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Determination of iron in wheat and corn flour using x-ray fluorescence technique

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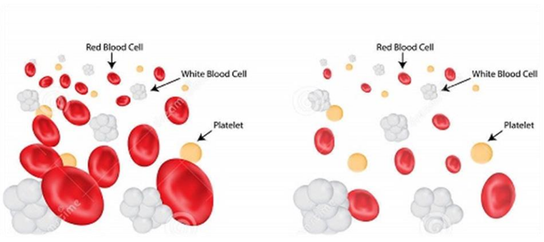
Introduction

Anemia in Brazil is a public health problem due to iron deficiency. According to National Health Surveillance Agency (ANVISA) several strategies have been adopted to prevent this deficiency, such as: food fortification. Among the foods highly consumed by the Brazilian population, iron fortified flour food is a target of nutritional relevance to combat anemia.

In this research, brands commercially available in São Paulo city were evaluated by iron determination using Energy Dispersive X-Ray Fluorescence technique (EDXRF). The results were compared with the minimum amount recommended (MR).

Anemia



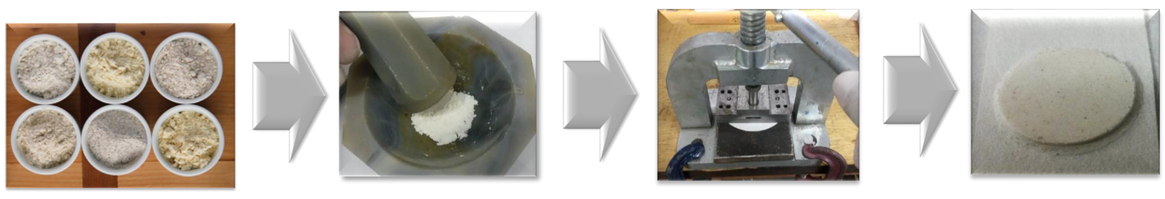
Symptoms

weakness and lack of memory
breathing problems
mental and appetite disorders
dizziness and nausea

Methodology

Sample Preparation

- flour samples were sieved and homogenized.
- each sample was pressed in a manual press (as a tablet), in triplicate.



homogenized manual press tablet

EDXRF Measurements

X-ray Spectrometer by X-123SDD, Amptek:

- Silicon drift detector (SDD) with Be window (12.5 µm)
- Targets : Ag e Au
- Experimental condicions: 30 kV, 5 µA, 300s
- Analyze: WinQxas software

Results and Discussion

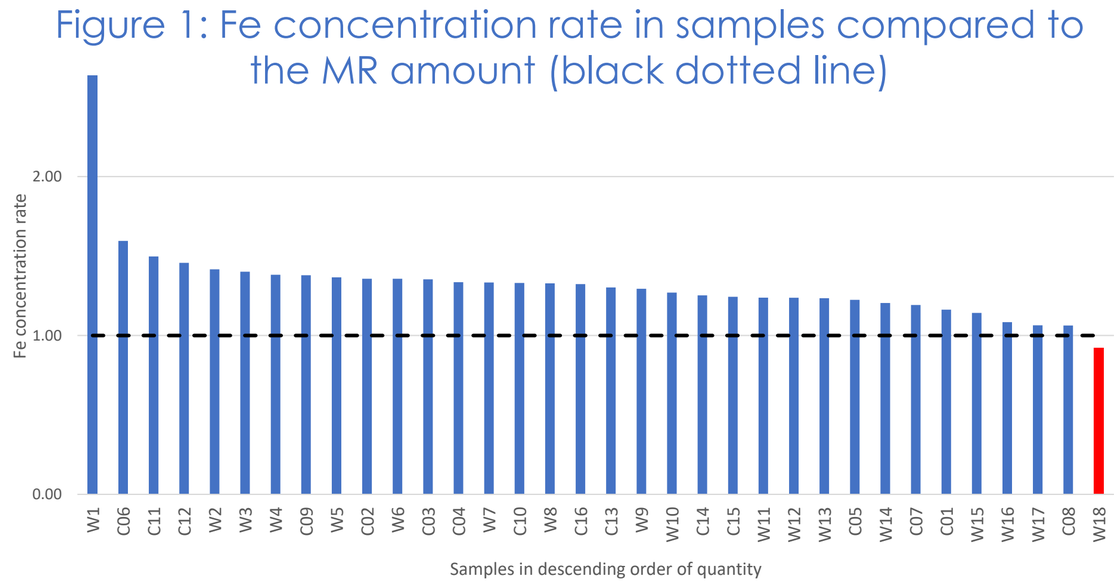
The data for Fe in corn and wheat flour samples are presented in Table I. ANVISA established a minimum amount of 42 mg/kg (4.2 mg/100g) Iron in flour.

Only one sample (W18 = 39 mg/kg, see Table I and Figure 1, is near of the MR, all the other samples are above the minimum limit established by Brazilian legislation.

Table I: Iron concentration, expressed by Mean Value (MV) ±1Standard Deviation (1SD) in flour samples

Wheat flour samples (n=18)	MV ± SD (mg/kg)	Corn flour samples (n =16)	MV ± SD (mg/kg)
W01	111±5	C01	49±3
W02	59±3	C02	57±3
W03	59±3	C03	57±3
W04	58±3	C04	56±2
W05	57±3	C05	51±3
W06	57±3	C06	67±3
W07	56±3	C07	50±2
W08	56±3	C08	45±2
W09	54±4	C09	58±3
W10	53±3	C10	56±3
W11	52±4	C11	63±3
W12	52±3	C12	61±3
W13	52±3	C13	55±3
W14	51±2	C14	53±3
W15	48±2	C15	52±3
W16	45±2	C16	56±3
W17	45±2		
W18	39±2		

Figure 1: Fe concentration rate in samples compared to the MR amount (black dotted line)



Conclusions

- The Fe concentration in some samples are even above 2.6 times over of the Minimum Recommend .
- This raises a warning for people with iron overload, as the food label indicates the RM and not the amount present.
- This study showed need for detailed regulation regarding labeling.

Finally, it is important to emphasize that good diet can generate incredible benefits:

Remember

they are not anemic because they keep an iron rich diet

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