Annals Agric. Sci., Ain Shams Univ., Cairo, 49(1), 177 - 190, 2004

FLUORIDE CONTENT OF SOME EGYPTIAN NATURAL FOODS

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ABSTRACT

The study aimed to determine the fluoride concentration in the food items consumed mainly by the Egyptian population in order to ensure the importance of natural sources of fluorine. Samples of vegetables, fruits, cereals, Legumes and some sources of animal protein (meat, poultry, fish, egg, white chease and cow's milk) were collected from ten governorates (Cairo, Giza, Kaliobia, Fayoum, Menia, Mansoura, Alexandria, Marsa-Matrouh, Ismailia and port–Said). Also some beverages (Tea, coffee, anise, tilia, carawy, karkadeh, peppermint and sugar cane) were prepared. Results indicated that fluoride concentration vary in the different food groups, the fluoride contented in vegetables was variable, some vegetables contain high fluoride content like parsely, green pepper, spinach and cabbage, while, carrots, tomato, molokia and green onion contained intermediate fluoride content whereas, Kolkasia, green bean, onion, cucumber, squach, okra and peas had low fluoride content, Banana and Guava attained the highest fluoride concentration, while plum, pomegranate and peach had intermediate fluoride values, whereas, grape, cantaloupe, water-melon, orange, mandarin and lemon scored the lowest fluoride concentration. Cereals and legumes contained low fluoride concentration except rice that contained high fluoride concentration. Beverages prepared from medecinal plants can be considered as natural and safe source of fluorine, samples of tea, coffee, anise, tilia and karawy contained high fluoride concentration, while karkadeh and peppermint contained low fluoride content. Samples of meat, fish and egg contained high fluoride concentration while poultry and white cheese scored an intermediate fluoride content, whereas cow's milk had lower fluoride content The previous results revealed that the proper use of fluoride remains the best defense against dental carries, so, it is recommended to use banana, guava and egg for the nutrition of infants, also, it is desirable to use the water of boiled rice and to prepare karawy and tilia for infants which are mainly fed on milk so as to prevent dental caries. It is necessary to take moderate quantity of tea and coffee daily to prevent dental caries and low density bones.

Key words: Health, Fluoride, Natural foods

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(Received February 26, 2004)
(Accepted April 28, 2004)

INTRODUCTION

Fluoride is classified by the Food and Nutrition Board, **(National Research Council, 1971 and National Academy of Science, 1974)** as an essential trace element in human nutrition. Dental caries is a major dental disease affecting the lives of a large proportion of the inhibitants of the world. It impairs the quality of life for many people by causing pain and sepsis and lack of treatment can aggravate other systemic diseases. Dental caries is a disease in which factors interact to produce irreversible destruction of the hard tissues of the teeth-namely, enamel, dentine and cementum. Despite continuing efforts to develop methods of lowering the number of bacteria on teeth by mechanical means or of reducing their cariogenic activity with chemical agents **(Leukhart (1979 and Royal College of Physicians (1976)** the proper use of fluoride remains our best defense against dental decay.

The prevention of dental caries has attracted the attention of many researchers **(Nowak and Anderson, 1990; Rock, 1990; Newbrun, 1992; Abd El-Latif, 1994 and El-Awamry *et al* 1998).** Prevention of dental caries by fluoride is considered to be one of the most successful method in caries reduction **(Dijkman *et al* 1986).** Fluoride's abundance in soil plants means that everyone consumes fluoride, whether he wants to or not. Absorption of fluoride from the diet, however, can vary from one individual to another. Some foods concentrate additional fluoride ions from boiling and processing.

Fluoride ion concentration levels, in various food items vary widely, even between samples of the same kind of food **(Waldbott, 1963).** Apart from the systemic disorders mentioned earlier, absorption of fluoride is hindered if calcium, magnesium, or aluminium ions are present, because these cations can "bind " F **(Whitford, 1992).** In this concern, **Toth, (1975),** calculated the amount of dietary fluoride needed to substitute for the total fluoride contributed by drinking water. His calculations were based on body size, caloric intake, fluoride derived from foods of three age groups: for infants less than 2 years of age (10 kg) the optimal dose of fluoride was 0.45 mg / day. For children 7-9 years (24 kg) the dose was 0.77 mg / day and for adult (65 kg) the dose is 1.45 mg / day.

Older, frequently estimates the daily fluoride intake from food and beverage for an adult male have included 1.0 – 3.0 mg **(Massier and Rose, 1972).**

Hattab and Wei (1988) suggested that the general decline and dental caries may be due to fluoride supplemented from food and beverage processed with fluoridated water. The optimal percentage of fluoride in communal water supply to prevent dental caries without producing mottling of the enamel was found to be 1ppm **(WHO, 1970 and Barnes, 1983).** It reduces dental caries by approximately 60% **(National Academey of Sciences, 1974).** This is achieved by a daily fluoride intake of 0.5 to 1mg F/day in children and of 1. to 1.5 mg F/ day in adults **(WHO, 1984).**

Fluoride intake by human is a result of ingestion of water, food and inhalation of air containing fluoride **(WHO, 1984).** Several thorough reviews concerning the fluoride content of foods have been presented **(Kumpulainen & Koivioinen, 1977 and Becker & Bruce, 1981).** Water and food are the main sources of fluorine

intake and the amount of fluorine absorbed by the body is related to the amount of water and type of food ingested by the individual (**Osis *et al* 1974 and Hattab & Wei, 1988**). Because of the widespread distribution of fluoride in nature, it has not been possible to produce a diet that is completely deficient in this element, and its presence indicates some physiological importance to man (**Waldbott, 1963**).

Burt (1999) and Levy (1994) stated that the dietary fluoride intake by man has received attention for many years. The daily dietary fluoride intake based on the fluoride content of various food items prior to fluoridation of water.

The mechanism by which fluoride can decrease the incidence of dental caries can be summarized in the following

1- Replacing the hydroxyl group of the hydroxy apatite crystals present in the surface enamel by ionic exchange forming fluoroapatite which is less soluble in acids (**Shafer *et al* 1963**). Fluoride was credited with being the element responsible for the unique hardness of enamel (**Glenn *et al* 1984**).
2- Fluoride reduces the bacterial ability to ferment carbohydrate and to produce acids through its direct antimetabolic effect on plaque micro-organism (**Svanberg and Westergen, 1983**).
3- Fluoride may also interfere with the action of bacterial enzymes in the breakdown of fermentable carbohydrate into organic acid (**Eggen and Rolle, 1983**).
4- Fluoride can interfere with the tendency of plaque to adhere to the tooth surface by decreasing its surface energy (**Dejong *et al* 1984**).
5- Fluoride has the ability to precipitate minerals from saturated solution, so it favours the precipitation of calcium phosphate from saliva on enamel surface. Thus, it aids in post eruptive maturation of enaml as well as in the remineralization of partially demineralized enamel in early caries (**Joyston and Kidd, 1982**).
6- Also, fluoride may alter the morphology of the teeth in areas with high fluoride ions content in its drinking water, the teeth in these areas are smaller in size with shallower fissure and low cuspheight (**Levine, 1976 and El-Molla, 1991**).

The aim of this study is to determine the fluoride concentration in food items mainly consumed by Egyptian population to supply some of the needed information related to fluorine ingested within an average Egyptian diet. This will be beneficial in studying and planning preventive measures of dental caries particularily.

MATERIAL AND METHODS

1- Sampling

1-1- Vegetables

Composite samples of water- cress, parsely, green-pepper, spinach, dill, leek, cabbage, potatoes, carrots, tomato, molokia, raddish – leaves, lettuce, green onion, kolcasia, green-bean, onion, cucumber, raddish-root, squash, okra, cauliflower and peas of 1 kg were collected during the year 2002 – 2003 from 3 different locations of each of 10 governorates : Cairo, Giza, Kaliobia, Fayoum, Menia, Mansoura, Alexandria, Marsa-matrouh, Ismailia and Port–Said during the months

of their production (30 composite samples of each / month).

1-2- Fruit

Composite samples of banana, guava, plum, pomegranate, peach, grape, cantaloupe, water-melon, orange, mandarin and lemon of 1 kg were collected from 3 different locations of each studied governorates during the months of their production (30 composite samples of each/ month).

1-3- Cereals and Legumes

1-3-a- Cereals

1 Kg of each type of rice, wheat and maize were collected from 3 different locations of each studied governorates for five months (30 composite samples of each / month).

1-3-b- Legumes

1 Kg of each type of lupin, lentil, peas, cow pea, chiek peas, beans and french beaws were collected from 3 different locations of each studied goverenates for five months (30 composite samples / month).

1-4- Beverages

Five samples of tea, coffee, anise, tilia, caraway, karkadeh and peppermint were collected from 3 different locations of each studied governorate for five months (30 composite samples of each / month).

1-5-a- Preparation of samples

The required vegetables, fruits, cereals and legumes were washed by spraying with clean distilled water to get rid of any dust. Then, it was dried in oven at 40°C. The purified clean parts were kept in clean plastic vessels in refrigerator till analysis.

1-5-b- Preparation of beverages

Tea, coffee, anise, tilia, caraway, karkadeh and peppermint were prepared using distilled water as follows; 200 ml boiled distilled water was added to 2 gm of each sample for 10 min, cool and then filtered. Filtrates were kept in plastic bottles in refrigerator till analysis. Sugarcane is used as fresh juice.

1-6- Source of Protein

1-6-a- Meat

Fresh sample of cow's meat of 1 Kg was collected monthly from markets of the 10 selected governorates (120 samples/year). The meat samples were boiled in distilled water for 30 min and then kept in refrigerator till analysis.

1-6-b- Chicken and fish

Composite fresh samples of chicken fillet and fish fillet of 1000-1500g were collected from 3 different locations of each studied governorates during the year 2002-2003 (120 samples of each / year). The samples were boiled in distilled water for 15 min and then kept in refrigerator till analysis.

1-6-c- Whole eggs

One sample was collected from each of the ten governorate every other month. One sample is composed of 9 eggs collected randomly from 3 farms, i.e. 3 eggs

from each farm (30 composite samples / year). Egg samples were boiled in distilled water for 10 min.

1-6-d- White cheese

Composite samples of white cheese of 1000-1500 g was collected from 3 different locations of each studied governorates during the 2003 (120 samples / year) and kept in refrigerator till analysis.

1-6-e- Cow's milk

Bulk sample of 1000 ml were collected monthly from cow's herds at farms situated in the 10 selected governorates (120 samples all over the year 2003). The samples were kept frozen till the day of analysis and then they are left to reach room temperature.

II- Determination of fluoride

Fluoride concentration in all foods was determined according to **(McQuaker and Gurney, 1977)**. The food samples were dried at 105°C, homogenized and 0.5 gm of the prepared sample was weighed and transferred to a nickel crucible. 6.0 ml of sodium hydroxide solution (670 g / L) was added and then placed in an oven set to 300°C. The temperature was then raised to 600°C and the sample was fused at this temperature for 30 min. After the sample had been removed from the muffle furnace and allowed to cool, 10 ml of distilled water was added to the sample. Next, about 8 ml conc H cl was added so as to adjust the pH to 8-9. The sample had cooled, transferred to a 100 ml volumetric flask, diluted to volume and then filtered through whatman No. 40 filter paper and the fluoride was analyzed using ATI Orion 960 (ion meter) using fluoride ion selective electrode 96-09 BN. The electrode filling solution and the total ionic strength adjustment buffer solution (TISAB)were prepared as described in the electrode instruction manual.

RESULTS AND DISCUSSION

1- Fluoride concentration in some vegetables

Table (1) shows the levels of fluorine in 23 fresh vegetables collected from 10 governorates during 2002-2003 .There were no trend in the fluorine contents of most vegetables. Results of Table(1) show that water-cress, parsely green pepper, spinach, dill, leek and cabbage are amongst the greatest sources of fluorine ranging from (2.1-2.3), (1.2-1.6), (1.3-1.6), (0.76-0.97), (0.89-1.2), (0.66-0.79) and (0.70-0.87) mg/kg fresh weight, respectively. Whereas, carrots, tomato, molakia, raddish-leaves, lettuce and green onion have generally intermediate fluorine concentrations ranging from (0.62-0.76), (0.52-0.71), (0.49-0.59), (0.59-0.68), (0.40-0.55) and (0.39-0.42) mg/kg fresh weight, respectively while kolcasia, green bean, onion, cucumber, raddish-root, squash, okra, cauliflower and peas, have low fluorine concentrations ranging from (0.32-0.38), (0.24-0.35), (0.25-0.28), (0.25-0.32), (0.25-0.39), (0.23-0.38), (0.17-0.23), (0.36-0.46) and (0.21-0.30) mg/kg fresh weight, respectively. Many studies in different parts of the world have confirmed the close relationship between fluoride and dental caries. Several reviews concerning the fluoride content of vegetables have been studied by **(Toth & Sugar, 1978; Becker & Bruce, 1981; Koivistoinen, 1980 and Abd El-Latif, 1994)**. Various values for

Table 1. Fluoride concentrations as mg/ kg vegetables* in 10 governorates of Egypt

Item \ Location	Cairo	Giza	Kaliobia	Fayoum	Menia	Mansoura	Alex.	Marsa-Matrouh	Ismailia	Port-Said	Range
Water-cress	2.30	2.22	2.15	2.25	2.19	2.20	2.19	2.21	2.23	2.15	2.15-2.30
Parsely	1.25	1.23	1.40	1.42	1.50	1.21	1.30	1.41	1.61	1.56	1.21-1.61
Green-pepper	1.34	1.64	1.47	1.43	1.51	1.52	1.57	1.80	1.65	1.65	1.34-1.80
Spinach	0.91	0.86	0.89	0.97	0.76	0.73	0.92	1.0	0.88	0.87	0.73-0.97
Dill	0.91	0.90	0.89	0.99	0.89	0.97	0.99	1.11	1.01	1.21	0.89-1.21
Leek	0.72	0.66	0.75	0.79	0.78	0.66	0.67	0.73	0.69	0.78	0.66-0.79
Cabbage	0.70	0.78	0.72	0.80	0.76	0.79	0.87	0.83	0.79	0.76	0.70-0.87
Potatoes	0.62	0.69	0.70	0.72	0.71	0.63	0.75	0.70	0.76	0.71	0.62-0.76
Carrots	0.62	0.61	0.59	0.59	0.61	0.52	0.58	0.66	0.71	0.68	0.52-0.71
Tomato	0.52	0.57	0.52	0.56	0.57	0.52	0.49	0.59	0.56	0.52	0.49-0.59
Molokia	0.59	0.62	0.61	0.64	0.66	0.61	0.62	0.67	0.68	0.66	0.59-0.66
Raddish-Leaves	0.59	0.58	0.58	0.59	0.56	0.57	0.64	0.68	0.67	0.56	0.56-0.68
Lettuce	0.45	0.55	0.53	0.40	0.51	0.43	0.49	0.55	0.45	0.49	0.40-0.55
Green onion	0.42	0.41	0.39	0.42	0.39	0.40	0.39	0.42	0.42	0.41	0.39-0.42
Kolcasia	0.37	0.33	0.35	0.32	0.37	0.36	0.37	0.38	0.32	0.36	0.32-0.38
Green-bean	0.29	0.27	0.32	0.25	0.25	0.32	0.30	0.24	0.35	0.32	0.24-0.35
Onion	0.26	0.27	0.25	0.26	0.27	0.25	0.29	0.28	0.32	0.28	0.25-0.32
Cucumber	0.26	0.29	0.32	0.25	0.32	0.29	0.26	0.31	0.32	0.31	0.25-0.32
Raddish-root	0.25	0.27	0.26	0.33	0.27	0.26	0.32	0.34	0.36	0.39	0.25-0.39
Squash	0.24	0.23	0.26	0.27	0.23	0.32	0.35	0.38	0.28	0.33	0.23-0.38
Okra	0.21	0.18	0.18	0.22	0.17	0.19	0.18	0.21	0.23	0.19	0.18-0.23
Cauliflower	0.36	0.37	0.36	0.33	0.41	0.36	0.37	0.46	0.42	0.39	0.36-0.48
Peas	0.27	0.29	0.28	0.27	0.30	0.21	0.27	0.30	0.25	0.29	0.21-0.30

*Average of 30 replicates

fluoride concentration in vegetables have been reported, occasional values in the range of 1-7 mg / kg fresh weight have been reported for spinach, cabbage, lettuce and parsely, while values for other vegetables have seldom exceeded 0.2 – 0.3 mg / kg.

2- Fluoride concentration in some fruits

Table (2) presents the values of fluoride concentration in different kinds of fruits in 10 governorates of Egypt.

It is shown that banana and guava attained the highest fluoride concentration ranging from (0.55-0.66) and (0.52-0.71) mg/kg, respectively, while plum, pomegranate and peach have intermediate fluoride value ranging from (0.32 – 0.45), (0.23-0.45) and (0.22-0.36) mg/kg, respectively, whereas grape, cantaloupe, water melon, orange, mandarin and lemon have the lowest fluoride concentration ranging from (0.12-0.18), (0.16 – 0.23), (0.11-0.18), (0.10- 0.223), (0.05-0.11) and (0.03 – 0.08) mg/ kg, respectively. In this respect, the values reported in literature for fruit ranged 0.1-0.4 mg / kg fresh weight **(Toth *et al* 1978)**, 0.1-0.5mg/kg fresh weight **(Koivistoinen, 1980)** and 0.16-0.38 mg/kg **(El-Awamry *et al* 1999)**.

3- Fluoride concentration in some cereals and legumes

Table (3) presents the fluoride concentration of some cereals and legumes in 10 governorates of Egypt.

Data revealed that rice has the highest fluoride level ranging from (1.82-2.82) mg/kg. **Ohno *et al* (1973) and Abd El-Latif (1994)** have been reported that cereals and dried legumes contained small amount of fluorine, except for rice ranged from (1.98-2.23) mg / kg.

Wheat and maize have fluoride level ranged from (0.53 – 0.63) and (0.48-0.61) mg / kg, respectively as in accordance with **Koivistoinen (1980).**

As shown in Table (3), fluoride level in lupine, lentil, peas, snap beans, chickpeas , beans and haricot ranged from 0.38 – 0.48, 0.32 – 0.39, 0.28-0.36, 0.26-0.33, 0.31-0.38, 0.26-0.34 and 0.24- 0.32 mg / kg, respectively.

4- Fluoride concentration in some beverages

Table (4) presents the fluoride concentration of some beverages in 10 governorates of Egypt.

Tea and coffee have the highest fluoride level ranging from 1.69-1.82 and 1.21-1.39 mg/kg, respectively. Tea leaves are usually very rich in fluoride, and levels ranging from 3.2-4 mg/kg dry weight have been reported **(Canadian Public Health Association, 1979) and Duckworth & Duckworth, 1978).** Anise, tilia and carawy have intermediate fluoride levels ranging from (0.22-0.31), (0.22-0.33) and (0.21-0.34) mg/kg, respectively, whereas, Karkadi, peppermint and sugar cane have low fluoride level ranging from (0.13-0.19), (0.17-0.19) and (0.15-0.17) mg/kg, respectively.

5- Fluoride concentration in some sources of protein

Table (5) presents the fluoride concentrations in some source of protein in 10 governorates of Egypt.

Table 2. Fluoride concentrations (mg/ kg) of some fruits in 10 governorates of Egypt

Item \ Location	Cairo	Giza	Kaliobia	Fayoum	Menia	Mansoura	Alex.	Marsa-Matrouh	Ismailia	Port-Said	Range
Banana	0.63	0.62	0.59	0.55	0.61	0.57	0.61	0.66	0.58	0.56	0.55-0.66
Guava	0.64	0.61	0.59	0.52	0.64	0.63	0.67	0.67	0.71	0.69	0.52-0.71
Plum	0.34	0.40	0.42	0.39	0.33	0.45	0.45	0.45	0.39	0.41	0.32-0.45
Pomegranate	0.28	0.23	0.33	0.35	0.41	0.36	0.23	0.43	0.40	0.34	0.23-0.43
Peach	0.22	0.23	0.33	0.32	0.34	0.32	0.26	0.35	0.32	0.36	0.22-0.36
Grape	0.13	0.15	0.16	0.12	0.15	0.14	0.12	0.15	0.18	0.16	0.12-0.18
Cantaloupe	0.18	0.19	0.19	017	0.18	0.16	0.19	0.20	0.23	0.18	0.16-0.23
Water-melon	0.11	0.14	0.15	0.15	0.16	0.13	0.17	0.18	0.16	0.16	0.11-0.18
Orange	0.12	0.10	0.17	0.13	0.15	0.16	0.18	0.22	0.11	0.17	0.10-0.22
Mandarin	0.05	0.06	0.06	0.09	0.10	0.07	0.06	0.11	0.11	0.08	0.05-0.11
Lemon	0.03	0.06	0.08	0.05	0.04	0.03	0.06	0.08	0.05	0.04	0.03-0.08

Table 3. Fluoride concentrations (mg/ kg) of some cereals and legumes in 10 governorates of Egypt

Item \ Location	Cairo	Giza	Kaliobia	Fayoum	Menia	Mansoura	Alex.	Marsa-Matrouh	Ismailia	Port-Said	Range
Cereals											
Rice	1.82	1.98	2.13	2.36	2.13	1.93	2.13	2.62	1.92	2.82	1.82-2.82
Wheat	0.56	0.53	0.55	0.57	0.61	0.56	0.56	0.61	0.63	0.62	0.53-0.63
Maize	0.48	0.53	0.48	0.49	0.54	0.49	0.52	0.61	0.53	0.56	0.48-0.61
Legumes											
Lupine	0.41	0.42	0.39	0.45	0.42	0.46	0.38	0.42	0.48	0.45	0.38-0.48
Lentil	0.39	0.38	0.36	0.35	0.39	0.34	0.29	0.35	0.32	0.33	0.32-0.39
Peas	0.32	0.29	0.29	0.31	0.28	0.35	0.36	0.28	0.29	0.31	0.28-0.36
Snap beans	0.31	0.32	0.31	0.34	0.28	0.32	0.33	0.29	0.27	0.26	0.26-0.33
Chick peas	0.36	0.33	0.31	0.34	0.38	0.34	0.31	0.31	0.37	0.34	0.31-0.38
Beans	0.26	0.28	0.27	0.27	0.31	0.29	0.30	0.34	0.32	0.34	0.26-0.34
Haricot	0.28	0.29	0.25	0.26	0.24	0.28	0.25	0.31	0.29	0.32	0.24-0.32

Table 4. Fluoride concentration (mg/ kg) of some beverages in 10 governorates of Egypt

Item \ Location	Cairo	Giza	Kaliobia	Fayoum	Menia	Mansoura	Alex.	Marsa-Matrouh	Ismailia	Port-Said	Range
Tea	1.723	1.692	1.716	1.739	1.811	1.741	1.698	1.814	1.823	1.768	1.69-1.82
Coffee	1.211	0.395	1.253	1.313	1.382	1.272	1.291	1.219	1.238	1.321	1.21-1.39
Anise	0.241	0.262	0.264	0.211	0.268	0.234	0.255	0.229	0.219	0.312	0.22-0.31
Tolu	0.221	0.253	0.259	0.278	0.316	0.272	0.311	0.330	0.316	0.282	0.22-0.33
Caraway	0.212	0.239	0.291	0.259	0.282	0.241	0.278	0.289	0.313	0.316	0.21-0.31
Karkadi	0.136	0.149	0.152	0.143	0.159	0.141	0.143	0.192	0.162	0.178	0.13-0.19
Peppermint	0.192	0.179	0.182	0.194	0.196	0.175	0.174	0.170	0.182	0.187	0.17-0.19
Sugar Cane	0.166	0.173	0.158	0.161	0.175	0.163	0.154	0.168	0.172	0.149	0.15-0.17

Table 5. Fluoride concentration (mg/ kg) of some sources of protein in 10 governorates of Egypt

Item \ Location	Cairo	Giza	Kaliobia	Fayoum	Menia	Mansoura	Alex.	Marsa-Matrouh	Ismailia	Port-Said	Range
Meat	1.43	1.36	1.22	1.58	1.49	1.32	1.74	1.28	1.53	1.33	1.22-1.74
Fish	1.43	1.82	1.64	2.1	1.7	2.11	2.43	1.94	2.36	2.24	1.43-2.36
Whole eggs	0.85	0.89	0.86	0.92	0.91	0.92	0.86	0.84	0.92	0.89	0.85-0.92
Poultry	0.63	0.65	0.54	0.59	0.59	0.65	0.61	0.64	0.58	0.63	0.54-0.65
White cheese	0.16	0.13	0.19	0.18	0.19	0.21	0.21	0.17	0.20	0.19	0.13-0.21
Cows milk	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00-0.01

Meat, fish and whole eggs showed higher values of fluoride ranging from (1.22-1.74), (1.43-2.36) and (0.85-0.92) mg/kg, respectively. The fish flesh had fluoride content ranging from 2 to 5 mg / kg **(National Research Council, 1971).** Poultry shows intermediate value ranged from 0.54-0.65 mg/ kg, while values for cheese ranged from (0.13-0.21) mg/kg and 0. – 0.01 for cows milk.

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مجلة حوليات العلوم الزراعية ، كلية الزراعة ، جامعة عين شمس ، القاهرة ، م٤٩ ، ع(١)؛ ١٧٧ - ١٩٠ ، ٢٠٠٤

محتوى بعض الأغذية الطبيعية المصرية من الفلورايد

[١٢]

سعيد عبد المنعم حسن[١]

١ - المعمل المركزى للأغذية والاعلاف - مركز البحوث الزراعية - الجيزة - مصر

استهدفت هذه الدراسة تقدير تركيز الفلورايد فى الطعام المستهلك بشكل أساسى عند المواطنين المصريين وذلك لتأكيد أهمية الغذاء الطبيعى كمصدر للفلورين. تم تجميع عينات من الخضروات، الفاكهة، الحبوب، البقوليات وبعض مصادر البروتين الحيوانى (اللحوم ، الدواجن، الاسماك ، البيض ، الجبن، اللبن البقرى) وكذلك تم تحضير بعض المشروبات (الشاى، القهوة، ينسون، تيليو، كراوية، كركريه، نعناع، عصير القصب) من عشر محافظات وهى (القاهرة، الجيزة، القليوبية، الفيوم، المنيا، المنصورة، الاسكندرية، مرسى مطروح، الإسماعيلية وبورسعيد).وقد أظهرت النتائج اختلاف تركيز الفلورايد فى مجموعات الاغذية المختلفة، فقد لوحظ أن محتوى الخضروات من الفلورين متغير وأن بعض الخضروات احتوت على تركيز عالى مثل البقدونس، الفلفل الاخضر، السبانخ والكرنب- بينما احتوى الجزر، الطماطم، الملوخيةو البصل الاخضر على تركيزات متوسطه من الفلورين واحتوى القلقاس والفاصوليا الخضراء والبصل والخيار والكوسة والبسلة على تركيزات منخفضة من الفلورين واحتوت عينات الموز والجوافة على كميات مرتفعة من الفلورايد واحتوى البرقوق و الخوخ والرمان على كميات متوسطة من الفلورين بينما احتوى الكانتالوب والبرتقال و اليوسفى والليمون على كميات منخفضة من الفلورين كما احتوت الحبوب والبقوليات على تركيز منخفض من الفلورين ماعدا الارز الذى يحتوى على تركيز عالى من الفلورين . المشروبات التى تم تحضيرها من النباتات الطبيعية تعتبر مصادر طبيعية وآمنة للفلورين وقد احتوت عينات الينسون والتليو والكراوية والشاى والقهوة على كميات عالية

من الفلورين بينما احتوى الكركديه والنعناع على قيم منخفضة من الفلورين وأيضا احتوت عينات اللحوم والسمك والبيض على تركيزات عالية من الفلورين وكان محتوى الدواجن والجبن الابيض من الفلورين متوسطه القيمة بينما سجل اللبن البقرى قيمة منخفضة من الفلورين وأظهرت النتائج السابقة أن الاستخدام الطبيعى للفلورايد يعتبر أفضل دفاع ضد تسوس الأسنان لذلك يوصى باستخدام الموز والجوافة والبيض لتغذية الأطفال كما ينصح باستخدام ماء الأرز وتحضير الكراوية والتليو للأطفال التى تعتمد تغذيتهم على لبن الام وذلك منعا لحدوث تسوس الأسنان وبالنسبة للشاى والقهوة فإن تناول كميات معتدلة منهم يوميا تساعد على منع تسوس الأسنان وهشاشة العظام.

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