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ORIGINAL RESEARCH

The logic of paired self-monitoring of blood glucose before and after meals: the role of glycemic variability in micro- and macrovascular risk - Evidence review

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1. ABSTRACT

The publication analyzed is a narrative review that evaluated why, in diabetes management, measuring glycemia before and after meals can provide additional information compared to fasting glycemia or glycated hemoglobin (HbA1c, an indicator of average blood glucose over the previous months) alone. The authors suggest that post-meal spikes represent an important component of glycemic variability and may contribute to the risk of complications; however, they acknowledge that conclusive prospective evidence was not available.In paragraph 3.1, "Glycemic variability," of "The Choice to Live in Health or Illness" by Dr. A. Colonnese and R. Panzironi, the study contributes primarily to the narrative that postprandial spikes are a relevant part of daily fluctuations and that their monitoring complements, rather than replaces, fasting glycemia and HbA1c. Independent studies confirm that the relative contribution of postprandial glycemia is greater when glycemic control is better, that structured monitoring can improve glycemic control, and that variability helps identify the risk of hypoglycemia. However, the attribution of an independent vascular effect to glycemic variability remains uncertain.

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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 diabetes management should consider not only fasting glycemia and HbA1c, but also daily glucose fluctuations, especially post-meal increases. The authors' hypothesis was that these postprandial spikes constitute a predominant component of glycemic variability and offer clinically useful information.The relevance to paragraph 3.1 is specific: the publication was used to argue that post-meal measurement can reveal variations that a single fasting glycemia or HbA1c reading does not describe. As this is a narrative review, the analyzed study cannot demonstrate a causal relationship between postprandial spikes and vascular complications, nor establish that their treatment prevents such complications in all people with diabetes.

3. MATERIALS AND METHODS OF THE ORIGINAL STUDY

The available material is only the abstract. The authors conducted a search in Medline using the terms “postchallenge” or “postprandial” associated with “glucose” or “diabetes”. After excluding reviews and clinical cases, they selected primary articles, meta-analysis, and bibliographic references deemed most relevant.The design was therefore a narrative review of the literature and not a clinical study with directly enrolled participants. The overall sample size, formal selection criteria, precise search period, method for assessing study quality, and a quantitative synthesis of the results are not reported in the available material. The authors themselves indicate a possible selection bias, meaning the risk that the choice of articles partially reflects the reviewers' judgment.

4. RESULTS

The review reports that glycemic variability, manifested primarily by glucose spikes after meals, was considered a possible component of the risk for macrovascular complications, i.e., those affecting the heart and large arteries. The available text does not provide quantitative estimates, aggregate sample sizes, risk values, or original statistical analyses.The result most relevant to the book's paragraph is conceptual: the authors describe blood glucose monitoring in relation to meals as a tool to identify postprandial hyperglycemia, understand the effect of diet, physical activity, and medication, and guide more timely therapeutic adjustments. However, the abstract specifies that the role of postprandial glycemia in the prevention of complications had not been conclusively demonstrated by prospective studies.

5. INTERPRETATION

In simple terms, two people can have similar HbA1c levels but different daily profiles: one with relatively stable glycemia and the other with repeated increases after meals followed by rapid decreases. Monitoring before and after a meal can make this difference recognizable, which the average HbA1c does not show directly.The segment of the chain documented by the analyzed study is: meal postprandial glucose increase greater visibility of glycemic oscillations through targeted measurements. The interpretation that this information can be useful for personalizing metabolic control is consistent with the content of the review. However, it is not proven by the publication that every postprandial spike causes vascular damage, nor that reducing spikes necessarily leads to a reduction in cardiovascular events or microvascular complications.

6. INDEPENDENT SUPPORTING EVIDENCE

An observational analysis conducted on 290 people with type 2 diabetes not treated with insulin showed that the relative contribution of postprandial glycemia to daily hyperglycemia was greater in subjects with lower HbA1c: it went from 69.7% in the quintile with the lowest HbA1c to 30.5% in the quintile with the highest HbA1c. In parallel, the contribution of fasting glycemia increased from 30.3% to 69.5%. This directly confirms that the relative weight of post-meal spikes changes with the level of metabolic control and can be particularly relevant when average glycemia is less elevated [1]. The limitation is that the study performed measurements at set times, not continuous monitoring throughout the entire day.A cluster-randomized clinical trial evaluated whether structured blood glucose measurements, including seven-point profiles throughout the day, could translate into more useful clinical decisions. Among 483 people with type 2 diabetes not treated with insulin, the group with structured monitoring achieved a greater average reduction in HbA1c after 12 months compared to the

control group: –1.2% versus –0.9%; difference –0.3%, P=0.04. Recommendations for therapeutic changes at the first month were more frequent in the structured group, 75.5% versus 28.0% [2]. The result supports the practical utility of reading glycemic profiles, but it does not isolate the effect of postprandial measurement alone: the intervention included training, shared interpretation, and adjustments to care.A retrospective observational study examined 60 people with type 1 diabetes and 100 with type 2 diabetes who underwent continuous glucose monitoring for 3–6 days. The coefficient of variation, which is the measure of the amplitude of oscillations relative to average glycemia, was higher in type 1 diabetes compared to type 2, 40.1% versus 29.4%, P<0.001. HbA1c was a weak predictor of hypoglycemia, while the coefficient of variation obtained from continuous monitoring discriminated risk well in type 1 diabetes, with an area under the curve of 0.88 [3]. This evidence confirms that glycemic stability adds information regarding the risk of hypoglycemia, but it does not prove that variability is the cause of hypoglycemia, nor that the data is applicable to all people with diabetes.

7. CONFLICTING EVIDENCE

An analysis of data from the Diabetes Control and Complications Trial has provided an important limitation to the vascular narrative. In 1,441 people with type 1 diabetes, after adjustment for mean glycemia and other factors, glycemic variability within the day and between visits showed no additional influence on the development or progression of retinopathy and nephropathy. P-values were 0.18 and 0.72 for retinopathy, and 0.32 and 0.57 for nephropathy, respectively [4].This result does not contradict the usefulness of postprandial monitoring for describing fluctuations or identifying potential daily issues. However, it scales back the broader claim that variability, regardless of mean glycemia, is certainly a causal factor for microvascular complications. The context was type 1 diabetes, and the metrics were derived from seven-point glycemic profiles, not from the continuous technologies available today. No directly conflicting evidence sufficiently relevant to the informative value of pre- and postprandial measurements was identified; this does not prove the absence of contrary results.

8. QUADRO COMPARATIVO E SINTESI DELLE EVIDENZE

The table distinguishes the study subject to the Evidence Review from the independent publications used to confirm or delimit the paragraph's narrative.

Quadro comparativo

Reference	Study type	Population or model	Main result	Direction of evidence	Strength of evidence
Original study	Narrative review	Literature on diabetes, postprandial glycemia, and monitoring	Proposes that postprandial spikes are an important component of variability and that targeted monitoring complements HbA1c and fasting glycemia.	biologically consistent evidence	preliminary
[1]	Cross-sectional observational	290 people with type 2 diabetes not treated with insulin	The relative postprandial contribution to daily hyperglycemia decreases from 69.7% to 30.5% as HbA1c increases.	direct confirmation	moderate
[2]	Cluster RCT	483 people with type 2 diabetes not treated with insulin	Structured monitoring resulted in a greater reduction in HbA1c and more recommended therapeutic changes.	indirect confirmation	moderate
[3]	Retrospective observational	60 people with type 1 diabetes and 100 with type 2 diabetes	Variability metrics predicted hypoglycemia better than HbA1c alone in the studied sample.	indirect confirmation	moderate
[4]	Secondary analysis of RCT	1,441 people with type 1 diabetes from the DCCT	Glycemic variability did not add independent risk for retinopathy or nephropathy beyond mean glycemia.	discordant evidence	moderate

9. SINTESI EDITORIALE E CONCLUSIONI

CONCLUSIONS

The analyzed study plausibly supports the idea that post-meal glycemia and its fluctuations provide additional information beyond fasting glycemia and HbA1c. This part of the narrative is moderately supported by independent evidence. Structured monitoring can facilitate more timely therapeutic decisions, and variability can help identify the risk of hypoglycemia. However, it has not been proven that reducing postprandial spikes, when considered in isolation, definitively prevents microvascular or macrovascular complications.

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] **Contributions of Fasting and Postprandial Plasma Glucose Increments to the Overall Diurnal Hyperglycemia of Type 2 Diabetic Patients**
Monnier et al., 2003
Diabetes Care
DOI: https://doi.org/10.2337/diacare.26.3.881

[2] **Structured Self-Monitoring of Blood Glucose Significantly Reduces A1C Levels in Poorly Controlled, Noninsulin-Treated Type 2 Diabetes**
Polonsky et al., 2011
Diabetes Care
DOI: https://doi.org/10.2337/dc10-1732

[3] **Beyond HbA1c: Comparing Glycemic Variability and Glycemic Indices in Predicting Hypoglycemia in Type 1 and Type 2 Diabetes**
Rama Chandran et al., 2018
Diabetes Technology & Therapeutics
DOI: https://doi.org/10.1089/dia.2017.0388

[4] **The Effect of Glucose Variability on the Risk of Microvascular Complications in Type 1 Diabetes**
Kilpatrick et al., 2006
Diabetes Care
DOI: https://doi.org/10.2337/dc06-0293