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Heavy Metals in Some Egyptian Foods

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ABSTRACT

Environmental pollution is one of the major problems which create health hazard to human and animals. Heavy metals are one of the most important reasons of this pollution. The objective of the present study was to determine concentration levels of some heavy metals namely nickel, cobalt, zinc, copper, cadmium, lead, chromium and iron in some Egyptian foods. The obtained results showed that most of Egyptian foods available in the local market had a higher concentrations of heavy metals in comparison with the FAO (1983), WHO (2000) and FDA (2001).

Keywords: Heavy metals, Egyptian foods, contaminants

INTRODUCTION

Environmental pollution is worldwide problem. Heavy metals are belonging to the most important pollutants. They constitute some of the most hazardous substances that can bioaccumulate in the body of the organisms (Zweig *et.al*., 1999 and Zaidi *et.al*., 2005).

Human activities that add toxic substances to the environment include smelting, manufacturing, refining, chemical, processing, fertilizer application, irrigation and waste disposal (Gough, 1993). Heavy metals accumulate in the living tissues any time.

The heavy metals not only affect the nutritive values of fruits and vegetables but also have deleterious effects on human beings using these food items. National and international regulations on food quality have lowered the maximum permissible levels of toxic metals in human foods; hence an increasingly important aspect of food quality should be to control the concentrations of trace metals in food (Radwan & Salama, 2006).

Heavy metals contaminations may be occurred due to irrigation with contaminated water, the addition of fertilizers and metal based pesticides, industrial emissions, transportation, harvesting process and storage (Radwan & Salama, 2006).

Heavy metals are known to elicit a number of immunomodulatory effects ultimate leading to an enhanced susceptibility to microbial agent and the appearance of neoplastic diseases and autoimmune phenomena. The severity of these effects depends largely on the animal species, strain used and the routes and duration of exposure (Granchi *et.al*., 1998; Martelli & Moulis, 2004)

During the last decades, the increasing demand of food safety has stimulated research regarding to the risk associated with consumption of food stuff contaminated by pesticides, heavy metals and/ or toxins (D'Mello, 2003). Heavy metals in general are not biodegradable and have long biological half lives and the potential for accumulation in the different body organs leading to undesirable side effects (Luckey & Venugopal, 1977; Jarup, 2003 and Sathaware *et.al*. , 2004).For example, cobalt is an essential component of vitamin B_{12} which is intermediary metabolism nucleic acid synthesis and single carbon metabolism (Allen ,1996) .However, severe exposure to cobalt can be toxic and caused heart damage allergic dermatitis ,polycythemia due to increases the erythropoieses in loonemansow,ticulocytosis, interstitials, tissues and DNA damage (Linna *et.al* , 2004; Diepgen *et.al* , 2005).

Lead and cadmium are the most toxic abundant heavy metals present in foods. Etiology studies included a number of diseases related to lead and cadmium especially hematological changes, and impair some organ's fanchon, kidney, nervous as well as bone diseases (Vetter, 1993; WHO.1995 and Jarup, 2003). In addition they are also implicated in causing carcinogenesis, mutagenesis and teratogenesis (Binder *et.al*. , 1996;Pitot & Dragan, 1996 and Hazard , 2002). Lead serves no biological purpose and replaced calcium in tissue and bone. Lead inhibits the biosynthesis of heme and thereby affects the membrane permeability of kidney, liver and brain cells (Forstner & Wittman, 1983). Chronic lead exposure is associated with anemia, hypertension, muscular pain, chronic nephritis and neuropothy of both central and peripheral nervous system (Wallace, 2001 and Hengsteir *et.al*., 2003). Moreover, lead exposure can produce chromosomal, aberration, cancer and birth defects (Johnson, 1998).

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The US-EPA (1991) classified lead in group B_2 carcinogens.

Cadmium toxicity may be manifested by renal dysfunction (Navas-Acien *et.al,* 2005), human hypertension (Piperaki, 1985) and hepatic injury (Staessen *et.al*., 1999).

On the other hand, excess of cadmium in foods causes abnormalities in calcium metabolism (Bhattachary *et.al*., 1996).Also,oral exposure to cadmium interferes with iron metabolism and causes RNA and DNA damage (Hengstier *et.al*.,2003 and Martelli & Moulis,2004). The IARC (1993) classified cadmium and cadmium compounds as class 1 human carcinogens.

Copper (Cu) and zinc (Zn) are essential metals that are usually accumulate in both plants and animals tissues (Demirbas, 2001). They have an important role in biochemical and physiological functions to maintaining health throughout the life where as, zinc deficiency results in a variety of immunological defects whereas copper deficiency led to anemia as well as neutrogena and skeletal abnormalities (Linder & Azam, 1996). A high supplementation of Cu had been related with liver damage (FDA, 2001). Moreover, Cu and Zn are widely available in food and can come from both plant and animal sources (FDA, 2001; Goyer & Clarkson, 2001).

Most of the chromium (Cr) present in food is in the essential trivalent from Cr (111), when the hexavalent form of chromium Cr (VI) is toxic but is to normally found in food (Ministry of Agriculture, Fisheries and Food, 1998). The main contributors to chromium intake are spices, yeast, liver, egg yolk, meat, poultry, beverages, dairy products and cereals (Moll & Moll, 2000). No international standards or guidelines exist for chromium, mercury or nickel so background values for vegetation have been incorporated (Lake, 1987).

The publicity regarding the high level of heavy metals in the environment has created a certain apprehension and fear in the public as to the presence of heavy metal residues in their daily food. The public is confused and alarmed about their food safety (Radwan and Salama, 2006).

Keeping in view of the potential toxicity. Persistent nature and cumulative behavior as well as the consumption of vegetables and fruits, it is necessary to test and analyze these food items to ensure that the levels of these contaminants meat the agreed not exceed the permissible levels. Regulor survey and monitoring programmes of heavy metal contents in foodstuffs have been carried out for decades in most developed countries (Milacic and Kralj, 2003; Saracoglu *et.al*; 2004).However, there are no available data for heavy metals content of some Egyptian foods available in the local market (Mesallam, 1987, Abou-Arab *et.al*.; 1999, Abou-Arab; 2001, Dogheim *et.al*.;2004 and Srour and Wehabe;2006)

Because of toxicity of metals, knowledge of intake of metals is essential for establishing regulatory issues. Therefore, it is of great importance for health regulations to determine the status of metal contamination, this study therefore presents data on the level of heavy metals (nickel,cobalt,zinc,copper,cadmium,lead, chromium and iron) in selected food groups sold in the local markets of Alexandria and EL-Gharbia governorates. This information could be useful in assessing the amounts of heavy metals ingested through eating antinutritional affected of heavy metals.

MATERIALS AND METHODS

MATERIALS

Sampling

A total of 320 different food samples (meat, fish, grain beverages, vegetables, fruits, dessert, grain, beverages, vegetables, fruits, dessert,sugar,milk,dairy-products,spices,and others) were collected at random from local markets of Alexandria and EL-Gharbia governorates during years of, 2005-2006. The samples were purshed for different districts along Alexandria and EL-Gharbia governorates. Sampling (3Kg for each commodity from where foodstuffs examined were scattered through out the governorates. For the analysis only the edible portions were included. Whereas ,bruised or rotten parts were removed.

METHODS

Sample preparation and determination of heavy metals

The samples were processed for analysis by the dry ashing method according to AOAC, (2000). The dried samples were powdered in a mixer grinder. Three powdered samples (5g, each) with two replicates for each food item were accurately weighed in crucibles and few drops of concentrated nitric acid were added to the solid as an ashing aid. Dry ashing process was carried out in a muffle furnace by stepwise increase of the temperature up to 550^0C and then left to ash at this temperature for 6h. The ash was rinsed with 1M nitric acid. The ash which dissolved was filtered into a 50 ml volumetric flask using whatman filler paper No.41 and the solution was completed to the mark with nitric acid (1M).

Analysis for heavy metals concentration namely nickel (Ni), cobalt (Co), zinc (Zn), copper (Cu), cadmium (Cd), lead (Pb) and iron (Fe) of interest were performed using Atomic Absorption Spectrophotometer

(Model Thermo Elemental 300VA, UK). The concentration was expressed as mg/ Kg dry weight sample (International Accreditation Criteria For Laboratories Performing Food Chemistry Testing, 1999).

Statistical analysis

The analyses were carried out in three replicates for all determinations. The means and standard deviation of means were calculated. The data were analyzed by one-way analysis of variance (ANOVA). A multiple comparison procedure of the treatment means was performed by Duncan's New Multiple Range Test. Significance of the differences was defined as $P<0.05$(SAS, 1994).

RESULTS AND DISCUSSION

Levels of heavy metals in some Egyptian foods

Data presented in table1. indicate the mean concentrations of nickel in some Egyptian foods collected from different governorates. The highest concentrations of nickel (Ni) was detected in chicken fillets (1068.4 ±0.1mg/ Kg) followed by wheat flour (969.0 ±1.0 mg/ Kg), rocket (845.8±0.1mg/ Kg), bread crumbs (557±1.0mg/ Kg) chicken shawerma (531.2±0.4 mg/ Kg),cinnamon (525.4 ±0.4 mg/ Kg) ,hot chicken stick (293.6±1.3 mg/ Kg), grilled chicken (227.4 ±0.1mg/ Kg) and chicken luncheon '1' (193.2± 0.9 mg/ Kg) The high level of Ni in the samples could be due to contamination during handling and processing. The high contamination found in some fruits and vegetables might be closely related to the pollutants in irrigation water, farm soil or due to pollution from the highways traffic (Igwegbe *et.al*., 1992; Qiu *et.al*., 2000).

There is some evidence that small amounts of nickel are essential for methyl metabolism and iron, calcium and zinc absorptions and to produce red blood cells (Alomar *et.al*., 1985). However , in excessive amount can become mildly toxic and can be nepherotoxic , hepatotoxic , respiratory toxicity , immunotoxic, teratogenic and mutagenic (Kawanishi *et.al*., 2002 ; Doreswamy *et.al*., 2004 and Sidhu *et.al*.,2004) . Inhalation of nickel compounds can cause allergic necrosis and lung cancer (Diepgen *et.al.*, 2005 and Saraha & Williams .2005).

Jorhem *et.al*. ,(1989) found that nickel ranged from less than 0.010-0.015 mg/ Kg in liver and meat to Swedish cattle , Also, Ellen *et.al*., (1989) reported that the average content of nickel of cattle and sheep was below 0.01 mg/ Kg .

The main contributors to nickel intake are fish,vegetables, meat, poultry, eggs and cereals (Moll& Moll, 2000).

Stainless steel cooking utensils release nickel in cooked foods and sometimes the levels reached > 1000 ug /kg in meat (Dabeka & Mckenzie, 1995).

Also,Table1. revealed that mean concentration lof cobalt (Co) in all tested foods was higher than the permissible limits according to WHO (2000). The carrot had the highest mean Co concentration (35.2±0.2 mg/Kg) followed by chicken shawerma, milk butter, cookies, laurel leaf, cream, fresh onion, tomatoes and potatoes were 32.6 ,31.2, 31.0, 29.6, 26.4, 25.8, 23.2 and 23.0 mg/ Kg, respectively. The levels show undetectable level of Co in the following samples: hot chicken stick, beef meat, pie-cookies, biscuits, some beverages (e.g. sahlab, coffee and tea). Some vegetables (e.g.green coriander,black bean and rocket), apricot jelly, halawa tehenia, traceale, milk, ghee, vegetar spiced coating mix, guava, ketchup, potato chipsy and salt. Cobalt is the central element of the vitamin B_{12} (Cyanocobalamin)cobalamin, which plays an important role in human health. (Moè *et.al.*, 2003) Cobalt levels in individual food composites are generally low. The main contributors to cobalt intake are dairy products, fish and crustacean's condiments, oil and sugar (Moll & Moll, 2000).

Zinc is an essential element for human health but high level exposure of zinc can be harmful and Joint Evaluation of certain food additives(JECFA)has recommended 60 mg/ day (WHO, 1982). Data in Table 1.proved that the highest mean concentration of Zn was detected in beef meat, chicken finger, green fenugreek and spleen, which was recorded as 1295.4±0.4, 1172.2±0.2, 1165.4±0.1 and 1021.4±0.4mg/ Kg. respectively. These results agree with those obtained by Ysart *et.al*., (2000) who reported that zinc concentration was high in the carcase meat and offal's meat (both 52 mg/ Kg). It is apparent that almost the samples collected from Alexandria and EL-Gharbia governorates contained higher concentration of Zn than the permissible limits of FAO (1983). Abraham *et.al*., (1998) reported that Zn content in muscle of buffalo from Madras veterinary college and market samples were 22.29 and 33.2 mg/ Kg, respectively.

While Zn concentration level could not be detected in fish, biscuits, orange beverages powder, coffee, garlic, sugar, honey, cream, milk butter, hot pepper and ketchup. These results were confirmed, which clearly showed that the differences were detected among the samples collected. Mehary *et.al*., (1999) reported a mean Zn concentration of 1390 mg/ Kg with an extreme value of 23731 mg/ Kg for tubers, while Radwan & Salama (2006) indicated that the maximum quantity of zinc was detected in spinach (20.9 mg/ Kg) while apple had the lowest concentration (1.36mg/ Kg).

Also, the same authers showed that Cu and Zn are essential elements for plant and animal, but slight increase in its level may interfere with physiological processes. Sufficient Zn is essential to neutralize the toxic effects of Cd.

The main contributors to copper intake are cereals, fish, meat, poultry, eggs, vegetables and beverages (Moll & Moll, 2000).

Copper is an essential element, but can be toxic at high levels of exposure (Ysart *et.al*, 2000). A part from its function as a catal. The maintenance of a healthy central nervous system, prevention of anemia, and is interrelated with the function of Zn and Fe in the body (Akinyele & Osibanjo ,1982) .

The results clearly indicate that the fresh onion, tomatoes, potatoes, banch chicken breast meat, green fenugreek and tea samples examined curing this study contained the highest concerned the highest concentrations of copper, which showed a mean values of 182.2, 152.6, 141.6, 120.8, 105.6 and 103.6 mg/ Kg, respectively. It is noticed from the data, that black bean , breadcrumbs, guava, chicken nuggets, chicken sausage and chicken finger samples contained a larger amount of Cu 98.8, 96.4, 95.2, 93.6, 93.0 and 90.2 mg/ Kg than the other samples. Copper is present in most foods, with offal and nuts containing the highest concentrations (Ysart *et.al.*, 2000). Also, they reported that mean copper concentrations in the nuts and offal group were 8.5 mg/ Kg and 50 mg/ Kg respectively, while mean concentrations in other food groups ranged from 0.05 mg/ Kg to 2.1 mg/ Kg.

The present study revealed that Cu was not detected in some samples. Beef meat, rice, coffee, garlic, sugars, apricot jelly, halawa tehenia, honey, cream, milk, ghee, ketchup ad salt samples were free of copper. The United States public Health service limiting value is 1.0 mg/kg Cu and the United States Environmental Protection Agency found 220 ug/kg Cu in 74.4% of all water samples collected in the United States (Kopp & Kroner, 1969).

Generally, plants contain the amount of Cu which is inadequate for normal growth of plants. Application of micronutrient fertilizers and copper based fungicides may sometimes increase it to the alarming levels (Radwan & Salama, 2006). Also, they reported that the highest amount of Cu was found in date and the lowest in potatoes.

Cadmium is present at low concentrations in most foods. The main contributors to cadmium intake are dairy products, meat, poultry and egg, fish and crustaceans and vegetables (Moll & Moll, 2000).

The present study revealed that the mean concentration levels of cadmium in potato chips, beef meat, orange beverage powder and rice were 8.2, 7.4, 7.4 and 6.4 mg/ Kg, respectively. Table1. shows that the level of Cd in cookies, sahlab, milk, traceal and milk butter were 5.6, 5.6, 5.6, 5.2 and 5.2 mg/ Kg, respectively.

Cadmium was found at mean levels of 0.086 ppm in sardine and 0.077 ppm in mackerel, which are comparatively much lower than levels of the other detected metals (Abou-Arab *et.al* ., 1996) Cadmium is present at low concentrations in most foods with those that are consumed in larger quantities making the greatest contributions to the population dietary exposure of 0.012 mg/ day (Ysart *et.al.*, 2000). Cadmium is considered to be one of the most toxic metals. In addition, it is implicated in high blood pressure (Perry *et.al.*, 1979). Prostate cancer, mutations, display and foetal (embryonic) death (Pitot & Dragan, 1996).

The main contributors to lead intake are beverages , fruits and vegetables , cereals and cereal products , meat products (game , edible offal) and fish , dairy products and eggs (Moll & Moll ,2000) .

The obtained results in Table1. showed that lead in the chicken luncheon (2) , milk , wheat flour , green fenugreek , cream cheese , spleen and coffee samples showed the highest mean concentration of 87.28 , 51.4 , 43, 40.8 , 37.8 , 36.6 and 36.2 mg/ Kg respectively , followed by tea , rice , milk butter , chicken nuggets , chicken fillets , chicken finger and beef meat being 31.8 , 30.2 , 29.4 , 28.50 , 28.50 , 28.20 and 27.6 mg/ Kg respectively. These levels are higher than the permissible limits of WHO (2000). So our results agreed with those reported by Boulis (1993) who noticed a high Pb concentration in cattie muscle and liver, it is noticed that level of lead in animal products was the highest compared with an other samples(Gough,1993).

The maximum concentration of lead which is prepared foods specifically intended for babies or young children is 200 ug/Kg, FAO/ WHO (CIFA, 1992). Exposure to lead is of concern mainly because of possible detrimental effects on intelligence.

Studies on exposure to lead and children's intelligence have indicated an adverse effect of low level lead exposure on neurophysiologic development (WHO, 1995).

Radwan & Salama (2006) showed that the level of Pb in all commodities were between 0.01 mg/ Kg in potatoes and 0.87 mg/ Kg in strawberries with ranges of 0.007-0.012 and 0.17-1.08,respectively. Also they reported that within the selected fruits, the highest concentrations of Pb were noticed in strawberries followed by peach melon and date. Among vegetables, the leafy vegetables (lettuce) and cucurbits (squash and watermelon) showed high Pb levels.

Mean Pb and Cd levels were respectively ,19.3 and 3.3 mg/ g for meats 8.4 and 4.1 mg/ g for vegetables , 14.9 and 0.58 mg/g for fruits and desserts , 9.6 and 0.53 mg/ g for juice and drinks and 32.8 and 33.6 mg/ g for dry infant cereals (Dabeka & Mckenzie ,1988).

The results presented in Table1. show that the highest mean concentrations of Cr were found in ketchup, tea, grilled chicken and ghee (104.0, 69.8, 46.6 and 45.8 mg/ Kg, respectively). The results also indicated higher concentrations in the cream biscuits , peanuts , apricot jelly , tomatoes , breadcrumbs , traceale and rice (43.8 , 40.2 , 37.6 , 37.0, 34.2 , 33.8 , 32.6 and 32.4 mg/ Kg , respectively) . Chromium was not detected in cocoa, orange beverages powder and laurel leaf samples. Ysart *et.al*., (1999) reported that relatively high chromium concentrations found in the oils and fats, milk, dairy products and nuts groups.

In general, the detected metals in abnormal high concentrations in most samples, this may be attributed to the aggregate amounts of these metals from different sources,e.g. Pesticides, fertilizers and polluted water from different industries which make them to be exist in the water resources (Zidan *et.al*.,2002) .

The Cr and Pb concentrations in fish muscle tissues were 0.245 and 0.348 Ug/ g, respectively (Altmdag & Yigit, 2005).

The main contributors to chromium intake are spices, yeast, liver, egg yolk and meat, poultry, beverages, dairy products and cereals (Moll & Moll, 2000).

Human beings are encouraged to consume more vegetables and fruits which are a good source of vitamins, minerals, fibers and also beneficial to their health. However, these plants concentrations. It is well known that plants take up metals by absorbing them from contaminated soils as well as from deposits on parts of the plants exposed to the air from polluted environments (Khairiah *et.al*, 2004; Chojnacha *et.al*, 2005).

The data in Table1. also show that processed products appear to contain high levels of Fe. The results show that the levels of Fe in all commodities were between 32.6±0.2 mg/ Kg in black bean and 1692.8±0.2 mg/ Kg in potato. Within the selected foods, the highest concentrations of Fe were noticed in potatoes followed by green pepper, chicken kofta, halawa tehenia, grilled chicken, traceale, biscuits and chicken finger. Among the processed foods (hot chicken stick , banch chicken breast meat, chicken nuggets, breadcrumbs) , vegetables (green coriander, fresh onion and tomatoes) and another groups (salt , ghee , tea and bread)showed high Fe levels . These values were above normal levels of Fe and Zn in broccoli (that being 66mg/ Kg and 45mg/ Kg, respectively) according to Houba& Uittenbogaard (1994).

These results may be explants by the similarity of soil and agricultural conditions. Since tea plant is able to grow in very acidic soils where Fe and aluminum are readily available for uptake by the roots. The absorbed metal normally accumulated in tea leaves (Lewis, 1990). Iron was found at mean levels of 5.09 ppm in mackerel and 4.91 ppm in sardine (Abou – Arab *et.al.,* 1996), while Szefer & Falandysz (1983) found that a mean level of iron in fish samples was 13.5 ppm.

Levels of heavy metals in some Egyptian Bread samples from different areas

Results for the determination of heavy metals (Co, Zn, Cu, Cd, Pb, Cr, Ni and Fe) residues in bread samples which collected from different area in Alexandria governorate are shown in table (2). All values are reported as mg/ Kg.

The data from this study indicated that the highest nickel (Ni) content (589.2; 279.2; 205.6 mg/Kg) was found in Shamy bread whereas the lowest Ni content (3.2and 115.8mg/kg) was found in white bread. The high contamination found in most other bread samples might be closely related to the pollutants in handling the bread, food additives, processing treatments which occur on the wheat (e.g. milling, blending, baking, grinding), locations (industrial area or rural area) or due to pollution from the high way traffic .

The present study revealed that the mean concentration levels of Co in bread samples ranged from 11.4±0.1- 0.4±0.2 mg/Kg, on the contrary. Three samples were found free of co residues. The highest mean concentration of cobalt was found in brown bread (sample No.1) (collected from vegetable market in Alexandria governorate).

Zinc is an essential element for human health, However, high levels of exposure to zinc can be harmful (Ysart *et.al*., 2000). The results in Table (2) clearly indicated that the bread samples examined during this study contained the highest concentration of zinc, the samples of bread collected from different area in Alexandria governorate showed Zn ranging from 775.4±0.3 to 41.4±0.2 mg/Kg. The obtained results revealed that Zn concentrations in all examined bread samples were higher than permissible limits according to FAO (1983).

Copper was found at the highest mean concentration in Shamy bread sample (No.3) 241.0 mg/Kg, while the

lowest concentration was detected in white bread Sample (No.2) 2.4±0.2 mg/Kg.

Cadmium is present at low concentrations in most foods with those that are consumed in larger quantities marking the greatest contributions to the population dietary exposure of 0.012 mg/Kg (Ysart *et.al*, 2000). Table2. shows that the samples of bread samples collected from different area showed Cd ranging from 1.20 to 3.60 mg/Kg. On the contrary, three bread samples were found free of Cd residues.

Exposure to lead is of concern mainly because of possible detrimental effects on intelligence. Studies on exposure to lead and children's intelligence have indicated an adverse effect of low level lead exposure on neurophysiologic development changes (WHO, 1995).

The present study has shown that Pb was found in all collected bread samples showed Pb ranging from 45.86 to 7.9 mg/Kg. The levels of Pb are higher than the permissible limits of WHO (2000).

It is noticed from the data in table 2. that the bread samples contained a larger amount of chromium, which ranging from 8.70 to 1.60 mg/Kg. The lowest concentration was detected in Shamy bread sample (No.2), on the other hand, white bread sample (No.1) was found to have the highest concentration (8.70mg/Kg). However, chromium levels in the bread collected from the highway traffic were higher than the permissible levels proposed by FAO (1983).

The main contributors to iron intake are animal products, cereals, fruits and vegetables (Moll and Moll, 2000). Numbers of factors influence the concentration of heavy metals on and within plants. These factors include climate, atmospheric deposition, the nature of the soil on which the plant is grown and the degree of maturity of the plant at the time of harvesting (Scott *et.al*., 1996). The nature of the soil is the most important factors in determining the heavy metal content of food plants (Itanna, 2002). However, the heavy metal content in plants can also be affected by other factors such as the application of fertilizers, sewage sludge or irrigation with waste water (Devkota & Schmidt, 2000).

The results in Table 2. show that the high concentrations of Fe were noticed in on of Shamy bread sample 0.3 followed white bread sample(No.3), brown bread sample (No.1) and another sample of brown bread. Among, the samples which were collected from crowed area by peoples and cars showed high Fe levels. The results showed that the levels of Fe in all commodities were between 1646±0.1 mg/Kg in Shamy bread and 51.2±0.2 mg/Kg in another Shamy bread which collected from another area during this study.

The present study provides additional data on heavy metals pollution in Egypt and also can help in risk assessment of consumer exposure to the expected heavy metal levels. It is therefore suggested that regular survey of heavy metal should be done on all another food commodities especially infant and children foods in order to evaluate whether any health risks from heavy metals exposure do exist to assure food safety and to protect the user from food that might injure their health.

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الملخص العربي

بعض المعادن الثقيلة فى الأغذية المصرية

سامية الصافى فرج – سميحة محمد السيد

تلوث البيئة أصبح من أكثر المشاكل أنتشاراً على مستوى العالم ويندرج تحته التلوث بالمعادن الثقيلة لذلك أجريت هذه الدراسة لتحديد مستوى بعض المعادن الثقيلة مثل:– النيكل– الكوبلت – الزنك – النحاس – الكادميوم – الرصاص – الكروم — الحديد فى بعض الأغذية المصرية المختلفة (والتى يتم بيعها فى السوق المحلى) بمحافظة الاسكندرية والغربية. تم جمع العينات وتحضيرها واعدادها للقياس بواسطة جهاز الامتصاص الذرى الطيفى وقد أوضحت النتائج المتحصل عليها ان متوسط تركيز المعادن الثقيلة كان أعلى مقارنة بالحدود المسموح بها(FAO 1983, WHO 2000 , FDA 2001).

أيضاً وضحت الدراسة وجود معادن ثقيلة بنسب مختلفة فى العينات المحلية التى تم دراستها وهذا سوف يؤثر على الصحة العامة.