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DETECTION OF IRON AVAILABITITY OF WHEAT FLOUR PRODUCED IN BAGHDAD CITY MILLS

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ABSTRACT

In the present study, a total of 245 flour samples were collected from 49 mills on both sides of Baghdad city (Al- Karkh and Al- Resafa), during the period from 1/6 - 1/12/ 2015 to detect the prolportion of iron added to the flour samples. It is found that only 45% of mills produced flour contain the prescribed percentage of iron (30-60 ppm) while 51.9% of the mills produced flour at rate is less or much more than the prescribed percentage, while only 4.1% of the mills were not added iron to the flour.

Key words: Flour, Iron, Fortification.

التحري عن توافر الحديد في الطحين المنتج في مطاحن مدينة بغداد

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الخلاصة

تم جمع 245 عينة من الطحين من 49 مطحنة في جانبي مدينة بغداد (الكرخ والرصافة) وتم فحص العينات للتحري عن نسبة الحديد فيها بهدف بيان مدى نجاح تطبيق برنامج تدعيم الطحين بالحديد المعتمد من وزارتي الصحة والتجارة وذلك للمدة من 6/1 -12/1/ 2015. وجد أن حوالي نسبة 45% من المطاحن فقط تنتج طحين يحوي على النسبة المقبولة من الحديد (30-60 جزء بالمليون) في حين أن 51.9% من المطاحن تنتج طحيناً بنسب تقل أو تزيد كثيراً عن الحدود المقبولة والمعتمدة وأن 4.1% من المطاحن لم تضيف الحديد إلى الطحين.

الكلمات المفتاحية: الطحين، الحديد، تدعيم.

INTRODUCTION

Anemia remains a widespread public health problem with major consequences for human health as well as social and economic development. Although estimates of the prevalence of anemia vary widely and accurate data are often lacking, it can be assumed that significant proportions of young, children and women of childbearing age are anemic (**WHO, 2001; WHO, 2004**).

Iron deficiency (ID) is not easily detected, although its consequences are important. Most often, anemia is taken as indicator for iron deficiency (**Verster, 2004**). Globally, about 300,000 babies are born every year with a neural tube defect, serious birth defects of the brain and spine; however, the true count is not currently known due to a lack of birth defects data in m3.any countries (**National Center on Birth Defects and Developmental Disabilities, 2015**).

Micronutrient fortification of food is an effective strategy to improve nutrition. The fortification of wheat flour with iron in particular has the potential to make an important contribution to reducing the problem of anemia in women and children (**WHO, 1998**). Because ID affect all age groups and all strata of society, iron fortification of food has distinct advantages over the other interventions (**Gillespie, 2007**).

Fortifying wheat flour with iron, preferably in the form of ferrous sulfate or ferrous formate, which are both well absorbed, makes it possible to provide large amount of additional iron to the diet (**Pan American Health Organization, 2004**).

Cereals grains especially wheat are very often the main source of protein as well as calories for low income groups in developing countries. Wheat in the milling process is converted into flour (usually 72% extraction) and coarse particles 28% including the bran and germ. Most of the minerals and vitamins are in these later parts of the wheat grain. The 72% extraction flour straight grade is usually used for bread (**Bauernfeind and Lachance, 1990**). Wheat flour is a suitable food vehicle for fortification with iron (**de Pee *et al.*, 2008**).

Food fortification with folic acid was associated with a significant reduction in the rate of neural-tube defects. The decrease was greatest in areas in which the baseline rate was high (**De Wals, *et al.*, 2007**). The fortification of wheat flour with micronutrients is a common strategy to increase vitamin and mineral intake. While wheat flour mills are often inspected by agencies affiliated with national ministries to ensure compliance with national fortification standards, few countries use data derived from these inspections to construct an external monitoring system for use in program management and evaluation (**Wirth *et al.*, 2013**).

Flour fortification was begun in Iraq in 2005. Ministry of Health and Ministry of Trade adopted the policy of adding iron and folic acid to all types of flour at level of 30-60 ppm for iron and 1.5 ppm for folic acid (**Ministry of Health- Nutrition Research Institute, 2014**).

MATERIALS AND METHODS

A total of flour samples were collected from 49 mills in Baghdad city, five samples from each mill. One sample every 10 days for the period from 1\6 - 1\12\2015.

All flour samples were analyzed individually for their iron using the iron spectrophotometric method 40-41 B, this method is approved by American Association of Cereal Chemistry (AACC) for quantitative determination of iron in cereals-based products. Samples were mixed well and duplicate analysis for each sample (**AACC, 2010**).

RESULTS AND DISCUSSION

Total of 49 mills in both sides of Baghdad city, Al- Karkh 31 and Al- Resafa 18 mills were taken.

Flour from only 10/31(32.26%) mills in Al- Karkh contain the iron with acceptable level (30-60 ppm) while flour from 12/18 (66.67 %) mills in Al- Resafa contain the acceptable level as shown in (Table, 1) .

(Table, 2) shows that flour of only 2 (4.08%) mills had no iron, flour from 7(14.29%) mills contain less than 15 ppm, flour from 8 (16.33%) mills contain iron between 15-29.9 ppm, flour from 22 (44.90%) mills contain iron between 30-60 ppm and flour from 10 (20.31%) mills contain iron more or less the acceptable levels (30-60 ppm) .

According to the acceptable iron level (Table, 3) was shown that flour from 17 (34.69%) mills contain iron less than the acceptable level while flour from 22 (44.90%) and 10 (20.41%) mils contain iron with acceptable levels or more respectively.

Table (1): Distribution the mills according to the area.

Area	No. of mills	Mills produced flour with acceptable iron level	
		No.	%
Karkh	31	10	20.41
Resafa	18	12	24.49
Total	49	22	44.90

Table (2): Distribution of the mills according to the amount of the iron in the wheat flour.

Amount of iron ppm	No. of mills	%
0.0	2	4.1
0.1-14.9	7	14.3
15-29.9	8	16.3
30-60	22	44.9
75-90	10	20.4
Total	49	100

Table (3): Distribution of the mills according to the acceptable levels of the iron.

Percentage of iron	No. of mills	%
Less than acceptable levels	17	34.7
Within than acceptable levels	22	44.9
More than acceptable levels	10	20.4
Total	49	100

From the results, only less than half of the mills (22/49) produced wheat flour within the acceptable level of iron, while more than half of the mills produced flour less or more than the acceptable levels.

About 4% of the mills didn't add iron to the flour, more than 20% of the mills added iron in quantities much higher than the prescribed limits.

The results also indicated that largest proportion of the mills not response to the standards of the wheat flour fortification program in the country, prescribed by both ministries Ministry of Health and Ministry of Trade, or due to lack of experiences of worker in the control of production.

CONCLUSIONS

Fortification of wheat flour with iron is the best way to provide daily doses of this element to woman, children and other groups of community. It is an absolute necessity and it need to be implemental in the right manner with good and direct follow up.

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