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ORIGINAL RESEARCH

The glycemic index: physiological significance - Review of the evidence

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1. ABSTRACT

The analyzed publication examines the physiological significance of the glycemic index, which is an indicator of the glycemia response following the intake of carbohydrate-containing foods. Its central point is that foods with apparently similar amounts of carbohydrates do not necessarily produce the same increase in glycemia, because the speed at which carbohydrates are digested and absorbed also matters.In section 2.1 of the book “The Choice to Live in Health or Illness” by Dr. A. Colonnese and R. Panzironi, the study contributes to the narrative that the assessment of carbohydrates cannot be limited to the grams consumed: the metabolic quality of the food, also measured through the glycemic index, modifies the response after a meal. Independent studies confirm the reproducibility of the methodology at the group level, the role of the structure of starchy foods, and the greater capacity of glycemic load to predict the response to meals and foods. However, significant variability remains between and within individuals, which requires that the glycemic index not be interpreted as an exact individual prediction.

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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 is whether the glycemic index can provide a physiologically useful description of the quality of carbohydrates found in foods. The hypothesis discussed is that knowing how many grams of carbohydrates a food contains is not enough: it is also necessary to consider the magnitude and speed with which that food increases glycemia after a meal.The topic is relevant to section 2.1 of the book "The Choice to Live in Health or Illness" by Dr. A. Colonnese and R. Panzironi because the text shifts the focus from the mere quantity of carbohydrates to their metabolic quality. The publication subject to the Review of evidence defines the glycemic index as a physiological assessment of carbohydrates based on the postprandial glycemic response, that is, the increase in blood glucose after eating.The study is not a new experiment on a single population described in the available abstract. It is a synthesis of literature that draws on results from trials and observational studies. It can therefore support the general concept of the glycemic index and its physiological relevance, but it does not prove on its own that a specific food will produce the same response in every person or in every complete meal.

3. MATERIALS AND METHODS OF THE ORIGINAL STUDY

The available material consists exclusively of the abstract. The publication presents and discusses evidence from clinical trials and observational studies regarding the glycemic index, glycemic load, and associated metabolic outcomes.The formal design of the review, the bibliographic search strategy, the inclusion and exclusion criteria for the studies, the total number of publications evaluated, the characteristics of the participants in the included studies, the time intervals analyzed, and the statistical procedures are not reported in the available material. It is therefore not possible to classify it with certainty as a systematic review or meta-analysis.The abstract specifies that the glycemic index evaluates the effect of a food's carbohydrates on postprandial glycemia. It also refers to the glycemic load, defined as the average glycemic index multiplied by the total amount of carbohydrates. This second parameter combines the physiological quality of the carbohydrates with the amount actually consumed.

4. RESULTS

The main result reported in the abstract is conceptual and physiological: carbohydrate-containing foods can lead to different postprandial glycemic responses. The glycemic index is presented as a tool for classifying foods based on this response, rather than solely on the declared quantity of carbohydrates.The publication reports that low glycemic index diets have been associated, in various studies, with an improved blood lipid profile, lower concentrations of C-reactive protein, and potential assistance in weight control. It also highlights observational associations between low glycemic index or glycemic load diets and higher concentrations of HDL cholesterol—the fraction commonly referred to as "good" cholesterol—as well as lower concentrations of C-reactive protein. However, the abstract does not report numerical values, confidence intervals, sample sizes, or statistical adjustment procedures.For the narrative context of the book, the most relevant passage is another: the glycemic classification of foods has physiological significance because the glucose response after a meal depends on the quality of the carbohydrates, in addition to their quantity. The abstract also acknowledges that inconsistencies remain in the literature. This clarification is important: the glycemic index can describe average differences between foods, but it does not eliminate biological and methodological variability.

5. INTERPRETATION

In simple terms, two foods with a similar amount of carbohydrates are not necessarily equivalent for the body. If a food is digested and absorbed more rapidly, glucose can reach the blood more quickly; if digestion is slower, the increase may be more gradual. The glycemic index is used to compare these relative responses under standardized conditions.The segment of the book's narrative supported by the analyzed publication is: similar amount of carbohydrates different speed and intensity of the glycemic response need to consider the metabolic quality of carbohydrates. The glycemic index primarily describes the response to a standardized amount of available carbohydrates; it does not, on its own, describe the usual portion, the context of the meal, the

order of foods, or individual metabolic characteristics.This distinction avoids two overinterpretations. It is incorrect to state that the glycemic index exhausts the nutritional value of a food. It is also incorrect to conclude that a food classified with a certain index will inevitably produce the same glycemic curve in all people. Its most robust use is as a comparative physiological measure, especially when interpreted together with the amount of carbohydrates and the overall composition of the meal.

6. INDEPENDENT CONFIRMING EVIDENCE

A multicenter study verified whether the glycemic index obtained using the recommended method could be reproduced in different laboratories. Seven centers studied 68 healthy adults and measured five foods, four provided centrally and one white bread purchased locally. The mean glycemic index values did not differ significantly between centers. Using capillary blood, i.e., taken from the finger, the standard deviation between laboratories was approximately 9 units. This directly confirms that, when applied in a standardized manner and interpreted as a mean food value, the glycemic index is a usable measure; however, it does not mean that the individual response is free from fluctuations [1].A controlled study on healthy young adults verified the next step in the chain: the amount of carbohydrates is not enough to predict the postprandial response. In isoenergetic portions of 121 individual foods and 13 mixed meals, the glycemic load explained 85% of the variability in the glycemic response and 59% of the insulin response for individual foods. For mixed meals, it explained 58% and 46% of the variability, respectively. Carbohydrate content alone predicted the response for individual foods, but not for mixed meals. The result supports the book's idea that quality and quantity interact: the glycemic index describes the relative quality, while the glycemic load adds the portion quantity [2].A systematic review with meta-analysis of 25 randomized crossover studies, totaling 369 healthy participants, evaluated the role of the physical structure of starchy foods. Foods with higher amylose, lower starch gelatinization, and larger or intact particles reduced the postprandial glycemic and insulin response compared to products with opposite structural characteristics. For example, high-amylose starch reduced the incremental area of glycemia, i.e., the overall increase in glucose above the baseline level, with a standardized difference of –0.64, 95% confidence interval from –0.83 to –0.46. This evidence confirms that food processing and structure can modify the rate of digestion and therefore the glycemic response, even when the carbohydrate remains the central nutritional element [3].Taken together, this independent evidence does not prove that the glycemic index is the sole determinant of the postprandial response. However, it confirms the direction of the narrative: the glucose response depends on the physiological quality of the food, its structure, and the amount of carbohydrates actually ingested.

7. CONFLICTING EVIDENCE

A significant limitation concerns the accuracy of the glycemic index when applied to an individual. In a study conducted on 63 adults without chronic diseases, white bread had an average glycemic index of 62 ± 15 using the recommended method. However, the coefficient of variation—a measure of the fluctuation in results—was 20% within the same person and 25% between different people. The insulin index and glycated hemoglobin explained 15% and 16% of the observed variability, respectively [4].This evidence does not contradict the fact that different foods can produce different average glycemic responses. However, it scales back the idea that the published glycemic index value of a food can accurately predict the response of a specific person on a specific day. Differences in glycemic status, insulin response, and experimental conditions contribute to this variability. For this reason, the glycemic index should be interpreted as a tool for physiological population classification rather than a self-sufficient individual test [4].

8. QUADRO COMPARATIVO E SINTESI DELLE EVIDENZE

The table distinguishes the publication subject to the Evidence Review from the independent studies used to confirm or define the narrative of the book's paragraph.

Quadro comparativo

Reference	Study type	Population or model	Main result	Direction of evidence	Strength of evidence
Original study	Narrative literature review	Clinical and observational studies cited in the abstract; sample size not reported	Describes the glycemic index as a physiological measure of postprandial glycemic response and distinguishes between carbohydrate quality and quantity.	biologically consistent evidence	moderate
[1]	Multicenter study	68 healthy adults across seven centers	Mean glycemic index values for five foods did not differ significantly between centers; inter-laboratory standard deviation was approximately 9 with capillary blood.	direct confirmation	moderate
[2]	Controlled food and meal study	Healthy young adults; 121 single foods and 13 mixed meals	Glycemic load predicted glycemic and insulin response better than carbohydrates alone, especially in mixed meals.	direct confirmation	moderate
[3]	Systematic review with meta-analysis of randomized crossover studies	25 studies, 369 healthy participants	Starch structures that were more intact, less gelatinized, or rich in amylose reduced postprandial glycemia and insulin.	indirect confirmation	moderate
[4]	Experimental reliability study	63 adults without chronic diseases	The glycemic index of white bread showed significant intra-individual and inter-individual variability.	discordant evidence	moderate

9. SINTESI EDITORIALE E CONCLUSIONI

CONCLUSIONS

The analyzed publication consistently supports the reason it is cited in the book's paragraph: not all carbohydrates behave the same way physiologically after a meal, and the amount consumed alone does not fully describe the glycemic response.Independent evidence confirms that the glycemic index can classify average differences between foods under standardized conditions, that starch structure and processing contribute to these differences, and that the glycemic load more comprehensively integrates both the quality and quantity of carbohydrates. The framework is therefore well-supported from a physiological standpoint. It remains necessary to avoid rigid interpretations, as individual glycemic response varies depending on the person, the meal, and the measurement conditions.

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.

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