Diversity of Monosaccharide Composition of Diets Consumed by Healthy U.S. Adults Is Highly Variable and Positively Associated With the Healthy Eating Index

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Objectives: Advances in analytical chemistry now make it possible to analyze the monosaccharide composition of foods thereby expanding dietary assessment of carbohydrates. We sought to characterize the monosaccharide composition of diets consumed in a healthy U.S. adult cohort (ClinicalTrials.gov Identifier: NCT02367287).

Methods: Dietary records consisting of two to three Automated Self-Administered 24-hour Dietary Recalls (ASA24) were obtained from 341 participants in the USDA Nutritional Phenotyping Study which assessed healthy U.S. adults balanced for age, sex, and BMI. Dietary recalls were merged with the Food and Nutrient Database for Dietary Studies (FNDDS) 2017–2018 to retrieve ingredient level data. From this dataset, recall items were mapped to the food glycan database (Glycopedia) to retrieve monosaccharide quantities for matching food items. Participants with at least 75% of calories consumed from carbohydrates mappable to the Glycopedia were included in the final analysis (n = 180).

Results: On average, glucose comprised the majority of dietary monosaccharides consumed by the cohort (83.4% ± 5.3%, mean, SD) followed by fructose (5.9% ± 2.9%, mean, SD), galactose (4.7% ± 2.7%, mean, SD), arabinose (2.1% ± 0.9%, mean, SD) xylose (1.3% ± 0.4%, mean, SD), GalA (1.2% ± 0.8%, mean, SD) and mannose (0.8% ± 0.6%, mean, SD). Seven additional monosaccharides were present at < 0.5% on average. Monosaccharide diversity in the diet was positively correlated with the Healthy Eating Index score after adjusting for age, sex, and BMI (Pearson's r, $r = 0.475$, $p < 1e\text{-}11$).

Conclusions: This is the first study to investigate population-based dietary intake at this resolution of food glycan composition. Greater diversity of monosaccharides in the diet corresponds to a healthier eating pattern which may be attributed to reduced intake of simple sugars.

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