

### Association of Sugar-Sweetened Beverages, Low/No-Calorie Beverages and Fruit Juice Intakes with Non-alcoholic Fatty Liver Disease: The SWEET Project

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**Objectives:** Examine associations between the intake of sugar-sweetened beverages (SSB), low/no-calorie beverages (LNCB), and fruit juice (FJ) and non-alcoholic fatty liver (NAFLD) in 4 population-based studies included in the SWEET project.

**Methods:** Data of 42,024 participants from the Lifelines Cohort Study (LCS), NQPlus, PREDIMED-Plus and the Alpha Omega Cohort

(AOC) were cross-sectionally analyzed. Dietary intake was assessed using food frequency questionnaires. NAFLD was assessed using the Fatty Liver Index ( $\geq 60$ ). Restricted cubic spline analyses were used to visualize dose-response associations in LCS. Multivariate Cox proportional hazard regression analyses with robust variance were performed for the associations with NAFLD (prevalence ratio [PR]) in all cohorts and linear regression analyses were conducted for the associations with its markers (triglycerides, gamma-glutamyl transferase, aspartate aminotransferase and alanine aminotransferase). Models were adjusted for demographic, lifestyle, and dietary factors. Results of different cohorts were pooled using random-effects meta-analysis.

**Results:** NAFLD prevalence was 22% in LCS and NQplus, 60% in AOC and 78% in PREDIMED-Plus. Each additional serving/day of SSB was associated with a 7% higher NAFLD prevalence (PR 1.07, 95%CI 1.03–1.10). For LNCB, dose-response analyses showed evidence for a nonlinear association with NAFLD i.e., a sharp increase at intake  $\leq 1$  serving/day and more gradual at higher intake levels. The intake of  $>2$  LNCB servings/week was positively associated with NAFLD (PR 1.38, 95%CI 1.15–1.60, ref: non-consumers), which disappeared after adjustment for BMI (PR 1.04, 95%CI 0.94–1.14). A J-shaped association was observed between FJ and NAFLD with an inverse association for intakes of  $>0-2$  servings/week (PR 0.92, 95%CI: 0.88–0.96), but not for higher intakes, compared to no intake. Modest positive associations were observed between all beverages and most NAFLD clinical markers.

**Conclusions:** Pooling results across 4 studies showed that SSB and LNCB were associated with higher NAFLD prevalence and the majority of its markers. A J-shaped association was observed between FJ and NAFLD, suggesting lower prevalence at medium intakes.

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