Proceedings of the Nutrition Society (2024), **83 (OCE4)**, E499 doi:10.1017/S0029665124007377

Nutrition Society Congress 2024, 2–5 July 2024

Development of a novel food frequency questionnaire for the estimation of dietary (poly)phenol intake

Y. Li[1], Y. Xu[1], M. Le Sayec[1], N. N. Zaidani Kamarunzaman[1], R. Gibson[1] and A. Rodriguez-Mateos[1]

[1]*Department of Nutritional Sciences, School of Life Course and Population Sciences, Faculty of Life Sciences and Medicine, King's College London*

(Poly)phenol intake has been associated with reduced risk of non-communicable diseases in epidemiological studies[1,2]. However, there are no dietary assessment tools that have been developed to estimate (poly)phenol intake in the UK. This study aimed to develop a novel food frequency questionnaire (FFQ) to capture dietary (poly)phenol intake in the UK and assess its relative validity by comparison with 7-day diet diaries (7DD) and plasma and urine (poly)phenols metabolites.

The (poly)phenol FFQ was developed based on the EPIC-Norfolk FFQ validated for energy and nutrient intake estimation in the UK population[3,4]. Food items added to the FFQ based on total (poly)phenols content (≥ 1 mg/serving) and UK consumption. Participants aged 18 ~ 29 years (n = 255) completed the EPIC-Norfolk FFQ and a (poly)phenol FFQ. In a subgroup (n = 60), 7DD, spot urine, and fasting plasma samples were collected. An in-house (poly)phenol database was used to estimate (poly)phenol intake from FFQs and 7DD. Plasma and urinary (poly)phenol metabolite levels were analysed using a validated LC-MS method[5]. The agreements between (poly)phenol intake estimated using the (poly)phenol and EPIC-Norfolk FFQ and 7DDs, as well as plasma and urinary biomarkers, were evaluated by intraclass correlation coefficients (ICC), weighted kappa, quartile classification, and Spearman correlations, and the associations were investigated using linear regression models adjusting for energy intake and multiple testing (FDR < 0.05).

Strong agreements were observed between hydroxycinnamic acids estimated from (poly)phenol FFQ and 7DDs (kappa = 0.75), fair agreements were found between 9 (poly)phenol groups, including total (poly)phenol intake (kappa = 0.41), while the agreements for the rest of 17 classes and subclasses of (poly)phenols were poor (kappa: 0.07 ~ 0.39). Strong positive associations were found in 9 (poly)phenols estimated from 7DDs, including dihydroflavonols, flavones, ellagitannins, hydroxyphenylacetic acids, total stilbenes, resveratrol, total other (poly)phenols, tyrosols, and alkylphenols with stdBeta from 0.62 (95% CI: 0.42 ~ 0.82) to 0.95 (0.86 ~ 1.00) (FDR $p < 0.05$). (Poly)phenol FFQs estimated (poly)phenol intake exhibited positive associations with 99 urinary metabolites (stdBeta: 0.27 (0.06 ~ 0.48) to 0.88 (0.72 ~ 1.03)) and 25 plasma metabolites (stdBeta:

0.39 (0.17 ~ 0.62) to 0.83 (0.64 ~ 1.02)) (FDR $p < 0.05$). The agreement between (poly)phenol FFQs and the EPIC-Norfolk FFQs was moderate (ICC 0.51 ~ 0.69) for all (poly)phenol intake after adjusting for energy intake. Compared with the EPIC-Norfolk FFQs estimated (poly)phenol intake, stronger and more agreements and associations were found in (poly)phenol FFQs estimated (poly)phenol with 7DDs and biomarkers.

(Poly)phenols estimated from (poly)phenol FFQ exhibited fair agreements and moderate to strong associations with 7DDs and biomarkers in the target population, indicating the novel questionnaire may be a promising tool to assess (poly)phenol intake. A representative UK population group is warranted for to test the further usability.

References

1. Potì F, Santi D, Spaggiari G *et al.* (2019) *Int J Mol Sci* **20**, 2, 351–377.
2. Del Rio D, Rodriguez-Mateos A, Spencer JP *et al.* (2013) *Antioxid Redox Signal* **18**, 14, 1818–1892.
3. Bingham SA (1997) *Int J Epidemiol*. **26**, Suppl 1, 137–151.
4. Kroke A, Klipstein-Grobusch K, Voss S *et al.* (1999) *Am J Clin Nutr* **70**, 439–447.
5. Domínguez-Fernández M, Xu Y, Young Tie Yang P *et al.* (2021) *J Agric Food Chem* **69**, 537–554.