Measuring the Level of Radiation in some Dry Food Imported in the Markets of AL-Kifil - City and Estimating Excess of Cancer Risk Factor in this Town

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Abstract

The radioactive contamination is one of the main causes of cancers. Since the Dry food imported with the different global products is uncensored and is increasing, it is necessary to carry out periodic radiological surveys of all types in our local markets ,the aim of this project is to highlight of radiation level of same food with a statistical procedure for patients with cancer in the AL-Kifil region, there for the activity concentrations of ^{40}K, ^{226}Ra and ^{232}Th radionuclide's calculated in 20 types of Dry food samples were taking from markets in (AL-Kifil City) by using γ-ray spectrometry with NaI(Tl) detector. The mean activity concentrations of ^{226}Ra is (25.3±9.3) Bq/kg, ^{232}Th(28.4±7.6)Bq/kg, and ^{40}K (501.2±158.4) Bq/kg the activity concentration of ^{40}K higher than the international recommended values (412) Bq/kg the reason is due to the nature of the terrain enjoyed by the industrialized countries for this type of food, which reflected negatively on the number of cancer patients in the digestive system of the population of the city of Kifil, the highest compared to other areas of the province of Babylon, an average of 33 cases.

1-Introduction

The main factor causing pollution of the environment and thus the contamination of the food is radioactive precipitation, a mixture of radioactive isotopes produced by a nuclear explosion and spread in the atmosphere and can travel far from the site of the explosion and the main source of these radioactive precipitation is the tests of nuclear weapons in the atmosphere is responsible (air, soil, water) and the most dangerous radioactive precipitation is the longest and the most concentrated such as 137Si and soil pollution of these isotopes to the transfer to plants by absorption by the roots of plants and depends on this process on several factors such as the type of radioactive material and the type of soil in which the plants grow and then its go in the food.[1]

2- Materials and Method

1.2 Sample collection and preparations

After collection 20 samples of imported dried food in different kinds during the year of the research work from the different markets in Iraq (AL-Kifil) .As shown in figure (1).

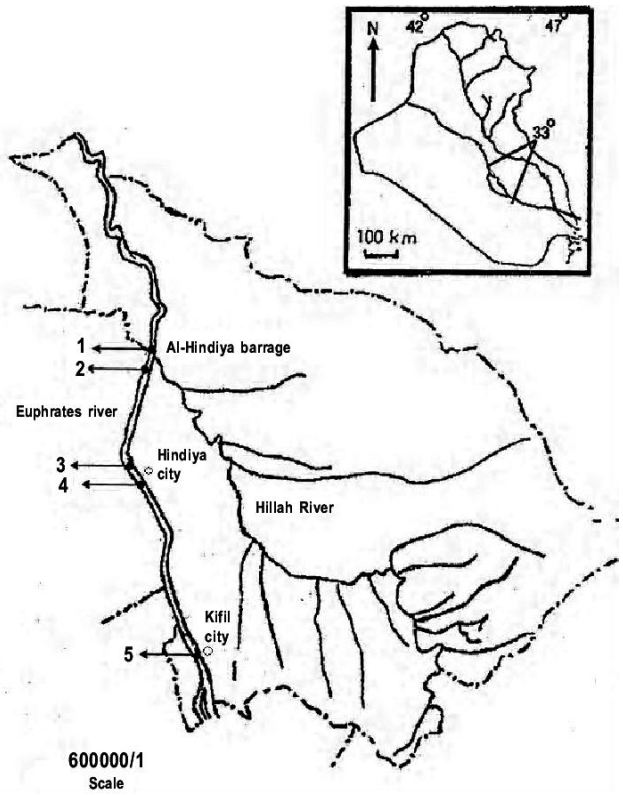

Figure 1.Babylon government map

Where illustrated the name and country of origin for each sample then its prepared and analysis , by using oven at (175^{o} C -225^{o} C) food grinder turns in to dry flour by dried in an 24h to become stable weight ,during drying a slow temperature increase should be observed to prevent damage to the samples and not to exceed the permissible limits, Finally, the samples is stored in a teachers container for four weeks in order to obtain radioactive equilibrium between parents and daughter [2].

Table(1): Types and origins of the Dry food imported samples

Code of Samples	Name of samples	Country of Origin
W1	Chickpesas Super frish	Turkey
W2	Chickpesas Abo Al-Areba	Portugal
W3	Chickpesas Al-Tunsa	Turkey
W4	Chickpesas Al-Kseeh	Jordan
W5	Chickpesas Beruit	Lebanon
W6	Chickpesas Al-Qahera	Egypt
W7	Lentils Al-Tunsa	Turkey
W8	Lentils Al- Eifea	India
W9	Lentils Al-Njoom	Pakistan
W10	Lentils Abo Al-Areba	Portugal
W11	Lentils Sydney	Austria
W12	Lentils Brasilia	Brazil
W13	Lentils Augar	United State America

W14	Lentils Mahmood	India
W15	Lentils Kalbahar	India
W16	Bean Al-Tunsa	Turkey
W17	Bean Al-Njoom	Pakistan
W18	Cowpea with beans	Portugal
W19	Cowpea with beans	Turkey
W20	Absolutely Valencia	U.A.E

2.2 Gamma Spectroscopy

By using NaI(TI) detector of (3"×3") of gamma ray spectrometer (ORTEC company) can measured the radionuclide's in dry food samples (Inc.-12I12/3,Alpha Spectra) that be connected by multi-channel analyzer (MCA) (Digital Base, ORTEC) ranged in 4096 channel joined with ADC (Analog to Digital Convertor) unit, through interface.[3]The spectroscopic are performed analysis by the (MAESTRO-32) software, as shown in figure(2).

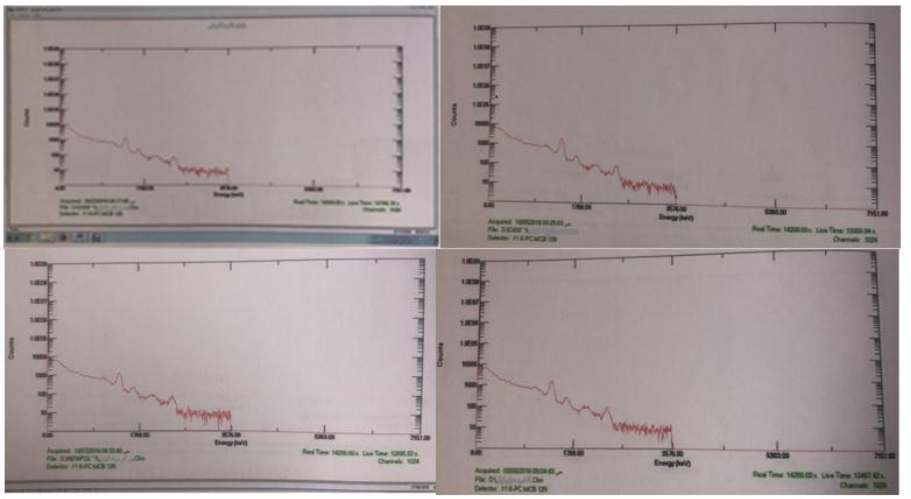

Figure 2. The spectroscopic measurements

Calibration of energy The process of calibrating energy is intended to determine the location of the fallen photon energy for each channel. When using these sources, the sources of the elements of the model are to be used for precise detection. For the purpose of standard calibration, the standard use of the following sources is used (^{137}Cs, ^{60}Co,^{54}Mn,^{109}Cd,^{133}Ba and^{22}Na). the energy of each source of radioactive fumes used the relationship between the standard energy sources and the channel number .[4]

3- Specific Activity Concentration

By using equation (1) can calculated the specific activity of a radionuclide in a gamma energy transition [5].

$$A = \frac{N_{net}}{\varepsilon . I_{\gamma} . m . t} \pm \frac{\sqrt{N_{net}}}{\varepsilon . I_{\gamma} . m . t} [\frac{Bq}{kg}] \text{----------(1)}$$

Where N_{net} is represented to the net count in (c/s), $\sqrt{N_{net}}$ is the random error in (c/s), ε is represented to the efficiency of the detector , I_γ is emitted gamma ray of the transition probability, t is the time in (sec) for spectrum collected and m is represented to the sample weight in (Kg).

Table 2. Specific Activity (Bq/kg) in the Dry food samples

Sample Mark	Specific Activity (Bq/kg)		
	^{226}Ra	^{232}Th	^{40}K
W1	18.6±1.35	29.1 ±2.0	511.3± 8.65
W2	30.7±1.4	30.3 ±2.5	610.9± 7.8
W3	26.31±2.1	31.4 ±1.2	622.21± 6.7
W4	36.61±3.5	40.3±3.12	679.2± 5.3
W5	29.71±2.6	32.3 ±1.4	566.3±4.6
W6	14.3±1.4	18.34 ±2.4	254.4 ±4.3
W7	26.1±3.2	29.9 ±3.9	490.6 ±5.7
W8	19.3±1.6	20.8 ±2.4	380.32± 4.7
W9	21.2±2.8	19.7 ±1.2	310.6± 2.1
W10	30.2±1.4	32.4 ±3.6	230.2 ±4.9
W11	25.5±1.5	28.4±1.4	503.4± 5.2
W12	16.5±1.1	34.6 ±2.1	621.9± 3.4
W13	46.6±4.6	37.3 ±1.3	709.4± 6.2
W14	34.3±1.4	28.3 ±1.2	604.4± 7.2
W15	34.4±1.2	42.7 ±1.5	679.1± 5.2
W16	33.7±1.4	29.8 ±1.2	691.7± 3.8
W17	8.3±1.6	14.9±1.7	297.6±6.2
W18	17.6±1.1	29.5 ±1.8	549.7±4.7
W19	21.4±1.7	20.6 ±1.3	410.8± 6.2
W20	15.6±0.9	17.6 ±1.6	300.8± 5.3
Mean±SD	25.3±9.3	28.4±7.6	501.2±158.4

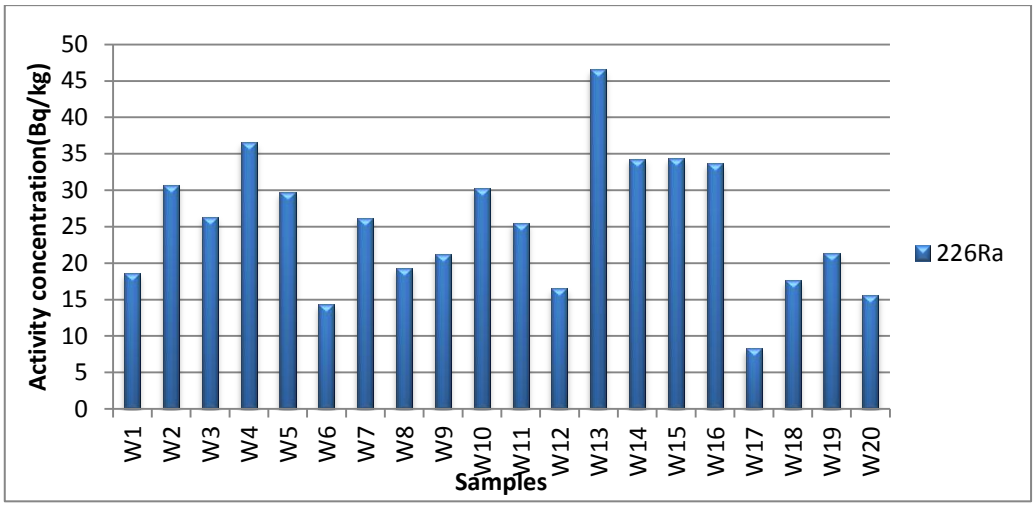

Figure 3: Activity concentration of ^{226}Ra in Dry food samples.

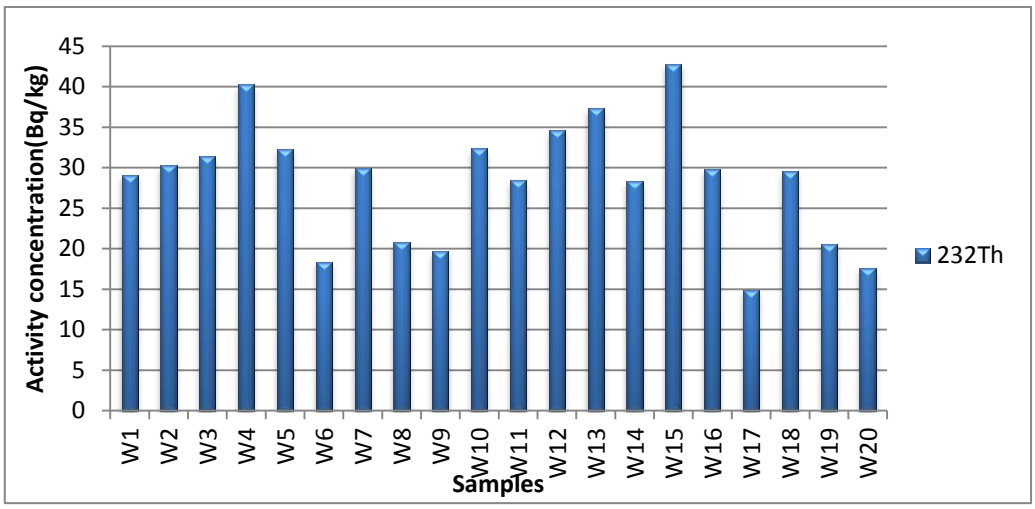

Figure 4. Activity concentration of ^{232}Th in Dry food samples.

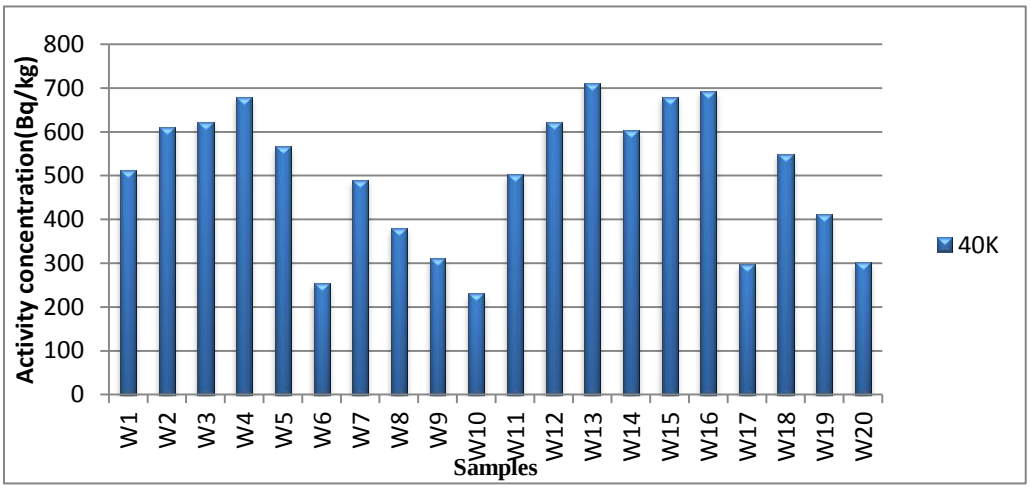

Figure 5: Activity concentration of ^{40}K in Dry food samples.

Province that the risk of health caused by exposure to radiation has become a concern because of the discovery of radionuclide as a source of the reason for the high incidence of lung cancer where studies The relationship between exposure to Radon and the risk of Gastrointestinal track cancer is linear, which confirms the importance of measurements on its concentration in populated areas.[6] Table 3 shows the number of cases of reindeer cancer according to patient reports in the archive of Morjan Hospital in Babylon Province in 2017, A relationship to increase The incidence of reindeer cancer with the high concentration of ^{40}K, where we note that the high rates of this radionuclide will be found in many areas of injury it cause (33) cases have the highest number of cancer patients from the other region in Babylon Governorate , the reason is due to the nature of the terrain enjoyed by the industrialized countries for this type of food, which reflected negatively on the number of cancer patients in the digestive system of the population of the city of Kifil.[7][8]

Table (3) Number of cases of Gastrointestinal track cancer in Babylon Governorate (For 20017)

Case Code	Name of City	Number of Cases
A1	Al-Kifil	33
A2	Abi-Gerik	11
A3	Al- Mahaweel	24
A4	Al-Qasem	18
A5	Al-Metehateae	19
A6	Al-Shomelee	14
A7	Hilla-Heealaskan	4
A8	Hilla-Heealgameaa	6
A9	Hilla-Heekeratai	5
A10	Hilla-HeealamamAli	2
A11	Hilla-Heealkrama	5
A12	Hilla-Heetmooz	3
A13	Hilla-Heealtehmazea	2
A14	Hilla-Heealbokerlee	8
A15	Hilla-Heealjazaeer	2
A16	Hilla-Heenadeer 2	14
A17	Hilla-Heealkadeea	9
A18	Hilla-Heealgemeea	11
A19	Hilla-Heealakremeen	10
A20	Hilla-Heealmuhendseen	16

4- Conclusion

As a result from this project we have many conclusions:-

1- It is found that many samples have higher specific activity for ^{226}Ra compared with safe limit values recommended by UNSCEAR (2008).
2- while the most samples have higher specific activity for ^{40}K compared with safe limit values.
3- The high rates of this radionuclide will be found in many areas of injury it cause (33)cases have the highest number of cancer patients from the other region in Babylon Governorate.

CONFLICT OF INTERESTS

There are no conflicts of interest.

5- Reffrences

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قياس مستوى الاشعاع في الأغذية الجافه المستورده والموجوده في بعض اسواق مدينة الكفل وتخمين عامل زيادة خطر مرض السرطان في تلك المدينه

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الخلاصة

يعتبر تلوث الاشعاعي للأغذية من اهم اسباب الاصابة بالسرطانات المختلفه وبما ان أستهلاك الأغذية المستورده المختلفه ذات مناشيء عالميه متعددة بدا يزداد وهي غير خاضعه للرقابه لذلك فمن الضروري اجراء مسوحات اشعاعيه دوريه لجميع هذه الانواع الموجوده في الأسواق,هدف البحث هو قياس مستوى الاشعاع الموجود في بعض انواع الأغذية الجافه المستورده الموجوده في اسواق مدينة الكفل وبيان تاثيرها على اعداد المرضى المصابين بسرطانات الجهاز الهضمي الموجودين في تلك المدينه لذلك فالنشاط الأشعاعي للـــ ^{40}K ,^{226}Ra و ^{232}Th قد تم قياسها بواسطة جهاز مطياف اشعة كاما ذو الكاشف يوديد الصوديوم لخمسين عينة فبلغ معدل النشاط الاشعاعي للـــ ^{40}K (501.2±158.4) Bq/kg ولـــ ^{226}Ra يساوي (25.3±9.3) Bq/kg وللـــ ^{232}Th يساوي (28.4±7.6) Bq/kg فنلاحظ ان مستوى الـــ ^{40}K هو اعلى من الحدود الطبيعية والمحددة عالميا" بالمقدار (412)Bq/kg والسبب يعود الى طبيعة التضاريس التي تتمتع بها الدول المصنعة لهكذا نوع من الأغذية مما انعكس سلبا" على عدد مرضى السرطان في الجهاز الهضمي لمدينة الكفل وهو الاعلى قياسا" بالمناطق الأخرى لمحافظة بابل بمعدل (٣٣)حالة.

الكلمات الدالة:التلوث، السرطان الاشعاع الطبيعي، الفيزياء الطبية.