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Effect of a high polyphenol intervention on Pregnancy Associated Plasma Protein-A in participants with hypertension

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High polyphenol diets have been associated with reduced risk of cardiovascular disease (CVD), but few intervention studies have been conducted to confirm this association. Dietary intervention studies with clinical outcomes are rarely conducted, and use of biomarkers of CVD risk with established prognostic links are more common. Evidence has shown that high circulating concentrations of pregnancy associated plasma protein-A (PAPP-A) may be associated with increased CVD risk^(1,2). Research suggests that diets rich in polyphenols, such as fruit, vegetables, berries and dark chocolate, may have the potential to reduce PAPP-A. This is due to polyphenols having an antioxidant effect that may inhibit the production of pro-inflammatory cytokines that stimulate PAPP-A gene expression^(3,4). The aim of this study was to investigate the effect of a high polyphenol diet on PAPP-A, as a novel biomarker of a CVD risk, where a previous effect of the dietary intervention on forearm blood flow has already been demonstrated⁽⁵⁾.

Eligible participants (with documented grade I (140–159/90–99 mm Hg) or grade II (160–179/100–109 mm Hg) hypertension; n = 104) were recruited to take part in a randomised controlled intervention study. All participants completed a 4-week run-in phase, consuming <2 portions of fruit and vegetables (F&V) daily and avoiding berries and dark chocolate. Subjects were then randomised to continue with this low-polyphenol diet for a further eight weeks or to consume a high polyphenol diet of six portions F&V (including one portion of berries/day and 50 g of dark chocolate). PAPP-A was measured in serum, collected at the start and end of the eight-week intervention, using a commercially available ultra-sensitive Enzyme Linked Immunosorbent Assay (Demeditec, Germany). Compliance with the intervention was measured using food diaries and biochemical markers. Ethical approval for the study was obtained from the Office for Research Ethics Committees Northern Ireland (ORECNI).

Analysis of the PAPP-A endpoint was conducted on n 98 participants. Results from the study showed that, in terms of compliance, there was a significantly larger increase in vitamin C, carotenoids and epicatechin in the high-polyphenol group (between-group difference p < 0.001; p < 0.001; p = 0.008, respectively), and larger change in self-reported FV, berries and dark chocolate intake than in the control group. When the change in PAPP-A (calculated post minus pre concentration, log-transformed data) was compared between the low and high polyphenol intervention groups, there was no statistically significant difference in change in PAPP-A between the two intervention groups (high polyphenol group 1.03 (0.81, 1.32); low polyphenol group 1.17 (0.96, 1.43); p = 0.43; independent samples t-test; change expressed as geometric mean (95 % CI), which, due to the logarithmic transformation, represents the ratio of the post to pre value).

In conclusion, the present study did not observe any effect of a polyphenol rich diet on PAPP-A, a proposed novel biomarker of CVD risk.

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