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In vitro iron bioavailability and protein digestibility of traditional Senegalese meals enriched with Moringa *oleifera* leaves powder

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Introduction

Iron deficiency anemia is a public health problem in Senegal (EDS-II, 1992). The major responsible factor of iron deficiency anaemia is poor iron bioavailability in the largely cereal/pulses based diets in many African countries (Guiro and al., 1991). With such diets, iron intakes are generally insufficient to meet the physiological requirements for the infants, pre-school children, pregnant and lactating women.
Moringa *oleifera* which is nutritious plant used by rural population in Senegal is known to contain large amounts of iron and protein, could be useful in combating iron deficiencies and protein energy malnutrition. However, there is a lack of data about iron bioavailability of *Moringa oleifera* products. Thus this s study was undertaken to determine the iron bioavailability and protein digestibility of meals containing *Moringa oleifera* leaves largely consumed in Senegal rural areas.

Materials and methods

Porridge of fonio cereal (*Digitaria exilis*) and two meals based on rice and pearl millet couscous were studied. A powder of dried leaf of *Moringa oleifera* was added to the porridge and the sauce of the rice meal (*mbeuleukhe*), while fresh leaf was used to prepare the sauce of the pearl millet couscous meal (*ceere mbuum*).
Chemical composition of *Moringa oleifera* products was determined according to the AOAC methods (AOAC, 1995). All samples were analysed in triplicate. *In vitro* iron bioavailability in *Moringa oleifera* leaves powder and in the 3 recipes was determined according to the method involves a double pepsin and pancreatic digestion (Kane and al.,1984; Miller and al., 1981). The digestibility of proteins was determined according to an improved pepsin digestion method (Mertz and al, 1984). The results are expressed as mean ± SD or percentages.

Results and discussion

Moringa oleifera leaves powder contains a high amount of protein (35.0± 0.01 g/100g) and iron (18.4 mg/100g). However, the % of Fe bioavailability (2.2 ± 0.7) and protein digestibility (56.1 ± 8.9) is low.

The iron content of the meals containing *Moringa oleifera* leaves (mg/100g) was for millet couscous meal: 8.5 ± 0.6 mg/100g; for Fonio porridge 2.9 ± 0.05 mg/100g and for rice meal: 2.3 ± 0.2 mg/100g.

The % Fe bioavalaibility was higher in the rice meal (4.2 ± 0.2) but this recipe showed the lowest protein digestibility (51.0 ± 6.3). Less than 1% of iron of the fonio and millet couscous meals is bioavailable, 0.2 ± 0.08 and 0.8 ± 0.03, respectively.

The amounts of bioavailable iron (µg/100g) were 412.0, 5.4, 95.4, and 70.0 for *Moringa oleifera* leaf powder, fonio porridge, rice meal and millet couscous meals, respectively.

These results suggested that the high Fe content in *Moringa oleifera* leaves was not only the native leave Fe but may be come from contaminating iron. The low Fe bioavailability may also be due to the presence of polyphenols which are the potent inhibitor of Fe bioavailability.

Conclusion

Despite high amounts of iron content, *Moringa oleifera* leaves powder are a poor source of bioavailable iron. With such rural diets enriched with the dried leaves, iron intakes are generally insufficient to meet the physiological requirements for the infants, pre-school children, pregnant or lactating women. However the high protein content of the leaves could be of interest for a better nutrition of the populations.

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