To Boosts Health Outcomes Choosing better Carbs in Low-Carb Diets

Researchers examined associations between varying low-carbohydrate diet (LCD) patterns and changes in oxidative stress and inflammation biomarkers.

Chronic low-grade inflammation contributes to the development of various diseases, including type 2 diabetes, obesity, neurodegenerative diseases, cancers, and cardiovascular disease (CVD), especially in older adults. LCDs have been investigated for their potential to modulate inflammation and reduce the risk of chronic diseases. Carbohydrates from diverse sources could differentially impact chronic inflammation.

High-quality (HQ) carbohydrate diets are characterized by increased consumption of non-starchy vegetables, whole grains, nuts, whole fruits, and legumes, which are associated with lower levels of inflammation biomarkers in circulation. Conversely, low-quality (LQ) carbohydrate diets are characterized by elevated intakes of sugar-sweetened beverages, refined grains, and sweet baked desserts, among others, and promote chronic inflammation through mechanisms like rapid blood sugar spikes (high glycemic impact), reduced fiber content, nutrient loss during refining, and the formation of inflammation-triggering compounds (advanced glycation end-products).

Current evidence from observational studies on the associations between LCD patterns and inflammation biomarkers has been mainly cross-sectional and limited to select biomarkers. Moreover, many of these studies have not examined the quality of carbohydrates. As such, long-term associations between LCD patterns, emphasizing carbohydrate quality, and changes in oxidative stress and inflammation biomarkers have not been adequately investigated. The key finding of this new research suggests that carbohydrate quality may be more important than just the quantity of carbohydrates when aiming to reduce inflammation.

Study

The present study examined the long-term relationships between LCD scores (LCDSs) and changes in oxidative stress and inflammation biomarkers. Data were used from the Framingham Heart Study (FHS) Offspring cohort. The cohort included 2,225 participants, with a median baseline age of 59 (56% female, mean BMI 27.3 kg/m^2). Participants underwent standard medical examinations every four years, which included anthropometric, dietary, and laboratory assessments. The study included data from the seventh (1998-2001) and eighth (2005-08) examination cycles, with a median follow-up of 6.7 years.

The food frequency questionnaire was used to evaluate dietary intake. Two LCDSs, HQ-LCDS and LQ-LCDS, were developed to assess carbohydrate quality in LCD patterns. HQ-LCDS scored the percent of energy intake from LQ carbohydrates, while LQ-LCDS scored that from HQ carbohydrates. A higher HQ-LCDS implied lower intake of LQ carbohydrates (while retaining high-quality sources and replacing the low-quality carbs with fat and protein), while a higher LQ-LCDS represented lower intake of HQ carbohydrates. The study also considered a Total Low-Carbohydrate Diet Score (T-LCDS), which reflected lower total carbohydrate intake and higher total fat and protein, without initially separating carbohydrate quality. Nine biomarkers of oxidative stress and inflammation were assessed.

Biomarkers included C-reactive protein, interleukin-6, P-selectin, monocyte chemoattractant protein-1 (MCP-1), intercellular adhesion molecule-1 (ICAM-1), lipoprotein phospholipase A2 (LPL-A2) activity and mass, osteoprotegerin, tumor necrosis factor receptor II, and urinary isoprostanes. An oxidative stress and inflammation score was estimated as the sum of standardized rank values of individual biomarkers (urinary isoprostanes were excluded from this composite inflammatory score due to a high number of missing observations at baseline). The primary outcome measured the change in this inflammation score over time.

Least-square mean change in the oxidative stress and inflammation score across LCDS quintiles was computed using multivariable linear regression, adjusted for sex, age, energy intake, alcohol intake, body mass index (BMI), menopausal status, smoking status, physical activity, use of corticosteroids and non-steroid anti-inflammatory drugs, CVD history, and current diabetes, hypertension, or dyslipidemia and treatment for these. Sensitivity analyses, such as adjusting for waist circumference instead of BMI and excluding participants on hyperglycemia medications, generally supported the main findings for HQ-LCDS.

Results

The highest quintiles of both LCDSs included a higher proportion of females, diabetic subjects, tobacco users, and individuals with higher BMI. Total carbohydrate intake was approximately 19% lower in the highest quintiles of both LCDSs compared to the lowest quintiles.

LQ carbohydrates were 17% lower in the highest HQ-LCDS quintile than in the lowest quintile, while HQ carbohydrates were 13% lower in the highest LQ-LCDS quintile than in the lowest quintile. There was an inverse association between HQ-LCDS and the change in oxidative stress and inflammation scores over the follow-up period. That is, oxidative stress and inflammation increased in individuals with the lowest HQ-LCDS (inflammation score change: +0.28) and decreased in those with the highest HQ-LCDS (inflammation score change: -0.31; Ptrend=0.001 after full adjustment). The T-LCDS also showed a significant inverse association with the inflammation and oxidative stress score (Q5 change: -0.32; Ptrend=0.02), similar to, although slightly more modest than, that observed for HQ-LCDS.

LQ-LCDS had no significant association with the change in the oxidative stress and inflammation score. In secondary analyses, HQ-LCDS was inversely associated with changes in LPL-A2 activity (a reduction of approximately 4% in the highest vs. lowest adherence groups; Ptrend=0.001) and ICAM-1 (a reduction of approximately 5%; Ptrend=0.003). Meanwhile, LQ-LCDS was positively associated with changes in LPL-A2 mass (an increase of approximately 3%; Ptrend=0.04) and MCP-1 (an increase of approximately 1%; Ptrend=0.04), suggesting that greater adherence to LQ-LCDS was associated with increased inflammation.

Conclusion

Taken together, the findings showed that LCD patterns that prioritize replacing low-quality carbohydrates (like refined grains and added sugars) with high-quality carbohydrate sources (such as vegetables, whole grains, and legumes) or with healthy sources of fat and protein were associated with favorable changes in the oxidative stress and inflammation score, potentially reducing inflammation biomarkers by an amount equivalent to a 0.31 point decrease on the composite score in high adherers. In particular, HQ-LCDS exhibited a robust inverse association with the change in the oxidative stress and inflammation score, potentially reducing the risk of chronic diseases. Conversely, LQ-LCDS showed no significant association with the change in oxidative stress and inflammation scores. The study highlights that the approach to lowering carbohydrates, specifically by reducing low-quality types while maintaining high-quality ones, is a critical factor when considering low-carbohydrate diets for managing inflammation. This provides an actionable insight: prioritize whole grains, fruits, and vegetables over sugary snacks and refined grains within a low-carbohydrate dietary framework.

The authors acknowledged certain limitations inherent in the study, such as the reliance on self-reported dietary questionnaires and the fact that the study population consisted predominantly of Caucasian American men and women, which may influence the generalizability of the findings to other populations. Furthermore, the study couldn't assess very low-carb diets (e.g., less than 25% of energy from carbohydrates) due to a lack of such eaters in this particular cohort.

Source:

https://www.news-medical.net/news/20250529/Choosing-better-carbs-in-low-carb-diets-boosts-health-outcomes.aspx