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ORIGINAL RESEARCH

Glycemic and insulinemic response to mashed potatoes alone or with broccoli, broccoli fiber, or cellulose in healthy adults - A review of the evidence

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1. ABSTRACT

The original study evaluated whether consuming cooked broccoli together with mashed potatoes modified the glucose and insulin response after the meal, compared to potatoes consumed alone or with fiber extracted from broccoli or cellulose. In thirteen healthy adults, whole broccoli reduced the glycemic peak and early insulin response, while isolated fibers and cellulose did not produce significant differences.The publication contributes to the narrative of "The Choice to Live in Health or Illness" by Dr. A. Colonnese and R. Panzironi, according to which the metabolic effect of a vegetable does not depend solely on isolated fiber, but also on its food matrix, i.e., the physical structure in which nutrients and plant components are embedded. Independent studies confirm that non-homogenized vegetables and more intact food structures can reduce the glycemic response after starch-rich meals. However, the evidence is acute, conducted primarily in healthy subjects, and does not allow for attributing the effect to a single component of broccoli nor for demonstrating long-term clinical benefits.

ONLINE ARTICLE

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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 a realistic portion of cooked broccoli, consumed alongside mashed potatoes, would modify the post-meal increase in glycemia and insulin compared to mashed potatoes alone. The authors also compared whole broccoli with fiber extracted from broccoli and with cellulose, a structural plant fiber.The hypothesis relevant to the book's section is that the effect of a vegetable on post-meal metabolism is not explained solely by the amount of added fiber. The research can show immediate differences in glucose and insulin curves after four experimental meals. However, it cannot identify with certainty the mechanism responsible, establish long-term effects, nor directly extend the results to people with diabetes, obesity, or other metabolic conditions.

3. MATERIALS AND METHODS OF THE ORIGINAL STUDY

A randomized, non-blinded crossover study was conducted. In a crossover design, each participant tests multiple dietary conditions and therefore serves as their own control; non-blinded means that both participants and researchers were aware of the meal consumed. Thirteen healthy subjects participated, each exposed to four meals: mashed potatoes alone; mashed potatoes with cooked broccoli; mashed potatoes with broccoli fiber; and mashed potatoes with cellulose.Capillary blood samples were collected between 0 and 180 minutes after the meal, and glycemia and insulinemia were measured. The authors calculated the incremental area under the curve, or iAUC, a measure of the overall increase relative to the baseline value over a period of time. Differences between meals were evaluated using analysis of variance for repeated measures. Inclusion and exclusion criteria, detailed participant characteristics, exact food quantities, nutritional composition of the meals, duration of the washout periods between tests, and complete numerical values are not reported in the available material, which consists only of the abstract.

4. RESULTS

The main result was a reduction in the early response when cooked broccoli was consumed with mashed potatoes. Compared to potatoes alone, the broccoli-potato meal produced a lower glycemic peak, a lower maximum increase in glycemia, and a lower glycemic iAUC in the first 30 minutes. The insulin iAUC in the first 30 minutes was also lower. Simply put, at the beginning of the post-meal period, glucose and insulin response increased less rapidly.However, the curve for the meal with broccoli returned to baseline later. Between 60 and 120 minutes, the insulin iAUC was significantly higher compared to the other meals. No significant differences emerged between the meal with broccoli and the other meals regarding the insulin peak, the maximum increase in insulin, or the other glucose and insulin iAUCs. This indicates a temporal redistribution of the response, not a proven reduction of insulin over the entire three-hour period.When only fibers extracted from broccoli or cellulose were added to the mashed potatoes, no significant differences in the glycemic or insulin response were observed compared to mashed potatoes alone. The abstract does not report absolute values, percentage reductions, P-values, or confidence intervals; such data are therefore not available in the examined material.

5. INTERPRETATION

For a non-technical reader, the data suggests that eating the vegetable in its whole food form can modify the speed at which glucose derived from potato starch appears in the blood. The comparison with isolated fibers and cellulose makes it unlikely that the observed effect depends solely on the addition of fiber as a separate substance.The segment actually documented is: whole cooked broccoli paired with mashed potatoes lower initial increase in glycemia and insulin compared to mashed potatoes alone; extracted fibers or cellulose no significant difference. The publication did not directly measure gastric emptying, starch digestion in the intestine, cell walls, water retained by the vegetable, or bioactive compounds. Therefore, the idea that these elements cooperate in slowing down digestion is biologically plausible, but in the study, it remains an interpretation and not a direct demonstration.This level of evidence

corresponds precisely to the passage in "The Choice to Live in Health or Illness" by Dr. A. Colonnese and R. Panzironi, which distinguishes the whole vegetable from isolated fiber. It does not, however, prove that every high-glycemic index food is compensated in the same way by any vegetable, nor that the acute effect prevents metabolic diseases.

6. INDEPENDENT CONFIRMING EVIDENCE

Direct confirmation of the structural aspect of this narrative comes from a randomized crossover study involving sixteen healthy volunteers. Non-homogenized cooked vegetables—that is, kept in a recognizable physical form—were added to rice. Eggplant, cauliflower, and bok choy reduced the glycemic index compared to rice alone, with values of 67, 73, and 71, respectively; their homogenized counterparts, however, showed no significant difference from rice. In vitro experiments, conducted outside the body, also showed lower starch hydrolysis in meals containing non-homogenized vegetables. This study supports the pathway of structured plant matter slower carbohydrate digestion lower early glycemic response, although it concerns rice and vegetables other than broccoli [1].A systematic review with meta-analysis examined 25 randomized crossover studies, totaling 369 healthy participants, on the relationship between the structure of starchy foods and the post-meal response. Intact and larger particles were associated with a reduction in postprandial glycemic exposure, with a standardized mean difference of –0.43 (95% confidence interval from –0.58 to –0.28), and a reduction in insulin response of –0.63 (interval from –0.86 to –0.40). The synthesis does not specifically concern broccoli, but it independently confirms that the physical structure of food can modulate the availability of starch for digestion [2].These findings converge on the fact that the shape and integrity of a meal can matter just as much as its chemical composition. Important limitations remain: the studies are primarily acute, the sample sizes are small, and the relative contribution of chewing, texture, volume, water, fiber, and other matrix components cannot be precisely separated. Furthermore, the meta-analysis included different starchy foods and different structural manipulations, so it does not quantify the specific effect of broccoli when paired with potatoes.

7. CONFLICTING EVIDENCE

A 2024 randomized crossover trial shows that the effects of the plant-based form are not uniform in every context. Nineteen healthy young men consumed chopped and chewed cabbage or the same cabbage in purée form, followed by a carbohydrate-rich energy jelly. Postprandial glycemia did not differ between the two conditions. In the group that chewed the cabbage, however, exposure to insulin and GIP, an intestinal hormone that promotes insulin secretion, increased; GLP-1 also increased at certain early time points [3].This result does not directly contradict the study on broccoli, because the vegetable, the accompanying carbohydrate, the texture of the meal, and the role of chewing are different. However, it shows that keeping a vegetable in solid form does not automatically guarantee lower glycemia. The benefit depends on the dietary context and the experimental model; no directly conflicting evidence sufficiently relevant to the specific comparison between whole broccoli, isolated broccoli fiber, and cellulose associated with mashed potatoes has been identified.

8. QUADRO COMPARATIVO E SINTESI DELLE EVIDENZE

The table distinguishes the publication that is the subject of the review from the independent evidence used to verify the narrative passage of the book.

Quadro comparativo

Reference	Study type	Population or model	Main result	Direction of evidence	Strength of evidence
Original study	Non-blinded randomized crossover trial	13 healthy adults; four experimental meals	Cooked broccoli with mashed potatoes: lower glycemic peak and initial insulin response; isolated fiber and cellulose: no significant difference	biologically consistent evidence	preliminary
[1]	Randomized crossover trial with in vitro testing	16 healthy volunteers; rice and vegetable-based meals	Non-homogenized cooked vegetables reduced the glycemic index; homogenized versions showed no significant difference from rice	direct confirmation	moderate
[2]	Systematic review with meta-analysis of crossover trials	25 randomized trials; 369 healthy participants	Intact and larger particles associated with lower postprandial glycemic and insulin response	indirect confirmation	moderate
[3]	Randomized crossover trial	19 healthy young men; solid or pureed cabbage followed by energy jelly	No difference in glycemia; higher insulin and incretin response with chewed cabbage	discordant evidence	preliminary

9. SINTESI EDITORIALE E CONCLUSIONI

CONCLUSIONS

The study analyzed directly supports the finding that, in the healthy adults examined, cooked broccoli consumed with mashed potatoes reduces the initial glycemic and insulin response compared to mashed potatoes alone, while the addition of isolated broccoli fiber or cellulose does not reproduce the result. Independent evidence makes the idea that the physical structure of vegetables and starchy foods contributes to modulating the metabolic response after a meal quite well-supported.

The proposed explanation involves more gradual digestion and glucose absorption, but this was not directly demonstrated in the broccoli study. The effect is not universal: it can change based on the vegetable, consistency, chewing, the associated carbohydrate, and individual characteristics. There is insufficient evidence available to translate these acute results into long-term clinical conclusions.

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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