Proceedings of the Nutrition Society (2023), **82 (OCE5)**, E348 doi:10.1017/S0029665123004470

Summer Conference 2023, 3–6 July 2023, Nutrition at key stages of the lifecycle

The development of a personalised dietary feedback system (PAD-Q), based on a diet quality screening tool and dietary biomarkers, for adults at risk of cardiovascular disease on the island of Ireland

M. Ferrari[1], S.F. Brennan[1], T. Grohmann[2], R. Finlay[2], A. Courtney[2], L. Brennan[2] and J.V. Woodside[1]

[1]*Centre for Public Health, Institute for Global Food Security, Institute of Clinical Sciences A, Queen's University Belfast, Belfast, UK and*

[2]*UCD Institute of Food and Health, UCD Conway Institute, UCD School of Agriculture and Food Science, University College Dublin, Dublin, Ireland*

Low diet quality is strongly associated with elevated cardiovascular disease (CVD) risk[(1)]. The effectiveness of personalised dietary advice has been explored due to the limited success of conventional approaches[(2)], but there is limited evidence in UK/Irish populations at risk of CVD. The PAD-Q trial aims to use a personalised feedback system to improve diet quality and cardiometabolic health. The PAD-Q system was based on the Prime Diet Quality Score (PDQS), associated with CVD[(3)] and validated in the UK/Irish population[(4)], in conjunction with dietary biomarkers. The feedback system development, diet quality at baseline and priority dietary goals identified in this population are explored here.

A feedback system was developed based on PDQS food groups and dietary biomarkers by grouping and ranking the PDQS food groups according to public health importance and UK/Irish population intake, to deliver eight personalised dietary priority goals to participants randomised to the intervention, during a six-month, parallel, randomised, controlled, single-blinded intervention study conducted at Queen's University Belfast and University College Dublin. Volunteers at risk of CVD and who had a low PDQS score were recruited. Baseline data were analysed via Chi-square tests, with p-values < 0.05 considered statistically significant.

The PAD-Q study recruited 149 participants (29% males, 71% females). Mean (±SD) age was 49 ± 12 y and mean BMI 33.6 ± 5.6 kg/m^2. Total PDQS score at baseline was 16 ± 4 (out of maximum 42 points). Based on the PDQS data, there was high intake (nearly daily or more) of whole milk dairy foods, desserts, sweet baked foods, processed meat, and high-fat foods (50%, 32%, 30%, 15% and 15%, respectively). Conversely, a low intake (once per week or less) of fish, nuts, legumes, citrus fruit, and dark green leafy vegetables was found in 84%, 83%, 79%, 74%, and 71% of the sample, respectively. Intake of fruit and vegetables (not including legumes) was 1.6 ± 0.9 portions/d and a very low intake of fruits was found in the sample, where 89% ate less than 1 portion/d.

The most frequent dietary goals delivered to the intervention group were fish (94.7%), nuts (90.7%), cruciferous vegetables (80%), and wholegrains (62.7%). The less frequent goals were desserts (5.3%), carrots (10.7%), sugar-sweetened beverages (13.3%), and poultry (20%). No statistically significant difference was found in the dietary goal frequencies by sex and age.

A personalised dietary feedback system was developed based on diet quality assessment, via PDQS and dietary biomarkers, to deliver the PAD-Q study intervention trial in a UK/Ireland population at risk of CVD. Baseline diet quality was low and the PAD-Q feedback system has allowed the selection of high priority goals aimed at improving diet quality in this population.

Acknowledgments

We like to acknowledge funding support of the US-Ireland Tripartite Programme sponsored by the US NIH/NIDDK (DK120870), the Health Research Board (USIRL-2019–1) and the HSC R&D Division, Public Health Agency and the Medical Research Council [STL/5461/2018].

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