

Investigating the Iron Level in Produced Enriched Flour of West Azerbaijan Province, North West of Iran

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ABSTRACT: Anemia is a common disease in Iran and more than half of the causes of anemia are due to iron deficiency. In this regard, flour fortification with iron is one of the strategies chosen by the iron deficiency anemia in Iran. In this study monitoring of enriched flour was performed. During the spring, summer and autumn of 2012 a number of 341 samples from 17 brands from produced flour in West Azerbaijan Province was collected and sent to a lab for measurement of qualitative (spot test) and quantitative iron of flour samples. The results showed that from 341 samples only 14.36 percent still suffer from iron deficiency. Awareness of amount of iron in flours for consumers achieving standard is essential for the prevention of iron deficiency anemia.

Keywords: Iron Level, Enriched Flour, West Azerbaijan Province, Iron Deficiency Anemia, Iran.

INTRODUCTION

Although the production of food in world is sufficient a large part of the world's population is the hidden hunger. Phrase or word of hidden hunger on deficiencies of micronutrients such as iron, iodine, zinc, folic acid, calcium, vitamins A and B a long period symptoms may not be felt is use (1). One of the most effective strategies in the prevention of disorders of micronutrient deficiency is food enrichment. Micronutrients to staple foods that are consumed every day by the people are added (1). In different cultures, micronutrients are added to a certain food. In many populations, the high prevalence of iron deficiency disorders is anemia. Strategies to improve of nutritional status, is a safe procedure for the control and prevention of micronutrients deficiency particularly iron deficiency (2). Anemia is one of the most common diseases in the world and the World Health Organization has estimated that 1.62 billion people in the world are diagnosed as anemia. Worldwide prevalence of anemia in children before school age, school age, pregnant women and elderly men is 47.4, 25.4, 41.8, 30.2, 12.7% and 23.9% (3).

Severe anemia in developing countries accounts for 20% of causes of death for pregnant women. Dietary habits such as using of vegetarian diet and insufficient intake of animal resources are associated with the prevalence of iron deficiency anemia (4-7). Approximately 0.8 million deaths annually are caused by iron deficiency disease (8). According to statistics published by the WHO half of anemia in world is due to dietary iron deficiencies (6).

Food fortification with iron is one of the strategies to cope with iron deficiency anemia (9, 10). Anemia and iron deficiency anemia is a common problem in Iran (11, 12).

In diet of Iranian, bread have a special position and so for enriching the food iron with wheat flour is used. In this study, we tried to evaluate the quality and quantity of iron in flour produced in West Azerbaijan Province, Iran.

MATERIALS AND METHODS

During the spring, summer and autumn of 2012 a number of 341 samples from 17 brands from produced flour in West Azerbaijan Province was collected and for measurement of qualitative and quantitative iron of flour samples.

Quantitative test (Measurements of iron)

Containers of porcelain, platinum or silica in a cold oven set at approximately at 500 ° C for one hour and then at a lower temperature of about 100 °C placed in the dryer. When the temperature reached the temperature of the laboratory, and immediately removed it from the dryer, 0/001 g was weighed carefully. 5 g of sample (with carefully of 0/001 grams) weighted and containers them on the oven, electric heat slowly until we were ash. 5 to 10 hours placed in an oven to 500 ° C until turned into ash. Then placed on oven dried with gentle heat again into furnace of ash converter. Obtained ash was added 10 ml of concentrated hydrochloric acid on the steam bath or an electric oven dried two normal hydrochloric acid was added to the remaining 20 ml of the solution was measured with a filter paper in a 100 ml flask was smooth. Residue and filter paper completely were washed with abstracted and the volume it by abstracted water was brought to 100 ml and mix well until it is homogeneous.

Absorption of the test solution directly or after dilution with hydrochloric acid 0.5 normal and providing solutions with measurable concentrations in the range measurement device. At least four standard solutions in the range of tests before and after each sample (6 to 12) was read. Between measurements and each time the ignition rinsed with distilled water absorbed at zero again connect.

Before and after each sample from the mean of each standard curve was prepared. Fe concentration of specimens read on the curve.

The amount of iron in the sample in terms of ppm is obtained from the following formula (16):

$$C = C_1 - C_2 \times 100 / W$$

C= depending on the amount of iron in the sample, PPM.

C1= deplete dissolved iron concentration in micrograms per milliliter.

C2= iron concentration in the final solution in terms of micrograms per milliliter.

W= the sample weight in grams.

Qualitative test for iron (spot test)

0.5 kg of flour was prepared for each specimen (341 samples). First, 1 ml of hydrogen peroxide 3% reagent was added to each flour sample. Three minutes after exposure to flour to the reagent, the second reagent (acid chloride 2 molar and potassium thiocyanate 10%) was added to the same sample. Observed red spots indicate the quality of the iron. If the spot red not apparent iron quality is less than 30 and high spots indicating high levels of iron in flour so that when the report is report over 90. Spot test acceptable level is 30-90 PPM [17].

RESULTS AND DISCUSSION

RESULTS

From 341 samples only 14.36 percent were still suffered from iron deficiency which from the perspective Iran's standard are unacceptable while 85.64% of the samples were within acceptable limits concerning iron level added to wheat flour (Table 1).

Table 1. Test results of produced enriched flour of West Azerbaijan Province, Northwest of Iran

spot test	Quantity of iron PPM
Acceptable	Acceptable
<30	29.63
<30	30.13
<30	34.5
<30	27.87
<30	28.13
<30	27.5
<30	25
<30	27.25
<30	26.69
<30	22.38
<30	37.5
<30	21.81
<30	25.43

<30	24
<30	25.62
<30	31.75
<30	23.9
<30	23
<30	25.12
<30	29.81
<30	35
<30	16.81
<30	30.31
<30	34.81
<30	34.87
<30	31.2
<30	27.5
<30	26.37
<30	37
<30	35.12
<30	32.18
<30	31.5
<30	29.69
<30	28.75
<30	24.5
<30	24.94
<30	28.87
<30	30.5
<30	29.37
<30	24.06
<30	32
<30	27
<30	25.81
<30	34.43
<30	34.3
<30	25.5
<30	33.25
<30	37.75
<30	28.87

Enriched flour: A type of wheat flour that is enriched by adding iron to it and it is distribution between bakeries. 40-85: Acceptable regarding amount of iron. Spot test acceptable level is 30-90 PPM.

DISCUSSION

The results of our study showed that the covering of enriched flour in West Azerbaijan province is 85.64%. It is desirable for achieving full covering so more accurate supervision should be performed on the process of flour fortification to iron.

Results of studies conducted in the provinces of Bushehr and Golestan in Iran showed that covering of enriched flour is 90 and 94.1%, respectively (13). These results nearly agree with results of the present study.

Center for Disease Control and Prevention in the U.S. recommended that covering and consumption of enriched flour of iron and folic acid in the world should be increased. This recommendation has been presented under the covering of wheat flour fortified with iron and folic acid in the world; from 18% in 2004 to over 27% in 2007 and despite in 2007, about 540 million people had access to enriched wheat flour, this wasn't apparently sufficient (14).

The history of these types of programs in industrialized countries have shown that iron fortification of food has a significant role in reducing iron deficiency in countries such as United States, Canada, Britain and some European countries (15).

Monitoring and controlling the enrichment of flour and prevent from entering the it to consumer market and ultimately reduction levels of iron and prevent iron-deficiency anemia will take.

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