Hazard Analysis of Some Pesticides in Meat and offal of Slaughtered Animals

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Abstract

One hundred and thirty five meat, liver and kidney samples (45 of each) were collected from 45 slaughtered animals (15 each of cattle, camel and sheep) slaughtered at Tanta abattoir .

The collected samples were examined for determination of organophosphorous (diazinon) and organochlorine (dieldrin) pesticides.

The obtained results revealed that the mean values of organophosphrous in examined liver, kidney and meat samples were 638.44 ± 52.19; 469.72 ± 37.95 & 77.29 ± 6.82 ppb for cattle, carcass 424.91± 37.44; 316.48 ± 28.12 & 38.76 ± 4.07 ppb for camel carcass and 287.18 ± 32.83; 139.54 ± 18.23 & 20.36 ± 1.07 ppb for sheep, respectively.

According to the Egyptian standards 26.67% & 13.33% and 20% & 6.67% of examined liver and kidney samples of cattle and camel, respectively, exceeded the maximum permissible limits for diazinon (700 ppb), moreover, 6.67% of sheep liver samples were exceeded the maximum permissible limits for diazinon. All examined meat samples of cattel, camel and sheep were accepted and fit for human consumption based on their contents of diazinon .

There are significant difference ($P < 0.05$) due to the interaction between the animal species and between the types of examined samples.

Moreover, the mean values of deldrin as organochlorine pesticide in the examined samples of liver, kidney and meat were 183.29 ± 11.03; 114.83 ± 8.52 & 40.67 ± 2.37 ppb for cattle, 129.73 ± 10.22 ; 101.87 ± 6.47 &28.96 ± 1.15 ppb for camel & 94.73 ± 7.18; 85.41 ± 5.06 & 19.28 ± 0.87 for sheep respectively. According to the Egyptian standards 66.67% & 80% ; 86 & 86.67% and 93.33 & 93.33% for liver and kidney samples of cattel, camel and sheep, respectively, were accepted and within the permissible limits. All examined meat samples of cattle, camel and sheep were fit for human consumption and free from doeldrin residues.

Introduction

Pesticide compounds are group of contaminants that pollute the nature as a result of industrial wastes of different factories, a real spraying of fields, water of drainage system and during eradication of different types of parasitic snails such as Shistosoma and Fasciola (Goldman et al., 1990).

Pesticides can be classified according to their action into insecticides (e.g. organophosphorus and organochlorine), fungicides, herbicides, mollouscicides and rodenticides. Moreover, organochlorine insecticides include dichloro- diphenyl- trichloro ethan (DDT), aldrin, dieldrin, toxaphene and lindane. While organophosphorus insecticides include malathion, parathion, dimethioate and diazinon (WHO, 1986).

Contamination of food of animal origin by organochlorine and organophosphorus compounds and their metabolites has been reparted in various counteries (Neumann, 1988).

The current widespread use of potent pesticides has created potential toxic hazands for both man and animal. There has been increasing concern about the possible harmful effects resulting from accumulation of these chemicals in soil, water and food of animals and man (Schafer and Kegley, 2002).

In recent years, pesticide residues in food arises as an important problem of serious public health hazards which may lead to acute or chronic hepatic toxicity for human, also produce neurological, reproductive, carcinogenic and genotoxic effects in animals and human beings (Wani et al., 2000).

Material and methods

Sampling

A total of 135 samples of liver, kidney and meat (45 of each) were collected from cattle, camel and sheep carcasses (15 of each) from Tanta abattoir. Each sample weight about (15 g.) and transferred to laboratory directly for determination of their pesticide contents.

All collected samples examined for quantitative estimation of organophosphorus pesticides (diazinon) and organochlorien peticides (dieldrin).

Estimation of organophosphrous pesticide residues (diazinon): Analytical procedure for determination of Diazinon with thin layer chromatogrphly (TLC) according to AOAC (1990).

Estimation of organochlorine pesticide residues (dieldrin): analytical procedure by Gas liquid chromatography (GLC) according to AOAC (1990).

Results

Table (1): Concentrations of diazinon as organophosphous pesticide (ppb) in the examined samples of slaughtened food animals (n=15).

Species Tissues	Cattle *			Camel			Sheep		
	Min	Max	Mean ± S.E	Min	Max	Mean ± S.E	Min	Max	Mean ± S.E
Liver•	405.70	913.20	638.44± 52.19	248.10	751.60	424.91± 37.44	157.50	711.20	287.18 ± 32.83
Kidney	278.30	827.80	469.72± 37.95	146.50	708.30	316.48 ± 28.12	88.70	269.80	139.54± 18.23
Meat	46.20	158.50	77.29 ± 6.82	13.70	68.20	38.76 ± 4.07	6.40	37.10	20.36 ± 1.07

* Significant differences ($P < 0.05$) between the animal species .

• Significant differences ($P < 0.05$) between the examined tissues .

Table (2): Standardization of the examined samples of slaughtered animals based on their contents of diazinon as compared with Egyptian specification (n=15).

Tissues	Permissible Limit (ppb)*	Cattle				Camel				Sheep			
		Fit		Unfit		Fit		Unfit		Fit		Unfit	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Liver	700	11	73.33	4	26.67	12	80.00	3	20.00	14	93.33	1	6.67
Kidneys	700	13	86.67	2	13.33	14	93.33	1	6.67	15	100	0	0
Meat	700	15	100	0	0	15	100	0	0	15	100	0	0

* Egyptian Organization of standardization " EOS" No. 1954 (1991).

Table (3): Concentrations of dieldrin as organochlorine pesticide (ppb) in the examined samples of slaughtered food animals (n=15).

Species Tissues	Cattle *			Camel			Sheep		
	Min	Max	Mean ± S.E	Min	Max	Mean ± S.E	Min	Max	Mean ± S.E
Liver•	78.90	336.70	183.29± 11.03	46.20	271.60	129.73± 10.22	31.90	210.30	94.73± 7.18
Kidney	33.40	254.10	114.83± 8.52	28.80	226.30	101.87± 6.47	27.40	202.50	85.41± 5.06
Meat	10.80	62.90	40.67± 2.37	7.70	59.10	28.96± 1.15	6.90	34.20	19.28± 0.87

* Significant differences ($P < 0.05$) between the animal species .
• Significant differences ($P < 0.05$) between the examined tissues .

Table (4): Standardization of the examined samples of slaughtered animals based on their contents of dieldrin as compared with Egyptian specification (n=15).

Tissues	Permissible Limit (ppb)*	Cattle				Camel				Sheep			
		Fit		Unfit		Fit		Unfit		Fit		Unfit	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Liver	200	10	66.67	5	33.33	12	80.00	3	20.00	14	93.33	1	6.67
Kidney	200	12	80.00	3	20.00	13	86.67	2	13.33	14	93.33	1	6.67
Meat	200	15	100	0	0	15	100	0	0	15	100	0	0

* Egyptian Organization of standardization " EOS" No. 1954 (1992).

Discussion

Results given in Table (1) revealed that the residual level of diazinon in the examined meat samples of cattle carcasses varied from 46.20 to 158.50 with an average of 77.29 ± 6.82 ppb, for liver 405.70 to 913.20 with an average of 638.44 ± 52.19 ppb, while for kidney samples were 278.30 to 827.80 with an average of 469.72± 37.95 ppb. While mean the concentration of diazinon in examined camel meat samples ranged from 13.70 to 68.20 with an average 38.76 ± 4.07 ppb. While for liver was 248.10 to 751.60 with an average 424.91 ± 37.44 ppb., and for kidney samples ranged from 146.50 to 708.30 with an average 316.48 ± 28.12 ppb.

Moreover, the average concentration of diazinon in the examined meat samples of sheep were ranged from 6.40 to 37.10 with an mean value 20.36 ± 1.7 ppb., for liver were 157.50 to 711.20 with an mean value 287.15 ± 32.83 ppb. and kidney samples were 88.70 to 269.80 with an average 139.54 ± 18.23. ppb., respectively.

The obtained results indicated that meat samples in all examined animal species had the lighest diazinon residues than the kidney and liver

samples. Furthermore the cattle liver were the most contaminated organ with diazinon than those of camel and sheep, while liver of sheep was the residue lowest level of diazinon in the three examined animals.

The results given in table (2) revealed that the percentage which exceed the permissible limit of diazinon in liver of cattle, camel and sheep were 26.67%, 20.00% and 6.67% , respectively. While the percentage which exceed the permissible limit in kidney samples were 13.33%, 6.67% and 0% in cattle, camel, sheep respectively.

Moreover meat samples of cattle, camle and sheep carcasses were free from diazinon residues and fit for human consumption. Such findings nearly similar to those obtained by Frank et al., (1990) and Bitaud (2000).

There are significance difference ($p< 0.05$) due to interaction between animal species as well as between examined samples.

The results given in Table (3) recorded that the minimum, maximum and mean values of dieldrin in the examined meat samples of cattle carcasses varied from 78.90 to 336.70 with an average 183.29 $\pm$ 11.03ppb. for liver; 33.40 to 254.10 with an average 114.83 $\pm$ 8.52ppb. for kidney and 10.80 to 62.90 to 40.67 $\pm$ 2.37 ppb. for meat, respectively, while the concentration of dieldrin in these examined samples of camel were 46.20 to 271.6 with average 129.73 $\pm$ 10.22 ppb. for liver, while was 28.80 to 226.30 with average mean 101.87 $\pm$ 6.47 ppb. for kidney and 7.70 to 59.10 with average 28.96 $\pm$ 1.15 ppb. for meat samples. Concerning to sheep samples were 31.90 to 210.30 with average 94.73 $\pm$ 7.18 ppb. for liver and 27.40 to 202.50 with average 85.41 $\pm$ 5.06 ppb. for kidney, while was 6.90 to 34.20 with average 19.28 $\pm$ 0.87ppb. for meat samples, respectively. This are significant differences ($p < 0.05$) due to the interaction between animal as species as well as between different types of examined samples. The obtained results revealed that the high concentration of dieldrin was recorded in liver of cattle, liver kidney and meat samples of cattle were most polluted organ than camel and sheep samples. Moreover, meat samples of sheep recorded the lowest level of dieldrin in all examined samples of different animals .

The results in Table (4) reported that the percentages which exceed the permissible limits of dieldrin in liver of cattle, camel and sheep were 33.33% , 20.00 % and 6.67 %, respectively, while for kidney samples in cattle, camel and sheep were 20.00 %, 13.33 % and 6.67 % respectively. Meat of the same animals was free from dieldrin residues. So, dieldrin can be interduced the surrounding environment through application of aquatic control of weeds and insects as a pesticides (Bai, et al., 2006).

Nearly similar results were obtained by Khalafalla and Gergis (1991) and Herrera et al., (1994).

Finally, the pesticides residues either organochlorine or organophosphorus compounds contaminating the meat and edible offal of slaughtered food animals may results in an important problem of serious public health hazards which may be lead to acute or chronic toxicity for human being. In other words, these pesticides have cumulative effect, therefore, they may constitute potential hazards to human health such as cancer, infertility, cytogenic effect, neuritixucuty, induction of liver micrsomal enzymes and increased chromosomal damage as well as decreased immunological status.

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الملخص العربي

تم تجميع عدد ١٣٥ عينة من اللحوم والكبد والكلاوي (٤٥ من كل نوع) من ذبائح الماشية والجمال والأغنام (١٥ من كل نوع) من مجزر طنطا وذلك لقياس المبيدات الحشرية (متبقيات المركبات الفسفورية العضوية و الكلوريد العضوية) .

وقد أوضحت نتائج البحث أن متوسط تركيز متبقيات الديازينون (جزء في المليون) في عينات الكبد والكلى واللحوم كانت ٦٣٨,٤٤ ± ٥٢,١٩ ، ٤٦٩,٧٢ ± ٣٧,٩٥ ، ٧٧,٢٩± ٦,٨٢ في الماشية ٤٢٤,١٩ ± ٣٧,٤٤ ، ٣١٦,٤٨ ± ٢٨,١٢ ، ٣٨,٧٦ ± ٤,٠٧ في الجمال و ٢٨٧,١٨ ± ٣٢,٨٣ ، ١٣٩,٥٤ ± ١٨,٢٣ ، ٢٠,٣٦ ± ١,٠٧ في الأغنام وبمقارنة هذه النتائج مع الحدود القصوى المسموح بها لهذا المبيد (٧٠٠ جزء في المليون) طبقاً للمواصفات القياسية المصرية وجد أن ٢٦,٦٧ % ، ٢٠% ، ٦,٦٧ % من أكباد الماشية والجمال والأغنام على التوالي قد تجاوزت هذه الحدود بينما كانت ١٣,٣٣ % ، ٦,٦٧ % من عينات الكلى للماشية والجمال غير مطابقة للمواصفات على التوالي وعلى النقيض كانت جميع عينات اللحوم للماشية والجمال والأغنام مقبولة ولم تتخطى الحدود المسموح بها لمبيد الديازينون .

أما بالنسبة لمبيد الداي إلدرين فقد أوضح البحث أن متوسط تركيز متبقيات _جزء في المليون) في عينات الكبد والكلى واللحوم كانت ١٨٣,٢٩ ± ١١,٠٣ ، ١١٤,٨٣ ± ٨,٥٢ ، ٤٠,٦٧ ± ٢,٣٧ في الماشية ، ١٢٩,٧٣ ± ١٠,٢٢ ، ١٠١,٨٧ ± ٦,٤٧ ، ٢٨,٩٦ ± ١,١٥ في الجمال ، ٩٤,٧٣ ± ٧,١٨ ، ٨٥,٤١ ± ٥,٠٦ ، ١٩,٢٨ ± ٠,٨٧ في الأغنام .

وبمقارنة هذه النتائج مع الحدود القصوى المسموح بها لهذا المبيد (٢٠٠ جزء في المليون) طبقاً للمواصفات القياسية المصرية وجد أن ٣٣,٣٣ % ، ٢٠% ، ٦,٦٧ % من أكباد الماشية والجمال والأغنام على التوالي قد تجاوزت الحدود المسموح بها بينما كانت ٢٠% ، ١٣,٣٣% ، ٦,٦٧ % من عينات الكلى في الماشية والجمال والأغنام غير مطابقة للمواصفات على التوالي .

وعلى النقيض كانت جميع عينات اللحوم للماشية والجمال والأغنام مقبولة ولم تتخطى الحدود المسموح بها لمبيد الداي إلدرين .

وقد خلص البحث إلى أن عينات الكبد في ذبائح الحيوانات هي الأكثر تلوثاً بمتبقيات المبيدات الحشرية سواء المبيدات العضوية الفسفورية (الديازينون) أو المبيدات الكلوريدية (الداي إلدرين) تليها عينات الكلى ثم اللحوم كما أوضحت أن عينات الكبد والكلى واللحوم للماشية قد احتوت على معدلات عالية من تلك المبيدات مقارنة بمثيلاتها في الجمال والأغنام.