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Organochlorine Residues in Fish in Rural Areas

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Abstract
A total of 45 samples of fish (Tilapia Nilotica and Claris Lazera) were collected from EL-Bagoria canal and EL-Menofy drainage and Bahr Shibin for detection and determination of Organochlorine pesticides (DDT, aldrin and dieldrin). Organochlorine pesticides could not be detected in Bahr Shibin while mean value of DDT in Tilapia Nilotica from EL-Bagoria canal was 0.37±0.09, mean level of aldrin was 0.33±0.03 and mean level of dieldrin was 0.50±0.20 while in EL-Menofy drainage mean level of DDT was 0.34±0.07, mean level of aldrin was 0.40±0.08 and mean level of dieldrin was 0.40±0.13. While in Claris Lazera samples from EL-Bagoria canal mean level of DDT was 0.40±0.06, mean level of aldrin was 0.25±0.07and mean level of dieldrin was 0. 34±0.08 while from EL-Menofy drainage mean value of DDT was 0.27±0.05, mean level of aldrin was 0.30±0.07 and mean level of dieldrin was 0.48±0.10. Pesticides are major pollutant of water sources which are considered the natural habitat of fish On the other hand , fish could be contaminated by pesticides either directly by gills breathing or indirectly through contamination of feeding items so it is very important to analyze fish samples to detect to what extent the rate of accumulation of pesticides residues in fish flesh and organs.

Keywords: Organochlorine, DDT, aldrin, dieldrin, HPLC.

Introduction

Fish is low-fat high quality protein. Fish is filled with omega-3, Fatty acids, and vitamins such as D and B2(riboflavin). Fish is rich in calcium and phosphorus and great source of iron, zinc, iodine, magnesium, and potassium. The American Heart Association recommends eating fish at least two times per week as part of a healthy diet. Fish is full of protein, vitamins and nutrients that can lower blood pressure and help to reduce the risk of a heart attack or stroke.
Fish are known to be highly nutritious and excellent sources of animal protein which are consumed by larger percentage of the world's population because of its availability and palatability **(Shaltout 2003; Hassan et al.2014; Edris et al.2017a and Saad et al., 2022).** Fish and fish products are in the forefront of improving safety and quality as they are the bestselling foods internationally. Fish and fish products are one of the most important food stuffs as they are one of the cheapest sources of animal protein. Fish is full of essential minerals, vitamins, and unsaturated fatty acids **(Shaltout and Hashim 2002; Hassan and Shaltout ,2004; Shaltout et al. 2015; Edris et al.2017 b and Hassan et al.2019.).** Today, the environmental pollution is considered one the most important problems in the world. The harmful effects of the environmental pollution of pesticides is one of the principal research activities 1962..Contamination of food at animal origin with Organochlorine compounds and their metabolites has been reported in various countries **(Neumann,1988 and Goldman et al.1990).**Residues of Organochlorine pesticides were reported in various food such as fish . The widespread usage of pesticides in Egypt led to many problems and posed a likely threat to fish. Water pollution by pesticides can enter to the natural water sources through direct application of pesticides for aquatic weeds and insects, or by indirect application which include various chemicals used for agriculture then running off industrial wastes and cleaning up of different containers used for pesticides formulations. In Egypt, many authors referred to the presence of such pesticides in fish, water and sediments **(EL-Sarnagawy and Rizk 1978, Abou EL-amyem et al. 1979; EL-Dib andBadawy1985; Abdel Gawaad et al.1989 and EL-Gazzar et al.1989 and Abou-Donia 1990)**.fish has been noticed to contain considerable amounts of Organochlorine pesticide and detected concentration of these pesticides in fish flesh were much reported
Fish has been found to contain significant amounts of organochlorine pesticides and concentration of these pesticides in fish flesh. Fish has long been contaminated with organochlorine pesticides. Organophosphorus pesticides are less persistent than Organochlorine pesticides and many significantly reduce the standing group of fish both by decreasing the nutritive value and or affecting in different stages of fish development. These compounds have short persistence and they could be changed into metabolites which mostly are mostly are toxic than the parent compounds in recent years, pesticides residues in food arises as an important problem of serious public health hazards which may led to acute or chronic hepatic toxicity for human being**.**

When people come into contact with large quantities of pesticide, this may cause acute poisoning or long-term health effects, including cancer and adverse effects on reproduction **(FAO, WHO, 1987).**

Aim of work:

Tilapia Nilotica and Claris Lazera from the EL-Bagoria , EL-Menofy drainage and Bahr Shibin were tested for the presence of DDT, Aldrin, and Dieldrin.

Material and Methods:

Regarding the purpose for detecting and determining organochlorine (DDT, Aldrin, and Dieldrin), 45 fish samples of the species Tilapia Nilotica and Claris Lazera were taken from the EL-Bagoria canal, the EL-Menofy drainage, and Bahr Shibin in the Menofia Governorate.

The collected samples were separately packaged and taken to a lab for examination.

Determination of Organochlorine pesticides:

Organochlorine pesticide determination: Samples were extracted in accordance with **AOAC ,1980 and Pesticide Analytical Manual, 1978.After** being ground for two minutes with 50 grams of samples and 100 grams of anhydrous sodium sulphate in place of 150 grams of 40-60 petroleum ether, the extract was decanted via a 500 ml Buchnov funnel with two wattman filter sheets number 1 and 2.

The extract was concentrated by passing it through a 40x25mm column of anhydrous sodium sulphate, collecting the elutent in a 500ml flask, and using a rotary evaporator. Acetonitrile saturated with petroleum ether and cleanup on extraction with 6 diethyl ether in petroleum ether were used to remove the pesticide residues from the fat. In a rotator evaporator, the eluate was concentrated, and then it was dried in a test tube at 50°C.

Table (1) Statistical analysis of Organochlorine residues (ppb, wet weight) in examined Tilapia Nilotica samples(n=45):

Pesticides	Positive samples in Bahr Shibin(15)		Positive samples in El-Bagoria canal(15)		Positive samples in El-Menofy drainage(15)	
	No.	%	No.	%	No.	%
DDT	0	0%	7	46.6%	8	53.3%
Aldrin	0	0%	3	20%	4	26.6%
Dieldrin	0	0%	3	20%	5	33.3%

Table (2) Mean residue levels of Organochlorine pesticides (ppb, wet weight) in examined *Tilapia* nilotica from EL-Bagoria canal and El-Menofy drainage

	DDT			Aldrin			Dieldrin		
	Min	Max	Mean=± St. error	Min	Max	mean± St. error	Min	Max	Mean ±St. error
El-Bagoria	0.17	0.85	0.37±0.09	0.20	0.40	0.33±0.03	0.25	0.90	0.50±0.20
EL-Menofi	0.15	0.76	0.34±0.07	0.29	0.65	0.40±0.08	0.15	0.85	0.40±0.13

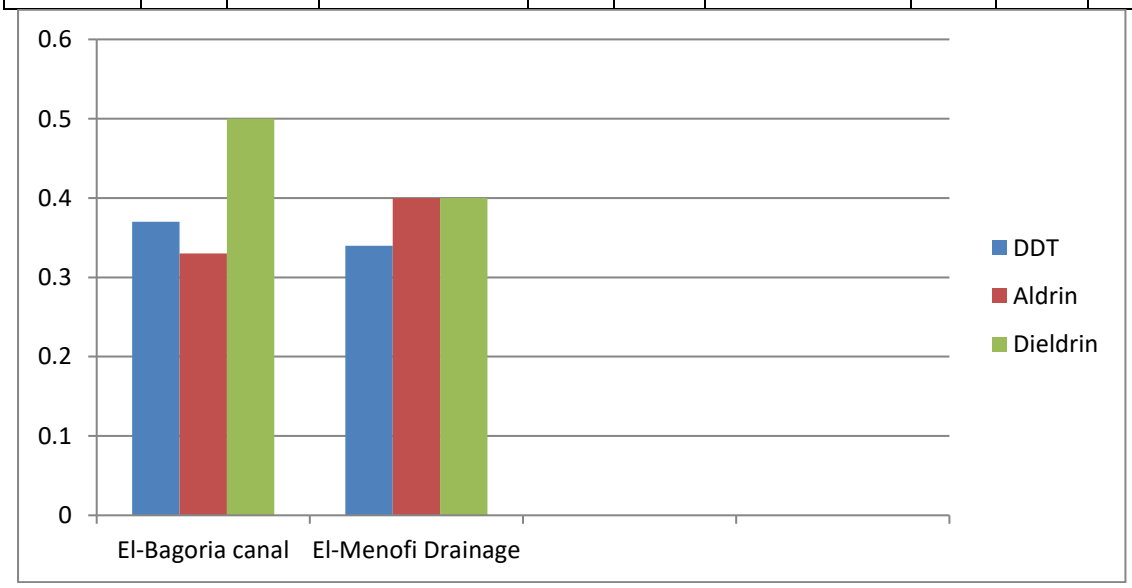

Figure (1): Mean residue levels of Organochlorine pesticides (ppb, wet weight) in examined *Tilapia Nilotica* samples from EL-Bagoria canal and El-Menofy drainage

Table (3) Statistical analysis of Organochlorine residues (ppb, wet weight) in examined Claris Lazera samples(n=45):

Pesticide residues	Positive samples in Bahr Shibin(15)		Positive samples in El-Bagoria canal(15)		Positive samples in El-Menofi drainage(15)	
	No.	%	No.	%	No.	%
DDT	0	0%	5	33.3%	7	46.6%
Aldrin	0	0%	4	26.6%	5	33.3%
Dieldrin	0	0%	6	40%	7	46.6%

Table(4): Mean residue levels of Organochlorine pesticides (ppb, wet weight) in examined *Claris Lazera* samples from EL-Bagoria canal and El-Menofy drainage

	DDT			Aldrin			Dieldrin		
	Min	Max	Mean± St. error	Min	Max	mean± St. error	Min	Max	Mean ±St. error
El-Bagoria	0.25	0.55	0.40±0.06	0.12	0.43	0.25±0.07	0.18	0.67	0.340.08 ±
EL-Menofi	0.10	0.48	0.27±0.05	0.19	0.55	0.30±0.07	0.18	0.96	0.48±0.10

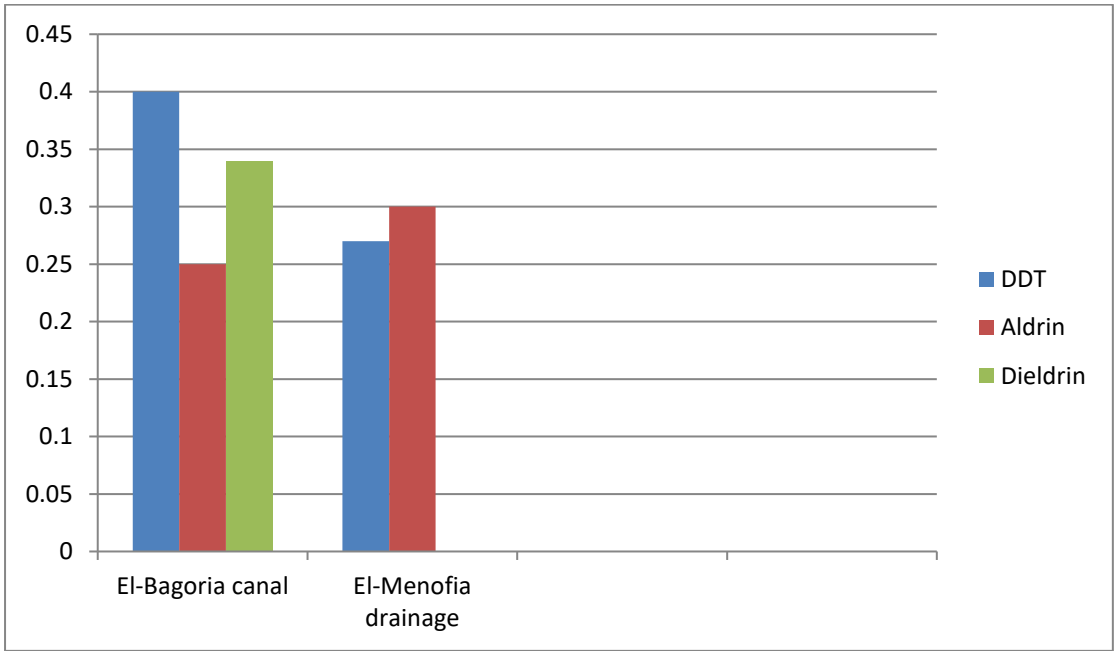

Figure (2): Mean residue levels of Organochlorine pesticides (ppb, wet weight) in examined *Claris Lazera* samples from EL-Bagoria canal and El-Menofy drainage

DISCUSSION

Concerning the high volume of trade worldwide, fish and fish products are considered at the forefront of food safety and quality development. As the cheapest source of animal protein, fish and fish products are among the most important nutrients.

Fish and other aquatic animals are exposed to pesticides in three

main ways ,The first is dermal, where the pesticide is directly absorbed through the skin during swimming in pesticide-contaminated waters, the second is respiratory system, where the pesticide is directly absorbed through the gills while breathing, the third is oral, where the pesticide is consumed when drinking pesticide-contaminated water or eating pesticide-contaminated prey**.** The intake of poisoned fish can lead to human poisoning **(Johnson and Finley (1980)**.

Pesticides are one of the most important contaminants in water sources, which are thought of as the natural habitat of fish. However, fish can be exposed to pesticides indirectly through contaminated diet or directly by gill breathing. Therefore, why it is important to analyze fish. Samples for measuring pesticide deposition in fish flesh.

Ralls and Corles (1972) noted that a significant amount of substances used to protect crops and control disease-carrying insects still contaminate the soil, air,

and water. This is a result of the DDT and its environmental transformation products.

The results in Table 1 revealed that there was no organochlorine was detected in Bahr Shibin while incidence of DDT in Tilapia Nilotica from EL-Bagoria canal was high 46.6 and high also in Tilapia Nilotica samples was 53.3, incidence of aldrin was also high in Tilapia Nilotica from EL-Bagoria canal and incidence dieldrin was also high in Tilapia samples from EL-Bagoria 20 and high in Tilapia Nilotica from EL-Menofy drainage 33.3.

According to table 2 and figure 1, the mean level of DDT concentration in tilapia from EL-Bagoria was 0.37±0.09, mean level of aldrin was 0.40±0.33, and mean level of dieldrin was0.50±0.20, while mean level of DDT was 0.34±0.07, mean level of aldrin was 0.40±0.08, and mean level of dieldrin was 0.40±0.13 from EL-Menofy drainage.

According to Table 3 level of DDT was high in Claris Lazera from EL-Bagoria canal 33.3and in Claris Lazera from EL-Menofy drainage 46.6,aldrin was also high in Claris Lazera from EL-Bagoria 26.6and in Claris Lazera from EL-Menofi drainage 33.3and dieldrin was high in Claris Lazera from EL-Bagoria 40and high also in Claris Lazera from EL-Menofi drainage 46.6

DDT levels in tilapia from the EL-Bagoria canal and EL-Menofy drainage were lower than that recorded by **Sethuraman et al., (2013).**

Mean level of DDT was lower than recorded by **(Khalifa et al.,2020)**

The results of Aldrin in Tilapia Nilotica from EL-Bagoria canal and EL-Menofy drainage were lower than that recorded by **Mohamed et al.,2016** but dieldrin in tilapia was higher than that recorded by **Mohamed et al.,2016**

Mean level of Aldrin and dieldrin was lower than that recorded by **Abbassy et al.,2021.**

Mean level of Aldrin in tilapia was lower than that recorded by **Ali et al.,2016** while mean level of dieldrin in Tilapia Nilotica that detected by **Ali et al.,2016**was higher than my investigation

Aldrin levels in Tilapia Nilotica from the EL-Bagoria canal were lower than that recorded by **Yahia and EL-Sharkawy (2014)**, however they were greater in Tilapia Nilotica from the EL-Menofy drainage.

Dieldrin levels in tilapia in the EL-Bagoria canal and EL-Menofy drainage are greater than that recorded by **Botaro et al., in 2011**.

While the mean level of dieldrin recorded by **Ali et al.,2016** was higher than my investigation, the mean value level of aldrin in Claris Lazera recorded by **Ali et al., 2016** was lower.

Mean level of aldrin and dieldrin in Claris Lazera were lower than that recorded by **Hassan et al.,2020.**

Mean level of Aldrin was higher than that recorded by **EL-Sayed et al.,2021.**

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