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The effect of incorporation of natural chelators to the diet on the iron bioavailability through *in vitro* analysis

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There are many natural iron chelators found in food sources. The use of these natural chelators could increase the bio availability of iron and benefit conditions such as iron deficient anemia or decrease the bio availability and benefit iron overload conditions such as beta thalassemia. The present study was carried out to assess the potential of incorporating food sources rich in natural iron chelators into the diets to control the complications of elevated iron in genetic conditions such as beta thalassemia. Fifteen diet plans were formulated based on four ingredients namely, red rice, fresh milk, turmeric and black tea that are rich in natural iron chelators against a control diet (no iron chelator source). The designed diets were *in vitro* digested using the stimulated gastro-intestinal conditions and their effect on bio-availability of iron in the obtained digesta was tested using the Atomic Absorption Spectrometric method. The results showed that the bioavailability of the iron had comparatively reduced in all the diet plans except in the diet plan comprising of all the four food sources (diet plan 15). The diet plans containing red rice and black tea showed a significant ($p < 0.05$) decrease in the iron bioavailability compared to the control indicating that fibers in red rice and tannin in black tea negatively affected the iron bioavailability and their actions surpassed the action of other natural iron chelators. The diet plan 15 showed a 37.22% increase in the bioavailability of iron compared to the control but is not significant ($p > 0.05$). This indicates the combination of natural chelators in the four food sources have increased the mobility of iron in the digesta without increasing the dietary iron contribution to the iron overload. Therefore, it can be concluded that under *in vitro* conditions there is a potential to incorporate the food sources rich in natural iron chelators to the diet for control of iron overload conditions and their combinations have synergistic effects compared to those of individual chelators. It is recommended to analyse and quantify the chelation action of the digested natural iron chelators.

Keywords: Iron bioavailability, iron overload, natural chelators, stimulating gastro intestinal conditions