Proceedings of the Nutrition Society (2022), **81 (OCE5)**, E228 doi:10.1017/S0029665122002610

Summer Conference 2022, 12–15 July 2022, Food and Nutrition: pathways to a sustainable future

Acute supplementation of beetroot but not blackcurrant juice manages postprandial blood glucose responses in healthy adults

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Currently, more than 463 million people are living with diabetes; a number predicted to rise to 578 million by 2030[(1)]. As type 2 diabetes mellitus (T2DM) is amongst the ten most common causes of death in adults worldwide[(1)], decreasing its prevalence will reduce the social and economic burden this disease causes. Diets high in sugar that lead to repeated high blood glucose levels are a risk factor for insulin resistance and development of prediabetes and T2DM[(2)]. Finding interventions that manage the postprandial blood glucose response can help in improving blood glucose control. *Beta vulgaris* (beetroot) and *Ribes nigrum* (blackcurrant) are both high in dietary polyphenols, with beetroot also high in dietary nitrate. Polyphenol consumption may decrease blood glucose peaks through several mechanisms including inhibition of starch degrading enzymes and improved insulin secretion and sensitivity[(3)]. Dietary nitrate improves blood pressure responses through increased nitric oxide production, a compound which regulates insulin secretion, glucose uptake and hepatic glucose output[(4)]. Our objective was to establish if acute supplementation with beetroot or blackcurrant juices improves blood glucose control following ingestion of a carbohydrate meal. This repeated measures, randomized, crossover trial, recruited 18 healthy participants aged 18–60 years, BMI 18–30 kg/m^2, HbA1c <40 mmol/mol and fasting glucose <5.7 mmol/L. Participants consumed 75 g of carbohydrate with either beetroot (BR; 600 mg nitrate), blackcurrant (Bk; 300 mg anthocyanins) or placebo (PL) beverages. Venous and capillary blood samples were collected at baseline and 5, 15, 30, 45, 60-, 90-, 120- and 150-min following ingestion.

Paired t-test analyses were used to compare peak changes in capillary glucose between PL and BR and Bk juices and change in incremental area under the curve (iAUC) for different time intervals.

Repeated-measures ANOVA for glucose and insulin levels were conducted at each time point to compare both Bk and BR juices with PL. Statistical significance was set at $p < 0.05$. Insulin indices (HOMA-IR, Matsuda index) and glucose measures will be presented. Preliminary results from capillary sampling indicate the glucose peak above baseline was significantly lower for BR (2.67mmol/L) than PL (3.33mmol/L; $p = 0.015$). There was a significant difference in iAUC between BR and PL for time intervals 0–30 min (52.96 mmol/L and 65.78 mmol/L, respectively; $p = 0.020$) and 0–60 min (98.01 mmol/L and 126.01 mmol/L, respectively; $p = 0.042$). Bk showed no significant difference for any period vs placebo.BR juice has the potential to decrease postprandial blood glucose peaks in an acute setting, which may decrease postprandial hyperglycaemic damage to blood vessels, and improve insulin sensitivity and metabolic function. On a population level, this may reduce incidence and burden of T2DM. Bk juice showed no significant effects on postprandial glucose in this acute setting.

Acknowledgments

The authors thank all the staff and students who contributed to the study, notably Charlotte Bertasius, Cassie Slade, Krutika Nanavati and Owen Mugridge for blood processing. We also wish to thanks all participants for volunteering to make the study possible. We thank Dr Wendy O'Brien for her help in managing the data collection laboratory. We give thanks to Lisa Ning and Professor Marie Wong for their contributions to beverage analysis and design. We also thank Dr Janice Lim for her knowledge and expertise in trial design. We thank the New Zealand Blackcurrant Cooperative for their kind donation of the blackcurrant beverage. This study was funded by Massey University School of Health Sciences and supported by Massey University Research Fund.

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