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The effect of a polyphenol supplement on iron absorption in Thai adults with nontransfusion-dependent thalassaemia: a stable iron isotope study

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Genetic disorders, including haemochromatosis and thalassaemia, can lead to iron overload and related adverse health outcomes, such as liver and cardiovascular disease[1,2].

Thalassaemia is one of the most common genetic blood disorders worldwide[1]. It is characterized by impaired production of haemoglobin resulting in chronic anaemia. This, in turn, leads to an upregulation of dietary iron absorption causing iron overload. Standard treatment therefore includes iron chelation therapy with frequency depending on the velocity of body iron accumulation[1].

Some polyphenolic compounds have strong iron-chelating properties[3,4]. We recently showed that a polyphenol supplement (PPS) consisting of grape juice extract, black tea and cocoa powder taken with an iron-rich meal or iron-fortified drink reduces iron absorption by ~40 % in European adults with haemochromatosis[5].

Here we investigated the effect of this natural PPS on iron absorption from an iron-rich meal or iron-fortified drink in Thai adults with non-transfusion-dependent thalassaemia.

We performed a single-blind, placebo-controlled, cross-over study in 20 Thai adults with ironloading, non-transfusion-dependent thalassaemia. Each participant consumed, in partially randomized order, an iron-rich test meal (8 mg native iron) or an iron-fortified test drink (8 mg iron as $FeSO_4$) extrinsically labelled with a stable iron isotope (2 mg ^{58}Fe or ^{57}Fe as ferrous sulphate [$FeSO_4$]) with the PPS (2 mg grape juice extract, black tea and cocoa powder in equal parts) or the placebo (2 g maltodextrin). Fractional iron absorption (FIA) from each of the four test conditions was determined by measuring the incorporation of stable iron isotopes into erythrocytes using inductively coupled plasma mass spectrometry (ICP-MS)[6]. Effects of treatment and matrix, as well as treatment x matrix interactions, were determined using 2-factorial repeated-measures ANCOVA.

Median (IQR) age of participants (n = 12 female; n = 8 male) was 26 (20–34) years; 12 (60 %) were alpha-thalassaemia and 8 (40 %) were beta-thalassaemia carriers. The PPS lowered FIA from the iron-rich test meal and iron-fortified test drink by 70 % and 35 %, respectively (treatment, $p = 0.016$; matrix, $p = 0.116$; treatment x matrix, $p = 0.089$; model adjusted for baseline haemoglobin). Median (IQR) FIA from the test meal consumed with the PPS and placebo was 0.36 (0.12–3.44) % and 1.37 (0.68–2.64) %, respectively. FIA from the test drink consumed with the PPS and placebo was 4.22 (2.42–15.3) % and 6.47 (3.00–14.0) %, respectively.

The findings from our study suggest that intake of this natural PPS alongside meals or drinks high in iron has the potential to lower iron absorption in people with non-transfusion-dependent thalassaemia. It remains to be investigated if long-term use of the PPS can reduce body iron accumulation and frequency of iron chelation therapy, as well as elicit potential cardioprotective effects, in people with non-transfusion-dependent thalassaemia.

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