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Ginger and HbA1c in type 2 diabetes: what the 2019 meta-analysis shows

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1. ABSTRACT

This systematic review with meta-analysis evaluated whether ginger intake can modify fasting glycemia and glycated hemoglobin in people with type 2 diabetes. The most favorable result concerned glycated hemoglobin, but the method used and the small size of the studies require a cautious interpretation.The authors' synthesis included eight randomized trials—studies in which participants are randomly assigned to treatment or comparison—for a total of 454 people with type 2 diabetes. Daily doses of ginger ranged from 1,600 to 4,000 mg, and interventions lasted from 8 to 12 weeks. Fasting glycemia did not show a statistically significant variation in the group taking ginger: weighted mean difference 1.38, 95% confidence interval from −0.53 to 3.30; P=0.16. In simple terms, the pooled data do not allow us to rule out that this difference is due to chance. Glycated hemoglobin, or HbA1c, instead decreased from the initial value to the end of the treatment in the ginger group, with a weighted mean difference of 0.46 percentage points and a confidence interval from 0.09 to 0.84; P=0.02. HbA1c describes the average glucose exposure over the last few weeks, so the data suggests a possible more stable change compared to a single glycemia measurement. However, the analysis mainly compared changes within the groups before and after the intervention. This approach does not always equate to directly measuring the difference between ginger and placebo.

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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. WHAT THIS RESEARCH ANALYZED

The 2019 study by Huang and colleagues sought to understand whether ginger can help control blood sugar levels in people with type 2 diabetes. It brought together randomized clinical trials published up to July 2018 and considered only studies with a control group.The two main outcomes were fasting glycemia, i.e., glucose measured after a period without eating, and HbA1c, or glycated hemoglobin, which reflects average glucose exposure over the preceding weeks. The preparations were not identical: dosage, duration, and participant characteristics varied. These differences become important when interpreting the results.

3. WHAT RESULTS EMERGE FROM THE STUDY

The simplest finding to understand is that fasting glycemia did not show a statistically significant decrease across the studies as a whole. The weighted mean difference was 1.38, with a 95% confidence interval from −0.53 to 3.30 and P=0.16. Since the interval includes both possible decreases and possible increases, it does not demonstrate a reliable effect on this measure.For HbA1c, the study by Huang and colleagues found an improvement in the ginger group from the baseline value to the end of the intervention: weighted mean difference 0.46, 95% confidence interval from 0.09 to 0.84 and P=0.02. This suggests a possible signal regarding glycemic control over time. However, it does not prove that every ginger preparation produces the same effect.

4. WHY THIS STUDY IS RELEVANT

The relevance of this research lies in having examined multiple human studies together rather than relying on a single result. This allows us to observe whether a common trend emerges, distinguishing between momentary glycemia and HbA1c, which describes a longer period.The picture that emerged is useful above all because it is not uniformly positive: a possible improvement in HbA1c was not accompanied by a statistically significant reduction in fasting glycemia. For a person with type 2 diabetes, this means that the data describe a supportive hypothesis, not an alternative to medication, personalized nutrition, physical activity, and clinical check-ups.

5. STUDY LIMITATIONS AND WHAT IT DOES NOT DEMONSTRATE

The main limitation is methodological. The authors primarily evaluated the change from baseline to the end of the study within each group. To attribute a change to ginger with greater certainty, the most informative comparison is the difference between the change in the ginger group and that of the placebo group.Furthermore, 454 participants distributed across eight studies represent a limited number to draw conclusions applicable to all people with type 2 diabetes. The interventions lasted a maximum of 12 weeks and do not allow us to know the long-term effects, prolonged safety, or impact on complications. The study does not demonstrate a cure, does not define a dose valid for everyone, and does not prove that ginger can replace prescribed therapies.

6. INDEPENDENT CONFIRMING EVIDENCE

An updated meta-analysis by Chen and colleagues has strengthened the narrative regarding a potential average improvement in glycemia and HbA1c. It brought together 13 randomized trials with 837 participants and estimated reductions in fasting glycemia of 16.27 mg/dL and in HbA1c of 0.41 percentage points. However, the authors reported high heterogeneity and low or very low certainty: this is a direct confirmation of the direction of the signal, not of its reliability for the individual patient [1].In a double-blind randomized trial, Arablou and colleagues compared 1,600 mg per day of ginger with a placebo for 12 weeks in 70 adults with type 2 diabetes. Fasting glycemia, HbA1c, insulin, and the HOMA index—an estimate of insulin resistance—all decreased. This supports the transition from a possible metabolic effect to clinical markers, but the small sample size and short duration limit the confirmation [2].An upstream biological mechanism was observed by Li and colleagues in L6 rat muscle cells: purified gingerols increased the presence of GLUT4 on the cell surface. GLUT4 is a protein that facilitates the entry of glucose into the cell. This is an indirect mechanistic confirmation, because a cellular experiment does not prove the effect in the human body [3].

7. CONFLICTING EVIDENCE

A 2024 review by Schumacher et al., based on randomized trials, did not find a statistically significant effect of ginger on either fasting glycemia or HbA1c. This reading contrasts with the favorable signal reported by Huang and the most recent meta-analysis. The divergence may depend on selection criteria, statistical methods, and included studies; it therefore reduces the overall certainty [4].A small single-arm clinical study by Nganou-Gnindjio et al. observed a decrease in HbA1c after six weeks of ginger extract in 21 people. However, it lacked a placebo group. The result is not contradictory, but it offers an alternative interpretation: without a comparison, one cannot separate the effect of the product from variations over time, adherence to treatment, or other factors [5]. No directly discordant evidence of sufficient relevance has been identified beyond these; this does not prove the absence of contrary results.

8. QUADRO COMPARATIVO E SINTESI DELLE EVIDENZE

The following publications help place the 2019 research findings within the context of biological confirmations, clinical data, and more cautious interpretations.

Quadro comparativo

Publication	Design and model	Main result	Relation to the study
Chen et al., 2026 [1]	Meta-analysis of 13 RCTs; 837 participants	Mean reductions in fasting glycemia and HbA1c, with high heterogeneity	Direct confirmation but with limited certainty
Arablou et al., 2014 [2]	Double-blind RCT; 70 adults; 12 weeks	Improvements in glycemia, HbA1c, and some metabolic markers	Direct clinical confirmation, small sample size
Li et al., 2012 [3]	Experimental study on rat muscle cells	Increase in GLUT4 on the cell surface	Indirect mechanistic support
Schumacher et al., 2024 [4]	Systematic review with meta-analysis of RCTs	No statistically significant effect on glycemia or HbA1c	Direct discordant result
Nganou-Gnindjio et al., 2022 [5]	Single-arm clinical study; 21 participants; 6 weeks	Reduced HbA1c, but without a placebo group	Alternative interpretation and weak evidence

9. SINTESI EDITORIALE E CONCLUSIONI

EDITORIAL CONCLUSION

This 2019 summary collected eight randomized studies on people with type 2 diabetes and examined fasting glycemia and HbA1c. The main signal concerns HbA1c, while fasting glycemia did not change in a statistically significant way in the authors' analysis. This contrast is understandable because the two tests describe different timeframes of glucose control. However, the available studies were small, short, and varied in terms of dose, preparation, and clinical characteristics. Furthermore, the method centered on a before-after comparison within each group limits the ability to estimate the specific effect compared to a placebo. Subsequent evidence confirms a possible average reduction in some indicators, but also null or uncertain results and high heterogeneity. For the reader, the essential point is that ginger can be studied as an additional support and not as a substitute for medication, personalized nutrition, and clinical monitoring. Larger, controlled, and prolonged trials are needed to understand who might benefit from it.

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

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Chen et al., 2026
Systematic Reviews
DOI: https://doi.org/10.1186/s13643-026-03251-5

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Arablou et al., 2014
International Journal of Food Sciences and Nutrition
DOI: https://doi.org/10.3109/09637486.2014.880671

[3] **Gingerols of Zingiber officinale Enhance Glucose Uptake by Increasing Cell Surface GLUT4 in Cultured L6 Myotubes**
Li et al., 2012
Planta Medica
DOI: https://doi.org/10.1055/s-0032-1315041

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Nganou-Gnindjio et al., 2022
Annales de Cardiologie et d'Angéiologie
DOI: https://doi.org/10.1016/j.ancard.2021.09.010