



Exploring the potential of objective metabolite measures in dietary assessment: randomised cross over feeding study

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Reliable dietary assessment is key to our understanding of diet-health interactions⁽¹⁾. Most current dietary assessment methods are self-reported, making them prone to a range of biases⁽²⁾. Objective markers, such as certain metabolite concentrations in human tissue, may prove a more reliable method of dietary assessment in the future while reducing participant burden^(2,3). An example of these metabolite markers are alkylresorcinols, a family of compounds found in the bran layer of common grains. High concentrations of alkylresorcinols reflect high wholegrain intakes, very low levels indicate only refined grain intake, while no alkylresorcinols would indicate a gluten-free diet. We conducted a randomised crossover feeding study of three interventions (one standardisation day followed by a feeding day where known amounts were consumed under observation). Each feeding day differed by which food groups were provided (e.g., chicken, legumes, and fruit) or entirely absent (e.g., grains, fish, and dairy). Participants provided 24-hour urine samples on all six days (standardisation days and feeding days), as well as a 24-recalls and fasted blood samples the morning after each day. Known metabolite markers of dietary intake (approximately 70) were identified in blood and urine with LC-MSqToF, and semi-quantified with a known standard. Twenty-four hour urine sodium content was also measured as the current best known objective marker of dietary intake⁽⁴⁾. Twenty-four participants (74% female, age (SD) 24.8 (6.1), BMI 24.1 (4.0)) commenced the study, with 21 (88%) completing all three interventions. Mean energy intake on feeding days (11720 kJ (2943.01)) was higher than self-reported energy intake on standardisation days (9243.57 kJ (3582.92)). Meals were well tolerated, with mean (range) intakes of 9.8 (6.3 – 16.1) serves whole grains, 2.4 (1.6 – 4.8) serves fish, 3.1 (1.9 – 5.5) serves dairy, 5.6 (4.5 – 9.1) serves chicken, 8.2 (7.0 – 14.1) serves legumes, 3.1 (1.3 – 4.6) serves fruit, 3.9 (2.6 – 6.4) serves red meat, 1.7 (1.35 – 2.6) serves nuts and seeds, or 13.4 (9.4 – 19.5) serves vegetables on their respective feeding days. The three feeding days provided clearly identifiable clusters when assessing the overall metabolic profile, both in terms of what was measured on the feeding days, and the difference in metabolite concentrations between standardisation day and feeding day. The relative correlations between self-reported intakes and individual metabolite concentrations reflecting specific foods or food groups with the known dietary intakes from feeding days will be presented first at the conference.

Keywords: dietary assessment; feeding study; metabolites; objective dietary assessment

Ethics Declaration

Yes

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