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A randomised, double-blind, placebo-controlled trial to assess dose-dependent effects of blueberries on blood pressure, glucose and cognition

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Obesity can increase the risk of diseases such as type 2 diabetes mellitus and cardiovascular disease⁽¹⁾. Glucose control is critical to both preventing and managing diabetes and can be achieved by enhancing secretion of insulin, limiting absorption of glucose from the gut and by upregulating the use of glucose in the muscles⁽²⁾. Abnormalities in glucose management⁽³⁾ and blood pressure control⁽⁴⁾ are known to impair cognitive function. Epidemiological studies report an inverse risk of type 2 diabetes with increased intake of polyphenols. These data are also supported by *in vitro* and animal studies reporting positive effects of polyphenols on insulin sensitivity, carbohydrate digestion and glucose regulation⁽⁵⁾. Here we aimed to evaluate postprandial glucose metabolism, blood pressure and cognitive function following a high carbohydrate meal accompanied by different doses of anthocyanin containing blueberry drinks.

A double-blind, placebo-controlled, dose-response study was designed and received ethical approval and 22 participants were recruited. Each participant attended four study days in a crossover design, separated by a minimum of 5 days during which, they consumed a high carbohydrate meal consisting of two slices of toast and one of three doses of blueberry beverage or a control beverage. Memory performance was assessed using the visual verbal learning test (VVLTL), measured at baseline and 90 minutes post consumption. Glucose was monitored every 15 minutes using a continuous glucose monitor which was worn across 10 days, and blood pressure was assessed every 30 minutes for a period of 4 hours in the laboratory. Glucose area under the curve (AUC) were analysed using linear mixed models. Blood pressure and VVLTL data were analysed using repeated measures ANOVA.

The analysis was performed blind to condition. In total, 22 participants completed all four study visits (mean age 28 ± 5.9 , mean weight $61\text{kg} \pm 10.4$, mean height, $1.64\text{m} \pm 0.9$, mean BMI 22.7 ± 2.27 , N=20 female, N=2 male). There was a significant effect of treatment on total words recalled in the VVLTL with best performance following condition B compared to condition C, and condition D compared to condition C ($p < 0.05$). Condition B also resulted in significant systolic blood pressure lowering compared to condition C (-2.47mmHg , $P < 0.003$). There was no effect of treatment on area under the curve for glucose over 3 hours postprandial ($p > 0.05$).

Taken together these results suggest that condition B conferred greatest benefit for memory performance and that this was associated with anthocyanin related effects on systolic blood pressure.

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References

1. Scherer PE & Hill JA (2016) *Circ Res* **118**(11), 1703–1705.
2. Gromova LV, Fetisov SO & Gruzdkov AY (2021) *Nutrients* **13**(7), 2474.
3. Anstey KJ, Sargent-Cox K, Eramudugolla R *et al.* (2015) *Alzheimer's Research & Therapy* **7**(48).
4. Ou YN, Tan C, Shen XN *et al.* (2020) *Hypertension* **76**(1).