact that both the quantity and quality of carbohydrates contribute to the postprandial glycemic response; this does not prove the absence of contrary results. However, there is significant evidence of methodological limitations. In 20 healthy volunteers, the glycemic load, calculated as the glycemic index multiplied by available carbohydrates, did not differ from the direct measurement in 12 of the 15 food-portion combinations examined. In three combinations, however, the indirect calculation overestimated the directly measured glycemic load [4].This result does not negate the general validity of the parameter, but it indicates that it is not a perfect prediction for every food and portion. Accuracy also depends on how precisely the glycemic index and available carbohydrates are estimated, the food matrix, and the not always linear relationship between carbohydrate dose and glycemic response. Therefore, glycemic load is more correctly interpreted as a tool for physiological estimation, rather than an infallible individual measure.

8. QUADRO COMPARATIVO E SINTESI DELLE EVIDENZE

The table distinguishes the publication subject to the Evidence Review from the independent research used to confirm or define the narrative of the paragraph.

Quadro comparativo

Reference	Study type	Population or model	Main result	Direction of evidence	Strength of evidence
Original study	Controlled experiments on single foods and mixed meals	Healthy, young, and lean subjects; sample size not reported in available material	Glycemic load predicted postprandial glycemia and insulinemia better than carbohydrates alone; in mixed meals, it explained 58% and 46% of the variability.	direct confirmation	moderate
[1]	Randomized crossover	12 women with obesity	Meals with similar glycemic load produced similar glycemic and insulin responses despite differences in the quantity and type of carbohydrates.	direct confirmation	moderate
[2]	Double-blind randomized crossover	10 healthy, young, and lean adults	High glycemic load breakfasts increased incremental glucose and insulin areas compared to low glycemic load ones.	direct confirmation	moderate
[3]	Randomized crossover	26 adults who are overweight or have obesity	Reducing glycemic index or carbohydrates in mixed meals reduced postprandial glycemia and insulinemia over 12 hours.	indirect confirmation	moderate
[4]	Experimental validation study	20 healthy volunteers; 5 foods and 15 food-portion combinations	Glycemic load calculation agreed with direct measurement in 12 out of 15 combinations, but overestimated it in 3.	discordant evidence	moderate

9. SINTESI EDITORIALE E CONCLUSIONI

CONCLUSIONS

The study analyzed directly supports the use of glycemic load as an estimate of the acute metabolic response to a food or meal, as it integrates both the quantity and the physiological quality of carbohydrates. Independent evidence in humans confirms that meals with a higher glycemic load tend to produce greater postprandial increases in glycemia and insulinemia.

The narrative of the paragraph is therefore well-supported in its physiological significance. However, it remains necessary to avoid absolute interpretations: glycemic load does not fully describe the individual response and does not, on its own, demonstrate long-term clinical effects. It must be interpreted in the context of the portion size, the composition of the meal, and the individual's metabolic characteristics.

Aggiornato al 17/11/2026. Questo contenuto riflette una sintesi divulgativa delle evidenze scientifiche al momento della pubblicazione e non sostituisce il parere medico.

10. TRANSPARENCY AND SCIENTIFIC RESPONSIBILITY

Artificial Intelligence was used solely as a tool for editorial and documentary support. All content, interpretations, bibliographic citations and conclusions have been verified, reviewed and approved by the author, who assumes full scientific responsibility for them.

The manuscript was also subjected to independent peer review prior to publication.

To ensure the greatest transparency, the complete history of the article, including the dates of submission, revision, acceptance and publication, as well as information on the peer review process, is available on the dedicated Article History page.

11. RIFERIMENTI BIBLIOGRAFICI

[1] **Acute effect of meal glycemic index and glycemic load on blood glucose and insulin responses in humans**
Galgani et al., 2006
Nutrition Journal
DOI: https://doi.org/10.1186/1475-2891-5-22

[2] **Glycemic Index and Glycemic Load Used in Combination to Characterize Metabolic Responses of Mixed Meals in Healthy Lean Young Adults**
Micha et al., 2011
Journal of the American College of Nutrition
DOI: https://doi.org/10.1080/07315724.2011.10719950

[3] **Reducing the Glycemic Index or Carbohydrate Content of Mixed Meals Reduces Postprandial Glycemia and Insulinemia Over the Entire Day but Does Not Affect Satiety**
Liu et al., 2012
Diabetes Care
DOI: https://doi.org/10.2337/dc12-0329

[4] **The Glycemic Load Estimated from the Glycemic Index Does Not Differ Greatly from That Measured Using a Standard Curve in Healthy Volunteers**
Venn et al., 2006
The Journal of Nutrition
DOI: https://doi.org/10.1093/jn/136.5.1377