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CHEMICAL AND MICROBIOLOGICAL STUDIES ON SOME EGYPTION FISH AFFECTED BY WATER MEDIA POLLUTION

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ABSTRACT

This study was conducted to evaluate the potential hazardous associatd with two different species of fresh water fish, bolti (*Tilapia nilotica*) and karmout (*Clarias sp.*) caught from River Nile, Abbassa aquaculture and channel of Bahr El-Bakar (Sharkyia Governorate). Microbial contaminations and heavy metals levels were determined in the fish and water collected from different sources as well as, superoxide dismutase enzyme activity (SOD) in fish organs. The results showed that water samples collected from channel of Bahr El-Bakar were more polluted with heavy metals such as (Pb, Cd, Mn and Cr) and microorganisms, followed by water samples collected from Abbassa aquaculture, while, water samples collected from River Nile were the lowest in contamination; similarly , fish samples caught from channel of Bahr El-Bakar were more polluted with heavy metals and microorganisms, followed by fish samples caught from Abbassa aquaculture, then fish samples caught from River Nile. Karmout fish was more polluted than bolti fish. Moreover, the liver of all fish samples caught from River Nile possessed the highest activity value of SOD.

INTRODUCTION

In Egypt, River Nile and its branches are subjected to different types of pollution such as discharge of domestic, industrial and agricultural wastes as well as dead animals.

Chemical and microbiological contaminants are main sources for economic losses of fish as well as food poisoning and infections.

Fish usually contain the normal bacterial flora from their environment in addition to the contaminates picked up during harvesting and handling of the fish. The predominant bacteria belong to the genera *Pseudomonas, Achromobacter, Moraxella, Acinetobacter, Flavobacterium and Vibriobacteria.* Also, *Micrococcus, Bacillus and Clostridium* occur variably in small numbers. The increase in the numbers of these bacteria results in spoilage of the fish. Coliforms should be absent or present in very low numbers. Other pathogens should not occur since these organisms are not part of the normal flora of the fish or their environment. Their presence thus, indicates contamination (FAO, 1979).

The presence of metals in the environment is partially due to natural processes such as volcanic activity and erosion, but it is mostly due to result of industrial wastes (liquid and solid) (PNUE, 1984).

Consumption of the polluted fish with heavy metals especially the mercury and lead are exteneous to metabolic function of organisms; being therefore hazardous to man (USFDA, 1974).

Determination of the changes in enzyme activities is one of the used methods of monitoring environmental pollution. Isamah *et al.,* (2000) and Achuba (2002) established the direct relationship between superoxide dismutase activity and lipid peroxidation.

This investigation was designed to determine the quality and safety characteristics of two kinds of Nile fish, i.e. bolti (*Tilapia nilotica*) and karmout (*Clarias sp.*) fish collected from different sources, i.e. River Nile, Abbassa aquaculture and channel of Bahr El-Bakar, as well as, evaluation of the water of these sources.

MATERIALS AND METHODS

1- Materials :

-Samples: Two different species of fresh fish (bolti, *Tilapia nilotica* and karmout, *Clarias sp.*) as well as water samples were collected from River Nile (Giza Governorate), Bahr El-Bakar (Sharkia Governorate) and Abbassa (Sharkia Governorate).

-Preparation of samples : Ten grams of a representative fish muscle samples were taken and homogenized.

2-Methods :

The TDS and temperature were determined by drying method as described in the standard methods for the examination of water and waste water as reported by A.P.H.A. (1985). Suspended solids (S.S) were measured by the method described by the standard methods for the examination of water and waste water as reported by A.P.H.A. (1985).The total bacterial count was determined using tryptic glucose yeast agar medium. It is recommended by A.P.H.A. (1980) and A.O.A.C. (2000). The coliform bacteria were determined using Machonkey agar medium according to the method described by A.P.H.A. (1976) and Difco manu(1984). *Staphylococcus aureus* was determined using Baird Parker Base agar medium. It is recommended by Baird Parke(1969).Yeast and molds were determined using Malt agar medium. It is recommended by A.P.H.A. (1976). Dissolved oxygen (DO) was determined for all water samples according to the method described in the standard methods for the examination of water and waste water as reported by A.P.H.A. (1985). The pH of the water samples was measured by using pH meter (HANNA) model HI 9321401 according to Ben-Gigirey *et al.*, (1998). The biological oxygen demand (BOD) was determined for all water samples according to the method described in the standard method for the examination of water and waste water as reported by A.P.H.A. (1985). Total volatile nitrogen (T.V.N) was determined according to the method described by A.O.A.C. (2000). Trimethylamine (T.M.A) as an index of fish freshness determined according to the method reported by A.O.A.(2000). 6- Thiobarbituric acid value (T.B.A) was determined as described by the method of Pearson (1970). Moisture, protein, fat and ash were analyzed according to A.O.A.C 2000). The heavy metals, i.e. lead (Pb), iron (Fe), copper (Cu), cadmium (Cd), manganese (Mn), cromium (Cr), nickel (Ni), and mercury (Hg) were determined in fish and water samples by using Perkin Elmer atomic absorption spectrophotometer model 2380 according to A.O.A.C. (2000). About 1g of the clean organs tissues were exactly weighed in homogenizer tube, then 5 ml of saline solution (0.9 % NaCl) were added, after homogenation the mixture was centrifuged at 3.000 r.p.m for 15 min, then filterated. Superoxide dismutase activity was determined in organs (liver and brain) according to Wolliams *et al.,* (1983) using Randox Laboratory Kits, BT 294QY. Data were analyzed using ANOVA and Duncan's test at a probability level of < 0.05 according to SAS INSTITUTE (1987).

RESULTS AND DISCUSSIONS

Physical characteristics of water samples i.e. temperature, total dissolved solids and suspended solids, as collected from River Nile, Abbassa aquaculture and channel of Bahr El-Bakar were tabulated in table (1). The results showed a significant defferences in the (TDS) and (S.S) between water samples collected from different sources. The highest values were in the Bahr El-Bakar sample which had more contamination. The obtained results showed that channel of Bahr El-Bakar sample contained the highest TDS and SS values (3258 and 346 mg/L) respectively, followed by Abbassa aquaculture sample (1222 and 229 mg/L) respectively, while River Nile sample contained the lowest values (306 and 59 mg/L) respectively. These results are in agreement with those reported by Ammar (1999), who reported that the River Nile water contained 362 mg TDS/L at Manyal and Giza regions. These may be due to magnitude of contamination in Bahr El-Bakar region. Lasheen *et al.*, (1982) reported that suspended solids are introduced into the natural bodies of water by natural forces, e.g. weathering, biosynthesis, or by man-made activities, e.g. sewage discharge, dreding and agricultural excavation.

No significant differences in the temperature and pH of water were found between all samples as shown in table (1). Table (1) showed that the higher value of DO concentration was recorded at River Nile sample being 9.22 mg/L, while the lowest value was measured at channel of Bahr El-Bakar sample being 5.11 mg/L, however, value of DO concentration at Abbassa aquaculture being 6.00 mg/L.These results are in agreement with those found by Abd El-Fattah (2002).

Table (1) shows also the variation of BOD of water samples collected from different sources. Results indicated that the River Nile water sample had the lowest BOD value being 6.2 mg/L, while channel of Bahr El-Bakar water sample had the highest BOD value (18.5) mg/L, followed by Abbassa aquaculture water smple (10.21 mg/L). The increase in BOD of Bahr El-Bakar water sample may be attributed to the biological matters as a result of the increment of agricultural and industrial waste water discharges in this area. Abd El-Hamid and El-Zareef (1996) attributed the highest BOD values of El-Manzalah lake water (Egypt) due to the organic contaminants from the sewage effluents and industrial waste water discharges into the lake.

Dissolved oxygen (DO) was in agreement with that of (BOD), i.e. the higher of (DO) and the lowest of (BOD) (Table, 1).

Table (1): Physico-chemical characteristics,heavy metals concentration and microbiological analysis of water samples collected from different sources

Analysis	Sources	River Nile	Abbassa aquaculture	Channel of Bahr El-Bakar
Physico chemical characteristics	Temp(C)	15.20 ± 0.09[a]	15.50 ± 0.09[a]	15.40 ± 0.09[a]
	D.O(mg/L)	9.22 ± 0.18[a]	6.00 ± 0.09[b]	5.11 ± 0.09[c]
	pH	8.53 ± 0.20[a]	8.66 ± 0.20[a]	8.76 ± 0.20[a]
	BOD(mg/L)	6.20 ± 0.46[c]	10.21 ± 0.91[b]	18.50 ± 1.02[a]
	T.D.S (mg/L)	306 ± 5.23[c]	1222 ± 8.10[b]	3258 ± 12.14[a]
	S.S (mg/L)	59.0 ± 2.61[c]	229 ± 2.94[b]	346 ± 4.65[a]
Heavy metals concentration (mg/L)	Lead (Pb)	0.125 ± 0.00[c]	0.175 ± 0.01[b]	0.325 ± 0.02[a]
	Iron (Fe)	6.52 ± 0.28[b]	11.03 ± 0.64[a]	3.0 ± .22[c]
	Copper (Cu)	0.1890 ± 0.01[a]	0.1875 ± 0.01[a]	0.0675 ± 0.00[b]
	Cadmium (Cd)	0.110 ± 0.00[a]	0.095 ± 0.01[b]	0.117 ± 0.01[a]
	Manganease (Mn)	1.005 ± 0.04[b]	1.0625 ± 0.06[b]	1.47 ± 0.08[a]
	Cromium (C r)	1.425 ± 0.06[b]	1.40 ± 0.08[b]	1.80 ± 0.10[a]
	Nickel (Ni)	0.67 ± 0.03[b]	1.54 ± 0.09[a]	1.225 ± 0.07[b]
	Mercury (Hg)	0.1015 ± 0.01[a]	0.10 ± 0.01[a]	0.1065 ± 0.01[a]
Microbiological analysis (cfu/ml)	Total plate count	$1.8x10^5$ ± 9128.7[b]	$2x10^5$ ± 9128.7[b]	$4x10^5$ ± 16832.5[a]
	Total coliform	$7x10^3$ ± 456.4[b]	$3.5x10^4$ ± 912.87[b]	$2.6x10^5$ ± 18257.4[a]
	Staphylococcus aureus	$4.5x10^2$ ± 9.13[b]	$2x10^3$ ± 91.29[b]	$1x10^4$ ± 912.87[a]
	Yeast&Molds	$6x10^2$ ± 18.26[c]	$6x10^3$ ± 216.02[b]	$5x10^4$ ± 1825.74[a]

Data are represented as means ± Standard Error .
Means with the same letters in the same column are not siginificantly different (P>0.05) using ANOVA .

Results recorded in table (1) show the heavy metals concentration in water samples collected from different sources.The water samples collected from channel of Bahr El-Bakar had the highest values of lead, cadmium, manganese and cromium concentrations being 0.325, 0.117, 1.47 and 1.80 mg/L, respectively,while, water sample collected from Abbassa aquaculture had the highest values of iron (11.03mg/L) and nickel (1.54 mg/L) , on the other hand, water sample collected from River Nile had the lowest values of these heavy metals. These results might indicate that water sample collected from channel of Bahr El-Bakar had higher polluted materials, followed by Abbassa aquaculture sample, these may be due to the industrial and agricultural wastes and pesticides.

These results are nearly similar to those results obtained by Osheba (1998).

No significant differences were found between different water samples for mercury, while, the Bahr El-Bakar samples had the lowest values of iron and copper. The highest value of nickel was recorded for Abbassa aquaculture water , followed by, Bahr El-Bakar water, then River Nile water.

Soltan and Awadallah (1995) found that nickel might be adsorbed on the suspended matters and distributed in the River Nile water (from Aswan into the outlet). Dean *et al.*, (1972) mentioned that the high levels of mercury in water from different locations can be attributed to industrial wastes from paper mills, organic and inorganic chemicals, alkalies, chlorine, fertilizer, petrochemicals and petroleum refining.

From the results in table (1), it could be noticed that, in all water samples collected from different sources, lead, cadmium and mercury concentrations were higher than the allowable limits (0.1, 0.005 and 0.001 ppm) respectively as recommended by WHO (1984). Also, manganese, cromium, iron and nickel concentrations were higher than the allowable limits (0.05, 0.05, 0.3 and 0.02 ppm) respectively as recommended by the E.O.S (1995). On the contrary, concentration of copper was less than the permissible limit (1.0 ppm) as recommended by USEPA (1986).

It is evident from the microbiological results given in table (1) that water samples collected from channel of Bahr El-Bakar had the highest values of total plate count, total coliform, *Staphylococcus aureus* and yeast and molds being 4×10^5, 2.6×10^5, 1×10^4 and 5×10^4 cfu/ml, respectively, followed by water samples collected from Abbassa aquaculture being 2×10^5, 3.5×10^4, 2×10^3 and 6×10^3 cfu/ml, respectively, then water samples collected from River Nile being 1.8×10^5, 7×10^3, 4.5×10^2, and 6×10^2 cfu / ml respectively.

No significant differences were found between samples collected from River Nile and Abbassa aquaculture for total plate count, total coliform and *Staphylocooccus aureus*, but there were significant differences for yeast and molds.

The above results indicated that water collected from channel of Bahr El-Bakar was more polluted with microorganisms than those collected from River Nile and Abbassa aquaculture which might give some indication about the hygienic quality of the fish.

It is known that coliforms are natural inhabitants of the alimentary tract of man and other mammals and therefore, their presence in relatively large numbers in fishes may be due to contamination of such fishes with polluted water (Frazier, 1988). Nearly similar coliform counts were reported by Osheba (1998).

Chemical analysis of fresh bolti and karmout fish collected from River Nile, Abbassa aquaculture and channel of Bahr El-Bakar was carried out, and the results are presented in table (2).

No significant differences were found between fish samples collected from different sources of water for moisture. Total protein count (N × 6.25) of fish samples indicated that karmout fish recorded the lower values of protein content as compared with the bolti fish. On the other hand fat content of fish samples indicated that bolti fish recorded the lower values of fat content, while karmout fish showed the highest values of fat content.

It is notable that, karmout fish is specified as a fatty fish (> 5% fat).

Total volatile nitrogen basis (T.V.N-B) and trimethylamine (T.M.A) contents are considered to be very important constituents which reflect quality of fresh fish. Usually these measures are used as indicator of the bacterial spoilage rather than as indicator of freshness as was reported by Ryder *et al.,* (1984).

Data in table (2) show the total volatile nitrogen (T.V.N) levels (as mg/100g sample). Fish samples (bolti and karmout) collected from River Nile had the lowest values of T.V.N with significant differences, while, fish samples (bolti and karmout) collected from channel of Bahr El-Bakar had the highest values of T.V.N.

No significant differences were found between bolti and karmout collected from different sources of water for T.V.N, while, significant differences were found between bolti and karmout fish samples which collected from different sources of water for T.M.A.

Trimethylamine (T.M.A.) mostly used as an index of fish quality specially those of salt water fish (El-Saaid Basuni, 1993).

Thiobarbituric acid values (T.B.A) of fresh bolti fish and karmout fish collected from different sources of water are presented in table (2).

It could be observed that karmout fish collected from different sources of water had higher values of T.B.A, while, bolti fish samples had lower values of T.B.A. Thiobarbituric acid (T.B.A) values mainly used as indicator for lipid oxidation (El-Saaid Bassuni, 1993).

Results recorded in table (3) show heavy metals concentrations in bolti and karmout collected from different sources of water. From the data, there were significant differences between heavy metals concentrations in bolti and karmout. Generally, karmout fish samples which collected from different sources of water had more concentrations of all determined heavy metals than that in bolti fish.

Bolti and karmout fish samples caught from channel of Bahr El-Bakar had the highest values of Pb, Cd, Mn and Cr concentrations being (1.8 and 2.6); (0.49 and 0.54); (2.29 and 4.63) and (8.6 and 17.7) mg/kg, respectively, followed by, Abbassa aquaculture for Pb, Mn and Cr concentrations being (1.40 and 2.20); (1.60 and 3.51) and (7.10 and 11.20) mg/kg respectively, while, bolti and karmout fish samples caught from River Nile had the lowest concentrations of Pb, Mn and Cr concentrations being (0.80 and 1.9); (1.32 and 2.73) and (3.40 and 7.50) mg/kg, respectively.

These results went parallel with the heavy metals concentration in the water samples collected from these sources (Table, 1). Also, these results were relatively similar to those of Osheba (1998) who found that the level of cadmium concentration in muscle of bolti and catfish collected from Shibin El-Kom canal ranged from 0.0862 to 0.4670 and 0.08812 to 0.6179 ppm respectively.

The above results indicated that fish samples caught from channel of Bahr El-Bakar was more polluted with heavy metals.

On the other hand, these results showed that Pb and Cr concentrations in bolti and karmout fish caught from different sources of water were higher than the permissible limit (0.5 and 1.0 ppm) as recommended by FAO (1983).

Also, Cd concentrations in all bolti and karmout fish samples were higher than the permissible limit (0.1 ppm) as recommended by EOSQC (1991).

Bolti and karmout fish samples caught from Abbassa aquaculture had the highest concentrations of iron and nickel being (19.06 and 25.44) and (3.61 and 6.21) mg/kg respectively, followed by, bolti and karmout fish samples caught from River Nile (15.87 and 21.72 mg/kg) for iron, and bolti and karmout samples caught from channel of Bahr El-Bakar (2.11 and 2.83 mg/kg) for nickel. The highest concentrations of copper in bolti and karmout fish samples were recorded for samples collected from River Nile 1.25 and 1.75 mg/kg respectively, followed by fish samples collected from Abbassa aquaculture, while, fish samples collected from channel of Bahr El-Bakar were the lowest concentrations of copper which may be due to River Nile being near pollution sources of copper. These findings are in agreement with those obtained by Osheba (1998) who reported that copper concentration in bolti and catfish collected from Shibin El-Kom canal ranged from 0.8173 to 2.037 and 0.9259 to 2.0561 ppm, respectively.

Data presented in table (3) showed that fish samples (bolti and karmout) collected from different sources of water were lower than the permissible limits (10.0 and 0.3 ppm) for Cu and Hg respectively as recommended by FAO (1983).

The activity of superoxide dismutase (SOD) enzyme in organs (liver and brain) was measured and tabulated in table (4).

These results indicate that the liver and brain samples of bolti and karmout fish collected from River Nile possessed the highest activity values of SOD, followed by, the liver and brain samples of fish collected from Abbassa aquaculture, while, the channel of Bahr El-Bakar samples possessed the lowest activity values of SOD. Moreover, the SOD enzymes of the liver of all fish samples were more active than the brain SOD enzymes, also, the liver and brain SOD enzymes in bolti fish of all samples were of higher activities than that of liver and brain samples of karmout fish.

The higher level of SOD activity in *Malaperurus electricus* may, therefore be hinged on intrinsic biological factor of the fish (Landner, 1986), oxygen levels (Smith, 1992) and high levels of pollutants in its environment (Achuba, 2002). Generally, the changes in SOD activities corroborate the changes in levels of lipid peroxidation.

Table(2) : Chemical analysis of edible part of bolti and karmout fish samples collected from different sources of water

Samples / Analysis	Bolti			Karmout		
	River Nile	Abbassa aquaculture	Channel of Bahr El-Bakar	River Nile	Abbassa aquaculture	Channel of Bahr El-Bakar
Moiture%	74.83 ± 0.61^{a}	74.98 ± 0.61^{a}	75.05 ± 0.63^{a}	76.52 ± 0.66^{a}	76.23 ± 0.63^{a}	76.47 ± 0.61^{a}
Protien %	20.85 ± 0.29^{a}	20.42 ± 0.26^{ab}	20.04 ± 0.26^{b}	17.33 ± 0.24^{c}	17.16 ± 0.24^{c}	16.64 ± 0.20^{c}
Fat%	2.90 ± 0.09^{d}	3.10 ± 0.09^{d}	3.42 ± 0.10^{c}	4.50 ± 0.11^{b}	5.14 ± 0.10^{a}	5.30 ± 0.12^{a}
Ash%	1.42 ± 0.05^{c}	1.50 ± 0.05^{c}	1.49 ± 0.05^{c}	1.65 ± 0.05^{a}	1.47 ± 0.05^{c}	1.59 ± 0.05^{ab}
T.V.N (mg/100g sample)	16.10 ± 0.35^{d}	18.20 ± 0.41^{ab}	18.90 ± 0.41^{a}	16.80 ± 0.38^{d}	17.50 ± 0.41^{bc}	18.20 ± 0.41^{a}
T.M.A (mg/100g sample)	2.80 ± 0.09^{e}	3.64 ± 0.10^{d}	3.92 ± 0.10^{d}	4.20 ± 0.12^{c}	4.62 ± 0.12^{b}	5.04 ± 0.13^{ab}
T.B.A. (mg malonaldhyde/ kg sample)	0.2789 ± 0.01^{c}	0.2219 ± 0.01^{d}	0.1993 ± 0.01^{d}	0.5743 ± 0.01^{a}	0.278 ± 0.01^{c}	0.3655 ± 0.01^{b}

Data are represented as means ± Standard Error .
Means with the same letters in the same column are not siginificantly different (P>0.05) using ANOVA .

Table(3): Heavy metals concentration (mg/kg)of edible part of bolti and karmout fish collected from different sources of water

Samples	Bolti			Karmout			Safe limit
	River Nile	Abbassa aquaculture	Channel of Bahr El-Bakar	River Nile	Abbassa aquaculture	Channel of Bahr El-Bakar	
Lead	0.80 ± 0.05^{e}	1.40 ± 0.05^{d}	1.80 ± 0.07^{c}	1.9 ± 0.14^{c}	2.20 ± 0.08^{b}	2.60 ± 0.11^{a}	0.5
Iron	15.87 ± 0.62^{d}	19.06 ± 0.81^{c}	14.86 ± 0.92^{d}	21.72 ± 0.88^{b}	25.44 ± 0.99^{a}	15.76 ± 0.62^{d}	-
Copper	1.25 ± 0.07^{b}	0.82 ± 0.03^{c}	0.80 ± 0.03^{c}	1.75 ± 0.07^{a}	1.63 ± 0.06^{a}	0.89 ± 0.03^{c}	10.0
Cadmium	0.44 ± 0.02^{c}	0.35 ± 0.01^{d}	$0.49 \pm 0.^{abc}$	0.50 ± 0.02^{ab}	0.43 ± 0.02^{c}	0.54 ± 0.02^{a}	0.1
Manganease	1.32 ± 0.08^{e}	1.60 ± 0.06^{e}	2.29 ± 0.09^{d}	2.73 ± 0.11^{c}	3.51 ± 0.14^{b}	4.63 ± 0.18^{a}	-
Cromium	3.40 ± 0.13^{e}	7.10 ± 0.26^{d}	8.60 ± 0.48^{c}	7.50 ± 0.29^{cd}	11.20 ± 0.43^{b}	17.7 ± 0.74^{a}	1.0
Nicle	1.58 ± 0.06^{e}	3.61 ± 0.20^{b}	2.11 ± 0.09^{d}	2.52 ± 0.10^{cd}	6.21 ± 0.24^{a}	2.83 ± 0.11^{c}	-
Mercury	0.1630 ± 0.00^{a}	0.1581 ± 0.00^{a}	0.1580 ± 0.00^{a}	0.1954 ± 0.01^{a}	0.1635 ± 0.00^{a}	0.1631 ± 0.00^{a}	0.3

Data are represented as means ± Standard Error .
Means with the same letters in the same column are not siginificantly different ($P>0.05$) using ANOVA .

The results in table (4) confirm the possible implication of SOD activity in general defense against environmental disturbances.

Table (4): Superoxide dismutase enzyme activity in some fish organs collected from different sources of water(u/mg protein)

Samples		SOD activity (u/mg protein)	
		Liver	Brain
Bolti	River Nile	212.60 ± 5.16[a]	32.25 ± 0.73[a]
	Abbassa aquaculture	185.10 ± 1.27[b]	16.09 ± 0.20[c]
	Channel of Bahr El-Bakar	149.75 ± 1.96[c]	11.22 ± 0.58[d]
Karmout	River Nile	162.00 ± 1.28[c]	22.65 ± 0.58[b]
	Abbassa aquaculture	140.19 ± 2.89[d]	16.86 ± 0.49[c]
	Channel of Bahr El-Bakar	114.34 ± 8.07[e]	8.81 ± 0.41[e]

Data are represented as means ± Standard Error .
Means with the same letters in the same column are not siginificantly different (P>0.05) using ANOVA .

Data presented in table (5) showed the microbiological characteristics (total plate count, total coliform, *Staphylococcus aureus* and "yeast and molds") in edible part of bolti and karmout fish collected from different sources of water.

The results indicated that numbers of microorganisms, i.e. total plate count, total coliform, *Staphylococcus aureus* and "yeast and molds" in karmout fish samples which collected from different sources of water were higher than that of bolti fish samples, also these levels in bolti and karmout caught from channel of Bahr El-Bakar were the highest, followed by samples caught from Abbassa aquaculture, while, samples which caught from River Nile were the lowest levels. These results come into li e with the results of the microbiological characteristics of water (Table, 1) which might indicate that water from channel of Bahr El-Bakar had higher polluted materials than water from River Nile and Abbassa aquaculture. The above results indicated that fish samples caught from channel of Bahr El-Bakar were more polluted with microorganisms than those caught from River Nile and Abbassa aquaculture which might give some indication about the hygienic quality of the fish.

The above results in table (5) showed that total coliform and *Staphylococcus aureus* in bolti and karmout fish caught from different sources of water were higher than the allowable limits (100 and 1000 cfu/g respectively), while, total plate count in bolti and karmout fish caught from different sources of water lower than the allowable limits (1000.000 cfu/g) as recommended by EOSQC (1991). Except ion was karmout sample collected from channel of Bahr El-Bakar which was higher than the same limit.

Table(5) Microbiological characteristics of edible part of bolti and karmout fish samples(cfu/g) collected from different source of water .

Samples	Bolti			Karmout			Safe limit
	River Nile	Abbassa aquaculture	Channel of Bahr El-Bakar	River Nile	Abbassa aquaculture	Channel of Bahr El-Bakar	
Total plate count	$7.3x10^4$ ± 4564.35^e	$2.5x10^5$ ± 9128.71^d	$6.9x10^5$± 49441.8^b	$5.3x10^5$ ±20615.5^c	$8.0x10^5$ ±42622.3^b	$1.8x10^6$ ±91287.0^a	1000,000 cfu/g
Total coliform	$1 x 10^4$ ± 912.87^c	$1.5 x 10^4$ ± 912.87^c	$3.2x10^4$ ± 912.87^c	$1.8x10^4$ ± 912.87^c	$2x10^5$ ± 9128.71^{bb}	$9.5x10^5$ ± 69402.2^a	100cfu/g
Staphylococcus aureus	$4x10^4$ ± 2380.4^c	$5x10^4$ ± 3109.1^c	$7.3x10^4$ ± 4564.3^c	$8.8x10^4$ ± 4262.2^c	$1.8x10^5$ ± 9128.7^b	$9x10^5$ ± 60277.1^a	1000cfu/g
Yeast&Molds	$4.5x10^2$ ± 9.13^c	$9x10^2$ ± 58.45^c	$2x10^3$ ± 91.29^c	$2.7x10^3$ ± 182.57^c	$2x10^4$ ± 912.87^b	$7x10^4$ ± 4564.35^a	-

Data are represented as means ± Standard Error .
Means with the same letters in the same column are not siginificantly different (P>0.05) using ANOVA .

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دراسات كيميائية وميكروبيولوجية على بعض الأسماك المصريه المتأثرة بتلــوث البيئة المائية

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تقوم هذه الدراسة علي تقييم المخاطر الكامنة لتلوث البيئة المائية المرتبطة بنوعين مختلفين من أسماك المياه العذبة وهما البلطي والقرموط والتي تم صيدها من نهر النيل ، والمزرعة السمكية بالعباسة وقناة بحر البقر بمحافظة الشرقية. حيث تم تقدير التلوث الميكروبي والتلوث بالعناصـر الثقيلة في المياه والاسماك التى تم جمعها من االمصادر المختلفة السابقة.

كما تم تقدير نشاط إنزيم السوبر أوكسيد ديسميوتيز في الأعضاء. وقد أوضحت النتائج أن عينات المياه التي تم جمعها من قناة بحر البقر كانت أكثر تلوثاً بالعناصر الثقيلة مثل (الرصـاص والكادميوم والمنجنيز والكروميوم) والميكروبات الدقيقة يليها مياه المزرعة السمكية بالعباسة ، بينما كانت عينات مياه نهر النيل الأقل تلوثاً. وبالمثل عينات االاسماك التي تم صيدها من قنـاة بحـر البقر كانت أعلي تلوثاً بالعناصر الثقيلة والميكروبات الدقيقة يليها عينات الاسماك التي تم صيدها من المزرعة السمكية بالعباسة ثم عينات الاسماك التي صيدت من نهر النيل ، أيضاً كـان سـمك القرموط أعلي تلوثاً من سمك البلطي ، علاوة علي ذلك فإن عينات الكبد لجميع أنواع الاسـماك التي صيدت من نهر النيل كانت الأعلي في نشاط إنزيم السوبر أوكسيد ديسميوتيز.