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Feasibility of testing the medium-term impact of inulin on phenolic acids bioavailability in healthy overweight individuals

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Abstract

Introduction: Interactions between polyphenols and non-digestible carbohydrates (NDC) can impact on polyphenolic metabolites bioavailability, including phenolic acids. The BLEND2 trial (NCT03840746) aims to study longer-term interactions of a flavonoid-rich food with/without NDC on microbiota metabolites and cardiometabolic markers. Trial feasibility using a bespoke food was tested.

Material and Methods: The soup was developed locally containing cherry tomatoes, tomato puree, red onion, fresh lovage, with/without the NDC inulin (10g), but improved and processed with Campden BRI, Chipping Campden, UK. The final product (~400g/ tin) was evaluated with VAS scales (0–10) for appearance, smell, taste and overall palatability, and flavonoid content evaluated using liquid chromatography-mass spectrometry. The 3-arm parallel randomised blinded design (control soup, soup + inulin, habitual diet control) recruited self-reported healthy participants (BMI > 25, 40–70y) with urine, blood, faecal samples collected at baseline, 3-week, 6-weeks.

Results: Both soups scored similarly (n = 8 testers) for visual appeal (with inulin 5.1 ± 2.1; without 4.5 ± 2.0); smell (with 5.9 ± 1.7; without 5.4 ± 0.8); taste (with 6.6 ± 2.0; without 5.5 ± 2.3), aftertaste (with 6.3 ± 2.9; without 5.4 ± 2.3) and overall palatability (with 7.0 ± 1.9; without 6.1 ± 2.1).

The soups (A&B), 1 tin/day, provide 68.5 ± 10.9 mg total flavonoids (soup A n = 3, quercetin equivalents) and 74.0 ± 16.1 mg (soup B, n = 3): quercetin (A 1.2 ± 0.1 mg; B 1.3 ± 0.6 mg), quercetin-4-glucoside (A 3.9 ± 1.0 mg; B 4.1 ± 1.9 mg), quercetin-3-rutinoside (A 23.0 ± 3.2 mg; B 20.5 ± 1.0 mg), quercetin 3,4-diglucosides (A 40.5 ± 6.9 mg; B 48.2 ± 14.9 mg).

Following notes of interest (n = 415), n = 111 attended screening, n = 34 did not proceed (medications, opt-out; 31%). Participants (n = 77) are mostly British (79%), median age 56y (IQR 49-62) with a median BMI of 31 (IQR 28-35). Dropout was low (12%) and early in the study (personal issues, n = 2; gastrointestinal issues, n = 2; failure to comply with protocol, n = 2; acid reflux symptoms, n = 1; dislike of test food, n = 1). Adverse events included acid reflux/heartburn (n = 4), gastrointestinal distress (n = 3) accounting for 3 drop-outs.

To date, urine, blood and faecal samples (study day or day + 1) were collected at all timepoints, for all participants. Participation (soup arms) has not led to body weight or blood lipids changes compared to control group.

Discussion: The protocol for this 6-week trial has proved feasible with lower dropout than expected. Soup flavonoid content representing ~16% of average European flavonoid intakes, with inulin (10g) half the UK daily fibre intake. The soup was well accepted with few reports of adverse issues. Recruitment in this population is challenging, due to high levels of medication and ill health.

Conflict of Interest

The authors have no conflict of interest; this study was funded through a BBSRC DRINC award, BB/M027724/1: Manipulating the activity of the gut microbiota with fermentable carbohydrates to maximise the bioavailability of bioactive phenolic acids for health