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Beneficial Effects of a Freeze-Dried Kale Bar on Type 2 Diabetes Patients: A Randomized, Double-Blinded, Placebo-Controlled Clinical Trial

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Abstract

Background/objectives: Type 2 diabetes (T2D) is one of the most common global diseases, with an ever-growing need for prevention and treatment solutions. Kale (*Brassica oleracea* L. var. *acephala*) offers a good source of fiber, minerals, bioavailable calcium, unsaturated fatty acids, prebiotic carbohydrates, vitamins, health-promoting secondary plant metabolites, as well as higher amounts of proteins and essential amino acids compared to other vegetables. The objective of this study was to investigate whether daily intake of freeze-dried kale powder can provide health benefits for T2D patients vs. placebo.

Methods: This study was designed as a 12-week, blinded, randomized, controlled trial. Thirty T2D patients were randomly assigned to either a placebo bar (control) or a kale bar (intervention). Participants in the intervention group were instructed to consume three bars/day, each containing 26.25 g of freeze-dried kale (corresponding to approx. 341 g fresh kale/day). At baseline and 12 weeks, all participants underwent an oral glucose tolerance test (OGTT), 24 h blood pressure measurements, DEXA scans, and fasted blood samples were taken.

Results: A significant reduction in HbA1c, insulin resistance, body weight, and calorie intake was observed in the intervention group compared to control. Positive trends were detected in fasted blood glucose and LDL-cholesterol for those in the kale intervention group. No significant differences were found in total body fat mass and area under the curve glucose 240 min OGTT.

Conclusions: Given the positive effects of high daily kale intake observed in this study, further research with a larger sample size is needed to better understand the health benefits of kale bars. This could potentially lead to new dietary recommendations for patients with T2D.

Keywords: calorie intake; essential AA; kale; type 2 diabetes; vegetables.

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Conflict of interest statement

The authors declare no conflicts of interest.

Figures

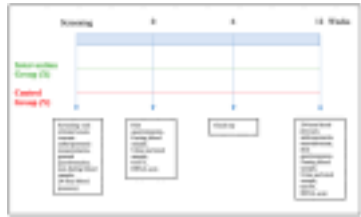


Figure 1 Study timeline.



Figure 2 Study flow diagram.

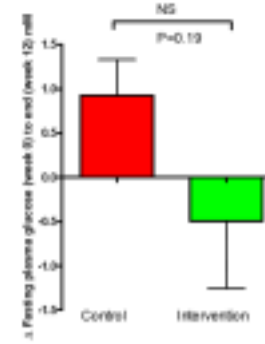


Figure 3 Change (Δ) in plasma glucose...

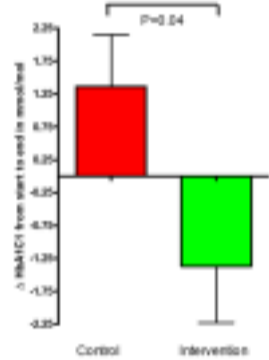


Figure 4 Change (Δ) in hemoglobin A1c...

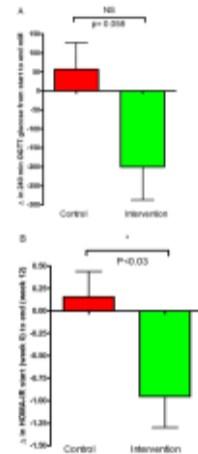


Figure 5 (A , B)....

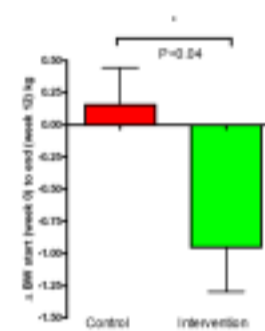


Figure 6 Changes (Δ) in body weight...

All figures (9)

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