

**SURVEY FOR LEAD LEVEL IN FISH, CATTLE AND SHEEP AND
THEIR PRODUCTS FROM KALUBIA GOVERNORATE REGIONS.
BY**

El-Tanahy, H.H.

Dept. Food Technology, Fac. of Agric. at Moshtohor, Zagazig Univ. Benha
Branch, Egypt.

ABSTRACT

One hundred and sixty samples of thirty seven various fish, meat and their products widely consumed in Qalyoubia Governorate were ashed and lead contents were determined by Atomic Absorption spectrophotometer. The highest level of lead was obtained from some samples of liver, kidney, meat products, fish and fish products. Data of lead concentrations were more than 500 ppb and less than 1000 ppb, whereas some samples of meat recorded lower lead content. Most samples had a lead level under the permitted limit, while some samples had a higher level. Results of lead concentration, were around the permitted limit and gave us an indication that stricit inspections and precutions must be taken in concideration for meat and fish foods.

INTRODUCTION

Trace elements are widely distributed in nature, they are normaly available unless there is an interfering variable. One of these elements Lead (Pb) is present in most animal tissues, especially in bones (0.8-5.3 mg/100gm) (Schromüller, 1974). He added that the total content of lead in a standard person reaches about 130 mg., which comes from the accumulated daily intake through respiration, food and water (0.3-0.6 gm daily), whereas the blood of a healthy person contains normally about 30 Ug/100 ml.

Hecht & Schramel (1973) found that the Pb concentration in beef meat ranged between 0.4 and 0.75 ppm on fresh weight basis whereas Bencivenga *et al.*, (1979) analysed meat and liver for Pb, Cd and Cr contamination and revealed that max-Pb concentration was 0.97 mg/kg in meat and 2.4 mg/kg. in liver. His results showed that the Pb contamination was the main health hazard. On the other hand El-Nabawi *et al.*, (1987) determined As, Cu, Cd, Pb, Hg and Zn concentration in muscle and liver of 4 fish sp. from Abu-Kear, Idku and Maryut lakes by atomic absorption spectroscopy, and concluded that fish from Alexandria region did not pose a health hazard.

Niemi *et al.*, (1991) analysed samples of muscle, liver and kidney from pig and cattle and they found that Pb concentration in cattle muscle, liver and Kidney (up to 113 samples of each) were 13, 57 and 110 mg/kg respectively. Higher content in cattle tissue reflected increased age at slaughter and consumption of green fodder exposed to more environmental pollution. They added that provisional tolerable daily intake (TDZ) of Pb for a 60 kg person is 0.43 mg; this would be supplied by 4 - 33 kg of corresponding cattle tissues (muscle liver and kidney respectively). The level of heavy metals in 5 sp. of fish were studied by Singh *et al.*, (1991) who found that the results were significantly higher in skin than in muscle. They also added that higher levels were found in head samples than in skin from mid-sections or tails. Tarique *et al.*, (1994) studied the pollution status of 2 rivers in Pakistan and they found that the maximum trace elements were high in areas close proximity to industrial and agricultural sites where they found that the max. level of Pb was 6.701 mg/100 gm.

Efforts to reduce environmental pollution with heavy metals were effective where decreases in Cd and Pb occurred in meat muscle, liver and kidney tissue (Hecht 1994).

Nagy (1994) stated that Luncheon meat from El-Bagour and Shebin El-Kom had the highest level of contamination with lead where it reached to 9.78 and 9.5 p.p.m. respectively, however, samples obtained from Quesna contained the lowest level 8.75 p.p.m..

The list of German Ministry of Health (Bundesgesundheitsplatt Jahr, 1977) stated that the maximum lead content in cattle, beef, chicken and their products was 0.25 mg/kg (ppm) whereas the maximum lead content in liver, fish and their products was 0.50 mg/kg (ppm).

In this investigation, the lead (Pb) level in about 37 various samples of fish, meat and their products widely consumed in Qalyoubia Governorate markets were conducted.

MATERIALS AND METHODS

Materials:

Samples of various fish such as Bolti (*Tilapia nilotica*), Bory (*Mugil cephalus*), Morgan (*Pagrus spp.*), Sardine (*Sardinella spp.*) and Frozen Sardine whereas meat such as Cattle and Sheep meat, Chicken, Duck and Rabbit. Livers of Cattle and Sheep, and Cattle kidney were collected from butchers, (A in Benha, B. Toukh, C. Qaha, D. Qalyoub,) and E.a supermarket in Benha) and fish sellers during the season on year 1996. Whereas processed fish and meat products such as grilled, fried fish from fish restaurants canned fish and meat from supermarkets. Pasterma, Luncheon, and Sausage from Supermarkets and

salted bory from shops were collected from different regions in Qalyoubia Governorate.

Methods:

The samples were ashed at 550°C and Pb content was determined by Atomic Absorption (Gerald Ash) according to U.S. Environmental Protection Agency method (1983).

RESULTS AND DISCUSSION

Different samples of fish, meat and their products from different location, were analysed for lead content. From Table (1) the lead content in fresh various meat samples from different regions had different lead content. It was low in cattle meat, ducks and rabbits while it was very high in kidney, minced meat and liver. This may be due to the green or dry fodder and/or the air contamination, these results agree with those obtained by Neimi *et al.*, (1991). From the same table it could be noticed that some chicken and minced meat samples had a level more than 250 ppb but cattle kidney had a level is more is higher than 500 ppb means thus Pb level higher than the maximum level stated in the German Ministry of Health (Bundesgesundheitsplatt Jahr, 1997).

Table (1): Lead content (Ug/kg) in some meats from different locations.

Sample type	Pb concentration Ug/kg				
	A	B	C	D	E
Veal meat	30.2	19.2	23.0	57.0	8.7
Cattle meat	97.5	37.9	81.6	31.1	15.1
Veal liver	50.1	78.3	43.7	71.2	--
Cattle liver	210.3	202.9	301.1	164.5	139.7
Veal kidney	78.2	103.7	90.9	182.3	--
Cattle kidney	230.4	427.1	269.2	591.5	--
Sheep meat	39.3	23.1	19.2	51.5	16.1
Sheep liver	107.3	98.3	153.7	162.5	--
Chicken	266.6	225.5	293.2	127.9	154.8
Ducks	39.1	20.9	25.7	35.1	--
Rabbits	11.2	18.2	15.3	20.5	--
Minced meat	347.7	161.7	227.4	242.6	112.5

A, B, C & D from butchers

E : from supermarkets

Table (2) shows the lead concentration in some meat products. It could be noticed that there are noticeable variations in the concentration of lead in one type such as Pasterma, where ranged from 0 to 370 ppb, Luncheon from 182.1 to 519.3 ppb Sausage from 99 to 308.7 ppb, canned beef from 69.8 to 172.1 ppb, Grilled meat (Kabab) from 280.5 to 791.9 ppb and minced grilled meat (Kofta) from 193.5 to 621.2 ppb. This may be due to meat source, location, the air contamination and/or the process methods.

From the same table, it could be concluded that the higher level of lead in minced grilled meat (Kofta) and grilled meat (Kabab) may be due to carbon burn or contamination from air and/or the age of animal.

Table (2): Lead content (Ug/kg) in some processed meat.

Sample type	Pb concentration Ug/kg				
	A	B	C	D	E
1- Pasterma	9.3	129.7	370.0	213.5	0
2- Luncheon	269.5	288.2	519.3	375.1	182.1
3- Sausage	197.0	308.7	237.2	201.1	99.0
4- Canned beef	69.8	90.5	121.3	49.3	172.1
5- Grilled meat (Kabab)	280.5	382.1	791.9	432.2	351.0
6- Minced grilled meat (Kofta)	352.3	271.7	305.4	621.2	193.5

1- 4 From shops and supermarkets

5- 6 From meat restaurants

Data in Table (3) show the lead concentration of fresh and cooked fish, the results showed that the fresh samples had a high lead level than that cooked, this may be due to washing and removal of fish skin which had a high level of lead. These results agree with those obtained by Singh *et al.*, (1991) and Tarique *et al.*, (1994). Also the lead concentration in fresh samples was high but it still less than 500 ppb, whereas the German Ministry of Health stated that the maximum level in fish and their products should not exceed than 500 ppb.

It could be concluded that preprocessing of fish is very important to remove most of lead whereas it concentrate in skins and heads than in muscle. Also, the fish drip during processing may remove some of the existing lead.

Table (3): Lead content (Ug/kg) in some fish from different locations.

Sample type	Pb concentration Ug/kg			
	A	B	C	D
1- Bolti (fresh)	427.1	325.5	311.2	372.4
2- Bo(fresh)	371.7	272.3	2.5.0	322.1
3- Sardine (fresh)	352.3	311.8	221.9	193.7
4- Morgan (fresh)	227.5	153.7	211.3	241.3
5- Frozen sardine	117.7	192.2	153.5	203.5
6- Fried bolti	123.9	92.1	105.5	173.2
7- Grilled bolti	151.3	271.5	203.2	159.3
8- Fried sardine	59.2	73.5	61.5	92.9
9- Grilled frozen sardine	113.2	172.9	151.3	107.2
10- Fried morgan	82.5	73.2	75.7	62.9
11- Grilled bori	127.3	250.0	192.3	118.8
12- Grilled fresh sardine	192.2	153.4	211.9	137.2

1- 5 From fish sellers

6- 12 From fish restaurants

Data from Table (4) show the lead content in some canned, smoked and salted fish. The results showed that the lead content in canned samples ranged from 101.7 to 472.1 ppb, this may be due to fish contamination before processing and/or from the can metal, whereas in smoked samples lead content ranged from 133.5 to 261.9 ppb. But in salted fish most samples had more than 500 ppb this may be due to contamination before salting and/or from the salt used which may be contaminated with lead.

It could be concluded that salted fish contained twice as much content of lead. So, precautions towards the salt used in salting process must be selected very carefully in order to avoid contamination of fish and fish products.

Table (4): Lead content (Ug/kg) in some processed fish.

Sample type	Pb concentration Ug/kg				
	A	B	C	D	E
Canned salmon	171.7	317.2	381.5	350.7	101.7
Canned sardine	152.2	472.1	379.7	291.0	190.3
Canned sardine with oil	461.1	272.1	552.5	325.1	227.5
Canned tuna	---	---	---	105.6	235.1
Smoked fish	261.9	191.7	146.7	231.5	133.5
Salted bori	527.3	431.1	59.2	---	---
Salted sardine	612.2	401.5	7.38	---	---

All samples are from supermarkets and shops

REFERENCES

- Bencivenga B.; Pollotti G.; Sanna M.; Simonetti - T.; Bonifazi-m and Porrozzi-G. (1979): Environmental pollution with Pb, Cd. and Cr. and effects on crops and foods in a defined area of the province of Rome. *Bolletino-dei-Chimici-dei-Laboratori - Provinciali*; 5 (1) 88-93.
- Bundesgesundheitsplatt Jahr (1997): Hett.s 182 in Derr Lebensmittelbrief, D/P. July/August, 1997, S 200.
- El-Nabawi, A.; Heinzow-B and Kruse, H. (1987): As, Cd, Cu, Pb, Hg and Zn in fish from the Alexandria Region, Egypt. *Bulletion of Environmental Contamination and Toxicology*; 39 (5) 889-897.
- Hecht, H. (1994): Long term behaviour of metals in pasture and in muscles and organs of some animals. *Mitteilungsblatt-der-Bundesanstalt-fuer-Fleisch forschung Kulmbach*; 33 (126) 420-427.
- Hecht, H. and Schramel, P. (1973): The concentration of trace elements in pork, beef and veal. *Fleiswirtschaft*; 53 (2) 237-240.
- Nagy, K.S.A. (1994): Studies on the quality of some foods on local market of El-Menofiya Governorate M.Sc. Thesis, Faculty of Agric. El-Menofiya Univ.

- Niemi Publ, A.; Venaelaecinen, E.T.; Hirn, J. and Karppanen, E. (1991): The lead, cadmium and mercury concentrations in muscle, liver and kidney from Finnish pigs and cattle (during 1987-1988).
- Schromüller, J. (1974): Lehrbuch der Lebensmittelchemie. Zweite Auflage, Springer-verlag Berlin, Heidelberg.
- Singh, J.G.; Chang-Yen, I.; Stoute, V.A. and Chatergoon, L. (1991): Distribution of selected heavy metals in skin and muscle of five tropical marine fishes. Environmental-Pollution, A.; 69 (2/3) 2.3-215.
- Tarique, J.; Ashraf, M. and Jaffar, M. (1994): Assessment of pollution status of rivers Jehlum and Sutlej, Pakistan through trace metals in fish, sedimental water. Toxicological and Environmental Chemistry; 43 (3/4) 1690174.
- U.S. Environmental Protection Agency (1983): Methods for Chemical Analysis of water and wastes EPA-600/4-79-020.

تقدير مستويات الرصاص في الأسماك ولحوم الابقار والأغنام ومنتجاتهما في محافظة القليوبية

--

حسن حسن الطناحي

قسم علوم الأغذية - كلية الزراعة بمشتهر - جامعة الزقازيق / فرع بنها .

—

تم سحب حوالي ١٦٠ عينة ممثلين لـ ٣٧ صنف من الأسماك واللحوم ومنتجاتهما خاصة الى تستهلك في محافظة القليوبية - حيث جمعت العينات العشوائية المسحوبة وتم تجنيصها ثم حرق وزنه معلومه منها على درجة حرارة ٥٥٠°م ثم قدر محتواها من الرصاص بواسطة جهاز الامتصاص الذرى للعناصر باستخدام لمبة الرصاص.

وأظهرت النتائج ان اعلى مستويات في محتوى الرصاص كانت من بعض عينات الكبد والسمك ومنتجات اللحوم والاسماك المعلبة حيث سجلت تركيزات أعلى من ٥٠٠ جزء في البليون وأقل من ١٠٠٠ جزء في البليون في حين أن الحد الأقصى المسموح به طبقاً لدستور وزارة الصحة الألمانية في بعض عينات اللحوم تصل الى مستويات منخفضة عن ذلك من الرصاص .

وعموماً فإن اغلب العينات المسحوبة كانت دون الحد الأقصى المصرح به في محتواها من الرصاص بينما بعض العينات كان محتواها من الرصاص أعلى من الحد المسموح به.

ونتائج تركيزات الرصاص في العينات تعطى مؤشراً لتحذير المستهلك من التحرى والحرص في اختيار مصادر احتياجاته من اللحوم والأسماك ومنتجاتهما وطرق إعدادها وطهيها .