The discriminatory metabolites, and α-amylase and α-glucosidase inhibition of commercial green and purple teas [*Camellia sinensis* (L.) O Kuntze]

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Introduction: Many traditional medicines are used to treat type 2 diabetes mellites (T2DM), but mostly without scientific validation. Alternative treatment strategies, such as tea and its associated active compounds, may be more cost-effective and readily available, and may provide an effective way to prevent, supplement or treat T2DM with fewer undesirable side effects. Purple teas are rare natural variants of *Camellia sinensis.* Recently, purple tea has drawn much attention due to its special colour, flavour and possible health benefits (de Moura *et al* 2021). Seven commercially available purple teas, including TRFK306 (identified in Kenya) and Sun Rouge (identified in Japan) were investigated in this study. The aims of this study were, firstly, to identify the metabolites that distinguish between green and purple teas and then, todetermine the inhibition of α-amylase α-and glucosidase by the green and purple teas compared to acarbose, an antidiabetic drug.

Methods: A metabolomics approach, employing nontargeted UPLC-MS/MS, was used to identify metabolites that distinguish between seven different commercial green and purple tea variants. The data were further subjected to multivariate data analyses by means of principal component analysis and orthogonal partial least square discriminant analysis (OPLSA-DA). The α-glucosidase and α-amylase inhibition of the different purple and green teas were determined using colorimetric enzyme assays and the inhibitory activity was compared to acarbose.

Results: The OPLS-DA analysis indicated that there were significant differences in the chemical profiles of purple and green tea. A total of 869 ion features were identified, of which 69 were significantly different between the purple and green tea cultivars. Cyanidin-3-galactoside, epicatechin, gallocatechin, epigallocatechin gallate and 1,2-di-O-galloyl-4,6-O-hexahydroxy-diphenoyl-β-D-glucose (GHG) were identified as discriminatory metabolites. Overall, the teas possessed moderate α-amylase inhibition and potent α-glucosidase inhibitory activity. The results revealed that purple tea were better α-glucosidase inhibitors than green tea. The purple teas, Sun Rouge (IC_{50}= 2.4 ± 0.15 µg/mL) and TRFK306 (IC_{50} = 4.3 ± 0.18 µg/mL) were the most potent α-glucosidase inhibitors, with IC_{50} values significantly smaller than acarbose (IC_{50} = 807 ± 190 µg/mL). The α-glucosidase IC_{50} values of the green teas ranged between 4.6 – 12 µg/mL.

Conclusion: This study characterized metabolites distinguishing between green and purple teas and provide evidence of the potential antidiabetic effect of purple tea related to the inhibition of α-amylase and α- glucosidase.

Reference: de Moura, C., Junior, T.K., Pedreira, F.R.D.O., et al. 2021. Purple tea (*Camellia sinensis* var. assamica) as a potential functional beverage: From extraction of phenolic compounds to cell-based antioxidant/biological activities. *Food and Chemical Toxicology*, p.112668.

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