

The PAD-Q Study – a novel approach to quantify diet quality and offer personalised advice based on diet quality and food intake biomarkers in biological samples

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Research has shown that maintaining a healthy diet and physical activity, while avoiding smoking and alcohol consumption could prevent up to 80% of cardiovascular diseases (CVD) and 30% of cancers⁽¹⁾. However, current guidelines to improve diet and lifestyle still follow a “one-size-fits-all” approach and therefore have low success rates in improving population health⁽²⁾. Personalised dietary advice has proved a more successful strategy in improving diet quality in the Food4me Study⁽³⁾. While dietary recall assessment is prone to bias due to over- or underreporting, other approaches such as diet quality scores and dietary biomarker research provides a novel approach to validate actual and habitual dietary intake of certain food groups⁽⁴⁾. The aim of the PAD-Q Study is to examine whether food biomarkers, in combination with diet quality assessment using the Prime Diet Quality Score (PDQS), can be used to deliver precision nutrition advice and substantially improve cardiometabolic health and diet quality in individuals, who are at risk for CVD. The PAD-Q Study is a dual-centre, 6-month, parallel, controlled, randomized, single-blinded intervention study performed in Queen's University Belfast and University College Dublin. The primary outcome of the PAD-Q Study is the improvement of diet quality, assessed via the PDQS after six months. Secondary outcomes are improvement in cardiometabolic markers such as blood pressure, cholesterol levels, HbA1c, anthropometric measures, and physical activity levels. Baseline data were analysed via Pearson correlation, with p-values <0.05 considered significant. Food intake biomarkers were measured using NMR and GC-MS. To date, 48 participants (n = 20 males, n = 28 females) recruited at both Queen's University Belfast and University College Dublin have completed the PAD-Q Study baseline data collection. Diet quality of all participants at the UCD study site (n = 25, 12 males, 13 females) was low at baseline (PDQS Scores 16 ± 2 out of 42 points). Dietary biomarkers indicated a low intake of cruciferous vegetables (n = 23), and low fruit consumption at baseline (n = 20). Only four participants had adequate omega-3 index levels at baseline, however likely due to supplement intake as opposed to regular fish consumption. Fruit biomarker levels at baseline were correlated with PDQS diet quality scores (R = 0.41, p = 0.041). Systolic blood pressure at baseline was significantly positively correlated with Waist-to-Hip ratio (R = 0.48, p = 0.016) and waist circumference (R = 0.42, p = 0.037). The preliminary data shows good relationship between assessment of diet quality (PDQS score) and biomarkers for total fruit intake.

Future work will determine if combining both data types in delivering personalised nutrition results in an improvement of diet quality.

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