

Iron bioavailability of sweet potato and moringa leaves in comparison with leafy green vegetables commonly consumed in Ghana

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Introduction: Iron deficiency anaemia (IDA) is a significant public health problem in Northern Ghana especially amongst women and children. Leafy green vegetables are major contributors to iron intake in this part of the world; poor iron bioavailability from these food sources may be part of the reason for the high prevalence of IDA. Evidence suggests that sweet potato and Moringa leaves might be better sources of bioavailable iron, compared with other leafy green vegetables, as both have high levels of iron, and also beta-carotene – a dietary factor that has been suggested to improve iron bioavailability.

Aims/Hypothesis: Our research aims were to evaluate iron bioavailability of sweet potato and Moringa leaves in comparison with other leafy green vegetables commonly consumed in Ghana. We hypothesized that iron uptake from sweet potato and Moringa leaves would be higher compared with the other tested vegetables.

Methods: We used the Caco-2 cell/*in vitro* digestion system; Caco-2 cell ferritin formation was used as a surrogate marker of iron bioavailability. In addition, we also measured levels of other nutrients and dietary factors known to affect iron bioavailability: beta-carotene, iron, calcium, zinc, ascorbate, phytates and polyphenols.

Results: Iron bioavailability from all tested vegetables was poor despite relatively high absolute levels of iron in the leaf samples (14.5 – 24.6 mg/100 grams dry weight); there was no statistically significant difference in iron uptake between any of the tested varieties or the control sample with no added iron. Levels of phytates and polyphenols, known inhibitors of iron uptake, were high and probably accounted for the low iron bioavailability of tested leaves. As expected, beta-carotene levels were highest in the sweet potato and Moringa leaves (ranging from 47–98 micrograms retinol activity equivalent)/gram freeze dried leaf) – approximately 100% more compared with the other leafy green vegetables, with the exception of the purple leafed sweet potato variety tested that had approximately the same amount of beta-carotene as the commonly consumed vegetables.

Conclusion: In our *in vitro* model neither sweet potato nor Moringa leaves demonstrated good iron bioavailability suggesting that increased consumption of these vegetables would not lead to improved iron status. However, both leaves were good sources of beta-carotene, and further testing *in vivo* to evaluate whether they could impact on vitamin A status may be warranted.