Original Article

Impact of Water Quality Changes on Hematological, Biochemical and Gonads Histology of Oreochromis Niloticus from Two Types of Water

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ABSTRACT

Background: There are many sources of water in fish farming. Most fish farms use the Nile River and agricultural drainage water in culture; it is the subject of research in this study.

Aim of the Study: This study was conducted to evaluate the effect of different sources of water on hematological, biochemical and gonads histology of Oreochromis niloticus.

Materials and Methods: Two fish farm Nile tilapia (O. niloticus) irrigate with different water sources supplied by fresh and drainage water. Fish and water samples were taken once biweekly during the study period to measure both Physico-chemical of water, and blood profile. At the end of the experiment, sample of 10 fish were taken from each types of water pond for measuring gonads histology.

Results: The results showed that, the highest values of pH, ammonia, nitrite and nitrate and decreased dissolved oxygen from drainage water. The results showed that, O. niloticus collected from drainage water recorded the highest values of alanine aminotransferase (ALT), aspartate aminotransferase (AST), glucose, uric acid, creatinine cholesterol, and urea. Also, the mean concentrations of the biochemical parameters were high from drainage water compared to fresh water and detecting some changes of gonads histology of fish in drainage water.

Conclusion: From the results that were mentioned inferred that, the agricultural drainage water affected more than fresh water on hematology, biochemical parameters and gonads histology of fish O. niloticus.

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Key Words: Biochemical parameters, hematological parameters, oreochromis niloticus, physico-chemical characteristics, .

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INTRODUCTION

In Egypt, the most prevailing aquaculture practice is the semi-intensive earthen ponds. In last 15 years the intensive aquaculture farming has grown increasingly, especially in the deserts of northern Sinai based on agricultural drainage waters.The development of fish farming in relation to production sources was 85 thousand tons in 1997, in the year 2000 to 340 thousand tons, an increase of 354 thousand tons in 3 years, and in the year 2013 reached 47% of production sources, so it was at the top of the list for fish production in Egypt.

Fish constitute an important class of organisms based on their use as an indicator of pollution. It is necessary to observe some clinical parameters in order to determine the lethal pesticides as pollutants in fish physiology. The use of hematological parameters as indicators of stress can provide thoughtless information regarding the physiological interaction of fish in a changing environment. Within organic pollutants, pesticides are considered to be most dangerous for aquatic organisms. Water pollution has negative effects on all kinds of organisms, whether plant or animal. Also, the physical and chemical properties of water such as temperature, pH, DO and nitrates, all affect the health of fish[1]. Physico-chemical properties changes in the aquatic environment often cause blood changes that cause physiological disturbances in fish. Some studies have shown that animal health can be known as chemical and enzymatic parameters of blood[2]. Blood profile studies as well important for environmental control and the relationship between blood properties and the ability of a species to adapt to the environment[3]. Changes in the activity of liver enzymes such as alanine aminotransferase (ALT), aspartate aminotransferase (AST) act as an indicator of normal liver function, and can also be used as biomarkers of tissue damage[4].

The present study aimed to demonstrate the dynamics of physicochemical environmental parameters in two types of waters, fresh and drainage water. Also the effects of varying water quality on the changes of hematological, biochemical parameters and gonads histology of the Nile tilapia (O. niloticus).

MATERIAL AND METHODS

A) Study area description

In this study, 2 Nile tilapia farms were included. Irrigated

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with different water sources as the follow fish farm (A) was supplied by fresh water from Ismailia Canal (Nile water) and a private fish farm (B) supplied with agricultural drainage water from connector of EL-Abbassa agricultural drainage water, and the two farms were at Abbasa, Sharkia.

B) Water quality assessment

Water samples were taken randomly from types of water pond once every biweekly during the study period (March-May 2019). Water quality criteria, PH, water temperature, DO and total dissolved solids (TDS) were measured in the fish farm pond. Total suspended solids (TSS), nitrite (NO_2), nitrate (NO_3) and ammonia (NH_3), sampling and assessment of water quality were done according to the traditional manual methods[5].

C) Fish samples collection

Samples of O. niloticus were collected once every biweekly from March to May, 2019. After that, the fish were transported to the laboratory for measuring Hematological and biochemical blood. At the end of the experiment, sample of 10 fish were taken from each types of water pond for examine gonads histology. With mean weight 50-70g, and mean total length 13-15 cm. Specimens were transported alive to the laboratory.

D) Blood samples

Fish were fasted for 24 hours, and blood obtained from the dorsal vain using 3 ml syringes in less than 3 minutes to reduce handling stress. The collected blood was divided into two tubes, one containing heparin as anticoagulant agent for hematological assessment and the other was anticoagulant free for biochemical estimation.

E) Hematological and biochemical measurements

After the collection blood samples were taken to the laboratory at the same day for assessment of hematological parameters: white blood cells (WBC) , Red blood cells (RBC), hemoglobin concentration (Hb), hematocrite (Hct), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC), using the fully automatic hematological analyzer (Sysmax XE-2100, Japan) according to[6].

The remainder of the blood sample obtained in the centrifuge tube was collected without anticoagulants, centrifuged at 3000 rpm for 10 minutes. Plasma samples were maintained clear at -20 °C until analysis following the described method by[7]. Colorimetric determinations of the specified biochemistry parameters were made using the Optical Spectrophotometer (Jasco-V530). The absorption of the detected sample was examined with a suitable wavelength, from 320 to 550 nm according to the parameter tested. alanine aminotransferase (ALT), aspartate aminotransferase (AST), cholesterol, glucose, creatinine, urea and uric acid.

F) Histological examination of gonads

Gonads were prepared for the histological examination by fixing in 10% neutralized formalin solution followed by dehydration in gradual series of alcohol. Clearing, embedding in paraffin wax and transverse sections (4-6 µm) thickness were obtained, and stained with eosin and hematoxylin then mounted with Canada balsam and covered with a glass cover, then examined with light microscope.

G) Statistical analysis

Statistical analysis was performed using ANOVA analysis and Duncan test to determine differences between treatments at the significance level of 0.05 Standard errors were also appreciated[8]. All graphics and tables were made by using Microsoft excel (1997).

RESULTS

A) Physico–chemical parameters of Water analysis

Water analysis parameters including temperature, total dissolved and suspended solids. PH, dissolved oxygen, nitrite, nitrate and ammonia are shown in (Table 1). Most of the measured, physical and chemical parameters satisfied the highest values in agricultural water. Average values of total dissolved solids (TDS), total suspended solids (TSS), pH, nitrite (NO_2), nitrate (NO_3) and ammonia (NH_3) were recorded to be highly significant ($p<0.05$) in the agricultural drainage water compared to the fresh water except for dissolved oxygen and water temperature.

B) Hematological variables

The statistical analysis of these variables showed differences between two types of water. The mean values of WBC, RBC, Hb, HCT, and MCV in the blood of O. niloticus in fresh water were highly significant ($p<0.05$) from drainage water. In contrast, MCH, and MCHC in drainage water increased from fresh water (Table 2).

C) Biochemical variables

The concentrations of alanine aminotransferase (ALT), aspartate aminotransferase (AST), glucose, uric acid, creatinine cholesterol, and urea, in the blood serum of O. niloticus were measured. Average concentrations of all biochemistry parameters were significantly high ($P<0.05$) in the blood plasma of fish tilapia collected from drainage water compared to those sampled from fresh water (Table 3).

D) Interaction between Hematological and biochemical parameters in two types of water

Interaction coefficients (Pearson correlation) between hematological parameters and biochemistry of freshwater were done, to compare the Hematological and biochemical parameters values were utilized for calculation of Pearson correlation coefficients (r) (Values greater than 0.05). Firstly, it should be noted the two hematological parameters had high correlations values among themselves, WBC correlated strongly with HCT and MCH (r 0.97, 0.99 respectively) and MCV with MCHC (r 0.99). Biochemical parameters AST strongly correlated with cholesterol, glucose and Cereatinin (r 0.91, 0.98 and 0.92 respectively) and glucose with creatinin and urea (r 0.97 and 0.83 respectively). Secondly, high correlations value was found between hematological parameters and biochemical parameters, HCT with AST, cholesterol, glucose and Cereatinin(r 0.99, 0.93, 0.98 and 0.90 respectively) and MCH with glucose and Cereatinin (r 0.99and 0.98 respectively), (Table 4). Also (Table 5) shows the correlation coefficient in the agricultural drainage water, and there is a correlation between the treatments, but it is much lower than in the freshwater.

E) Histological examination

The microscopic examination of the ovary during maturation stage in fresh water was done. The nucleus has migrated toward the periphery and it is in the process of dissolution, deposition of the yolks and the fat globules, which increases the size of the mature egg. The oocyte membrane at this stage of maturity has become well developed, and the placenta consists of a thin outer layer (Theca layer), followed by a cellular layer of epithelial follicles (Granulosa) and most of the inner non-cellular layer (Zona radiata). Also, the cytoplasm loses its basal nature and became completely occupied with yolk granules. Also, the yolk sacs (cortical vesicles) are observed in the circumference of the egg (Figures 1,2). On the other hand, fish ovary in the drainage water, showed few mature ova beside the atretic ova which possessed irregular vacuolization, cell degeneration, and a very thin membrane rupture (Figures 3,4). For the microscopic examination of the testis during maturation stages of fish live in fresh water, showed that condensed number of normal semineferous tubules of varying sizes and these tubules possessed different stages of spermatogenic cells (Figures 5,6). As regard to the fish live in the drainage water, showed number of empty semineferous tubules and dissociation of the intertubular tissue in the testicular structure. Some semineferous tubules showed dark clusters of sperms (Figures 7,8).

Fig. 1: Histological sections of O. niloticus during maturation stage in fresh water. Notice the following thecal cell (Th), yolk granulose (Gn) and zona radiata (Zn) and nucleus (N) (200X) (100 um)

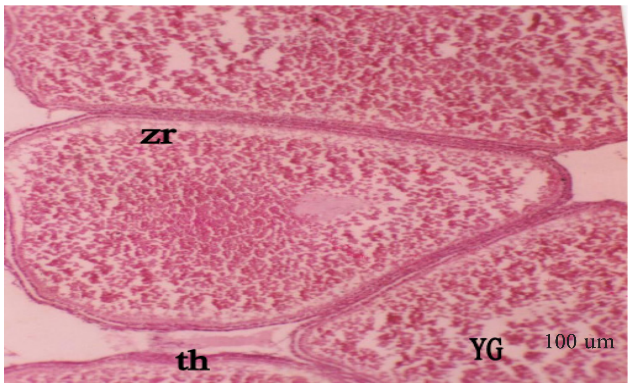

Fig. 2: Histological Sections of the ovary of O. niloticus in fresh water shwed that oocyte membrane thecal cell (Th), yolk granulose (Gn) and zona radiata (Zn) (X 400) (100 um)

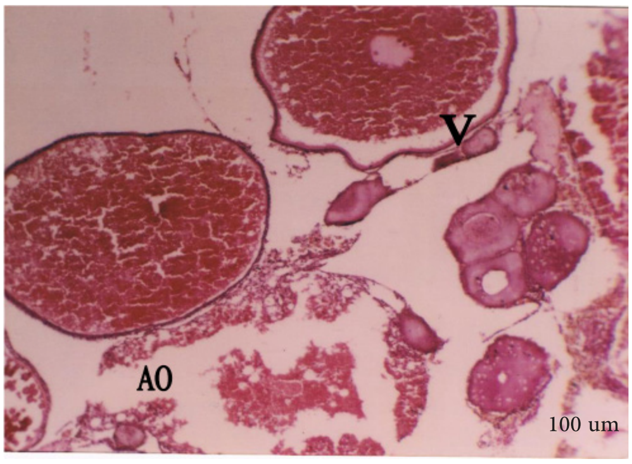

Fig. 3: Histological Sections of the ovary of O. niloticus in drainage water notice, atretic oocytes with breaking down of zona radiate (zr), irregular vacuolization (V), and cytoplasmic degeneration (X 200) (100 um)

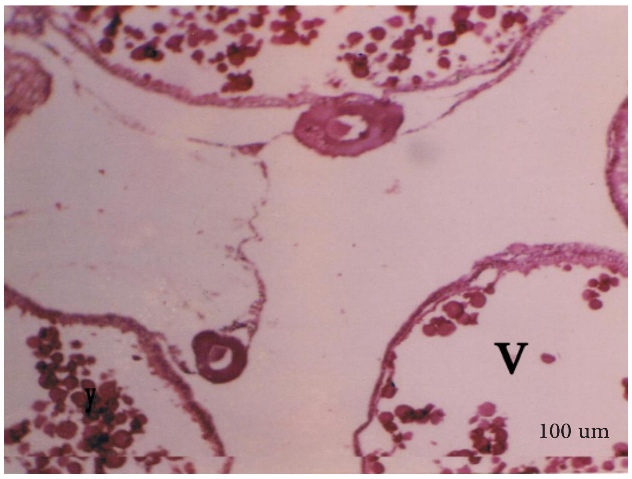

Fig. 4: Histological Sections of the ovary of O. niloticus in drainage water, notice, liquefied yolk (Y), cytoplasm very thin membrane and wide area of vacuoles (V) (X 400) (100 um)

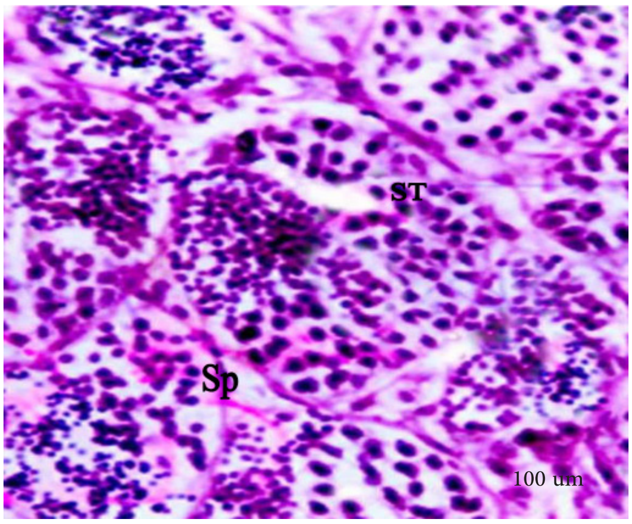

Fig. 5: Histological Sections of the testis of O. niloticus in, fresh water showing great number of normal semineferous tubules (ST) and with dark clusters of sperms. (H&E.X 200) (100 um)

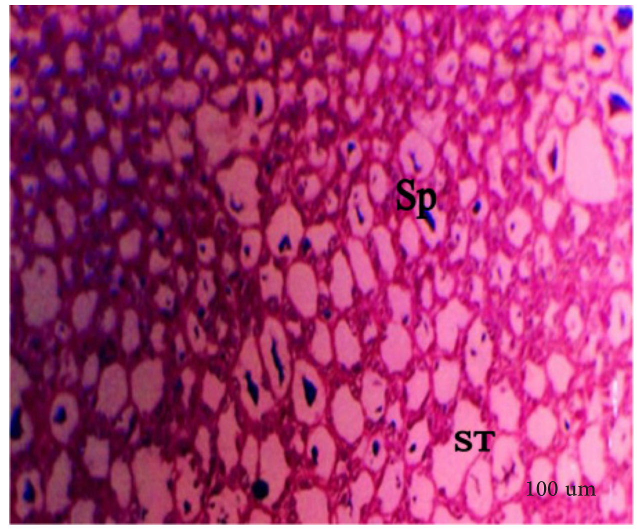

Fig. 7: Histological Sections of the testis of O. niloticus in drainage water showing some seminerferous tubules (ST) with dark group of sperms (Sp) and many empty seminerferous tubules (.X100) (100 um)

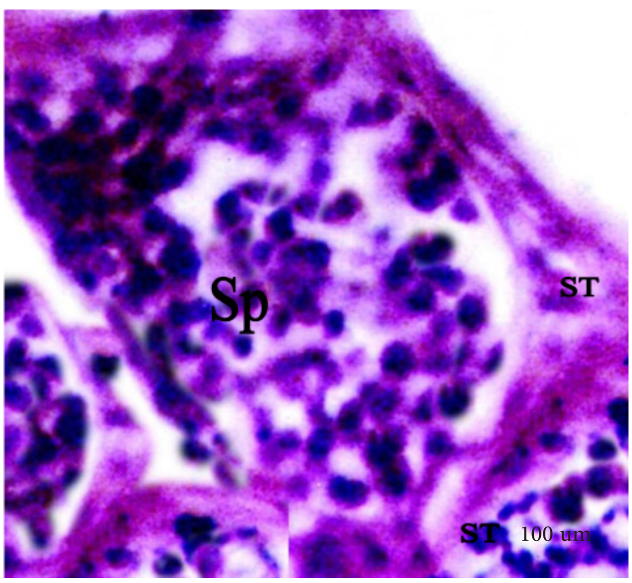

Fig. 6: Histological Sections of the testis of O. niloticus in, fresh water showing enlarged semineferous tubules (ST) and filled with sperm (X 400) (100 um)

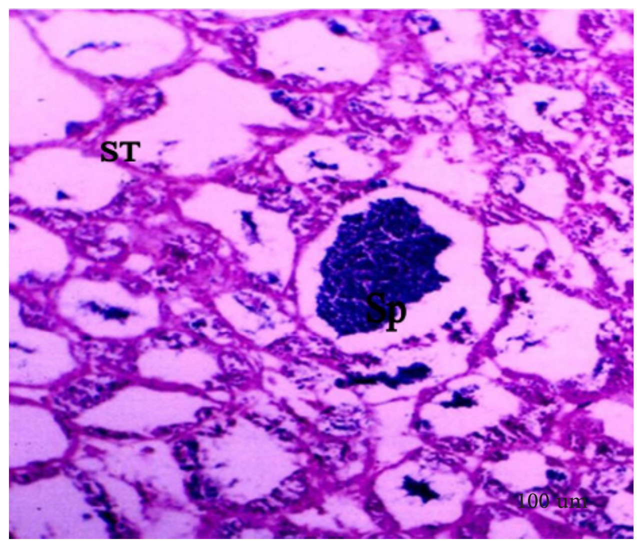

Fig. 8: Histological Sections of the testis of O. niloticus in, drainage water showing Is empty semineferous tubules (ST) and There are a few dark sperms on black spots (X 200) (100 um)

Table 1: Physico-chemical parameters (Mean ± SE) of water samples in drainage and fresh water in the month March to May 2019

parameters	March		April		May	
	Fresh water	drainage water	Fresh water	drainage water	Fresh water	drainage water
Temperature	19.2±0.49	18.4±0.34	23.5±0.60	23.5±0.52	27.4±0.69	26.9±0.81
TSS mg/l	48.4±2.4	125.4±1.3	60.8±3.3	135.4±1.9	68.1±5.7	133.2±1.5
TDS mg/l	125.1±2.7	271.3±6.6	189.3±4.3	248.7±7.5	242.2±3.7	254.1±7.3
pH	7.5±0.1	8.2±0.2	7.5±0.2	8.1±0.1	7.4±0.1	8.2±0.2
DO	5.8±0.3	4.9±0.4	5.4±0.3	4.4±0.1	5.9±0.3	4.7±0.2
NO_2 µg/l	18.4±1.6	59.6±4.4	29.5±3.4	99.1±5.3	52.4±4.1	58.3±3.6
NO_3 µg/l	47.6±4.4	102.1±1.2	39.2±3.6	85.1±0.4	56.4±7.6	164.1±2.0
NH_3 µg/l	270.8±5.9	804.3±19.4	261.2±7.8	734.8±12.4	294.3±7.3	798.6±16.5

Table 2: Hematological parameters of O. niloticus (Mean ± SE) collected from types of water during three months March to May 2019

parameters	March		April		May	
	Fresh water	drainage water	Fresh water	drainage water	Fresh water	drainage water
WBC(10^3/ µL)	26.6±3.0	27.0±1.2	27.7±3.0	22.4±1.4	28.5±2.5	21.1±1.9
RBC(10^6/ µL)	2.1±0.6	1.8±0.05	2.2±0.2	1.5±0.1	1.8±0.7	2.2±0.3
HG (g/dL)	9.4±0.7	6.9±0.3	9.7±0.6	8.0±0.6	9.3±0.9	7.8±0.6
HCT (%)	21.5±0.1.1	20.9±1.8	25.9±1.9	20.7±1.4	27.2±1.8	21.3±0.9
MCV(fL)	128.1±2.2	114.8±3.3	127.4±1.8	124.4±2.1	128.8±1.9	120.1±1.7
MCH(Pg)	36.6±4.1	45.5±4.6	46.7±4.9	41.6±3.9	57.1±3.4	38.7±3.2
MCHC(g/dL)	29.6±2.9	28.0±1.7	27.0±1.3	30.7±2.8	31.6±2.0	30.8±1.6

Table 3: Biochemical parameter of the blood of O. niloticus (Mean ± SE) collected from types of water during three months March to May 2019

parameters	March		April		May	
	Fresh water	drainage water	Fresh water	drainage water	Fresh water	drainage water
ALTU/I	14.6±1.2	19.2±1.5	14.9±1.1	25.4±2.4	14.4±2.0	22.5±2.0
ASTU/I	15.2±2.1	25.7±2.1	17.8±1.4	37.5±2.2	18.8±2.5	34.4±2.6
Cholesterol(mg/dl)	136.2±5.4	202.9±5.4	147.3±6.2	171.8±2.4	145.6±5.3	197.7±4.7
Glucose(mg/dl)	55.8±6.4	67.9±5.4	62.9±5.8	87.8±6.3	67.8±4.1	75.6±3.1
Creatinine (mg/dl)	0.54±0.07	2.4±0.2	0.91±0.11	2.4±0.2	1.5±0.17	2.5±0.5
Urea(mg/dl)	19.8±2.1	35.4±2.6	20.1±1.4	37.8±1.3	24.7±1.4	42.7±3.2
Uric acid	3.7±0.2	5.2±0.52	3.1±0.1	4.6±0.18	3.8±0.3	5.0±0.8

Table 4: Correlation analysis matrix between hematology and biochemical measurements in fresh water fish

	WBC	RBC	HG	HCT	MCV	MCH	MCHC	ALT	AST	cholesterol	glucose	Cereatinin	urea	Uric acid
WBC	1													
RBC	-0.65465	1												
HG	-0.15107	0.846154	1											
HCT	0.977329	-0.47976	0.061646	1										
MCV	0.419314	-0.96077	-0.96077	0.217595	1									
MCH	0.995068	-0.72641	-0.24839	0.951507	0.507299	1								
MCHC	0.349957	-0.93723	-0.97888	0.143686	0.997176	0.441153	1							
ALT	-0.31241	0.922613	0.986241	-0.1042	-0.9934	-0.4051	-0.99921	1						
AST	0.987184	-0.52563	0.008617	0.998592	0.269061	0.966485	0.195977	-0.15681	1					
cholesterol	0.839003	-0.13794	0.411129	0.935188	-0.14217	0.780891	-0.2161	0.254779	0.915086	1				
glucose	0.999894	-0.64359	-0.13668	0.980306	0.406065	0.99352	0.336294	-0.29856	0.989401	0.846829	1			
Cereatinin	0.975359	-0.8053	-0.36544	0.906535	0.609274	0.982433	0.548007	-0.51429	0.92765	0.698282	0.972047	1		
urea	0.847326	-0.95616	-0.65299	0.715676	0.837426	0.895827	0.794018	-0.7692	0.751715	0.421939	0.839512	0.943615	1	
Uric acid	0.041533	-0.78247	-0.99394	-0.17095	0.924473	0.140438	0.950492	-0.9621	-0.11845	-0.50881	0.026996	0.260944	0.565807	1

Table 5: Correlation analysis matrix between hematology and biochemical Measurements in drainage water fish

	WBC	RBC	HG	HCT	MCV	MCH	MCHC	ALT	AST	cholesterol	glucose	Cereatinin	urea	Uric acid
1														
-0.28934	1													
-0.92764	-0.08909	1												
-0.39068	0.994192	0.018621	1											
-0.78085	-0.37207	0.957662	-0.27001	1										
0.974199	-0.49791	-0.81942	-0.58836	-0.61971	1									
-0.98389	0.113528	0.979469	0.219798	0.879963	-0.91815	1								
-0.76638	-0.39317	0.950838	-0.29193	0.999739	-0.60162	0.868886	1							
-0.89274	-0.173	0.996418	-0.06599	0.978577	-0.76801	0.958914	0.97362	1						
0.452057	0.723037	-0.75248	0.64449	-0.91023	0.239079	-0.60426	-0.91945	-0.80548	1					
-0.64889	-0.54058	0.886108	-0.4469	0.982025	-0.46043	0.774481	0.986079	0.922126	-0.97203	1				
-0.67047	0.904194	0.344865	0.944911	0.060032	-0.82062	0.527011	0.037223	0.264257	0.358707	-0.12946	1			
-0.87393	0.718119	0.629173	0.788846	0.378766	-0.96108	0.772948	0.357533	0.561194	0.038479	0.197269	0.946562	1		
0.601859	0.590301	-0.85656	0.5	-0.96886	0.406093	-0.73495	-0.97427	-0.89713	0.984419	-0.99818	0.188982	-0.13783	1	1

DISCUSSION

The quality of water and the well-being of fishes are interconnected and directly proportional. Fluctuations of any of the parameters strongly affect organisms, especially fish[9]. The relationship between the quality of depleted water and the abundance of fish in the delta region, which is directly proportional to the water quality as well as oxidative stress, the incorporation of both anti-oxidant defenses as well as oxidative damage, is a common effect in organisms exposed to pollutants in their environment[10].

Temperature is an important parameter in the aquatic environment, its effects on growth rate, activity, reproduction processes and susceptibility to diseases[11]. In the present study, water temperature, was converged between them in both types of water. The changes of water temperature may depend on the variations in air temperature, latent heat of evaporation and different sampling times[12].

PH plays an important role in biodiversity of fish in the aquatic environment. The optimum pH, value of fish production range from 6.5 to 9.0, while pH 4.0 lead to death, at pH 4.0-5.0, fish not reproduce, at pH 4-6.5 show slow growth and at pH 11 is the alkaline death[13]. The increase in pH values at agricultural drainage water may be attributed to the intensive vegetation and phytoplankton which were accompanied by photosynthetic activity and consumption of CO_2[14,15].

Dissolved oxygen is very important factor to the aquatic organisms which decomposes organic materials, essential for respiration mention by[16]. In the present study, the depletion in oxygen at agricultural drainage water may be due to the increase in oxidative processes of organic, material mentioned by[17]. Furthermore, the depletion of DO may be attributed to oxidation, decomposition of the agricultural waste and pesticides[18].

Total dissolved and suspended solid, are due to carbonates, chlorides and nitrates of calcium, sodium, potassium and manganese, organic matter, salt and other particles[19]. TSS and TDS had the highest values in the drainage water. The tolerance of fish species to variations in TSS and TDS concentrations depends on physiological adaptation[20].

Nitrite was high in drainage water, It consider an intermediate state of nitrogen oxidation both in the oxidation of ammonia to nitrate or reduction of nitrate, such oxidation and reduction occur in waste water treatment and water distribution systems[21]. The high level of nitrites can be attributed to the decomposition of the organic matter present in the wastewater, the nitrosomonas bacteria oxidizes ammonia to nitrites through the process of denitrification[22]. On the other hand, the low values of nitrite might be attributed to the rapid conversion of NO_2 by nitrobacteria to NO_3[23].

Nitrate concentration in agriculture drainage water was higher than that from fresh water. This may be due to that agriculture drainage water is rich in nitrate content. Moreover, the high level of ammonia in agriculture drainage ponds water may be nitrified to nitrate due the high concentration of the available dissolved oxygen[24]. The low values of nitrate might be attributed to the uptake of nitrate by natural phytoplankton and its reduction by denitrifying bacteria and biological denitrification[22]. On the other hand, the increase of nitrate levels may be attributed to low consumption of phytoplankton as well as, the oxidation of ammonia by biological nitrification[22].

Ammonia (NH_3) was higher in agricultural drainage water than fresh water and this may be due to decomposition of organic matter. The formation of ammonia depends on the pH and temperature. Also, the increase of ammonia concentration may be attributed to the activity of denitrifying bacteria which are much higher under anaerobic conditions as mentioned by[25]. On the other hand, the decrease in the ammonia concentrations was related to the decrease in biological activities of aquatic organisms and nitrification in the water column as investigated at fresh water[22].

Hematological and biochemical parameter are affected by a variety of environmental pressures, they have the ability to be used as biomarkers of pollution of the Nile[26]. Blood parameters and biochemistry of fish are affected by several factors such as reproduction, health, and external factors such as water temperature, environmental quality, food and stress[27]. In this study, the values of RBC, Hb, HCT and MCV were higher in fish live in drainage water. Several studies have shown that the RBC, Hb, HCT, and MCV of fish show a decrease rate after exposure to different pollutants[28]. The observed reduction in RBCs, Hb, Hct and MCV values may be attributed to heamdilution of blood due to the destruction of mature RBCs and the inhibition of erythrocyte production[29].

According to research published in biochemical changes in fish blood, this indicates inappropriate environmental conditions or the presence of stress factors[30].

ALT and AST belong to nonfunctional plasma enzymes, which are usually localized within the liver, gills, and other organs[31]. In the present study, ALT, and AST concentrations in blood serum was higher than in the drainage water than that of fresh water fish. The same results were previously reported in blood of tilapia and African catfish after exposure to pesticides[32] and heavy metals[33]. ALT levels indicate the environmental adaptation to leakage into the bloodstream due to the presence of water toxicity[34].

Change in the cholesterol concentrations in the blood is a sensitive indicator of liver impairment because lipid balance is one of the main functions of the liver[35]. In the present work, the blood cholesterol level was higher in the fish live in the drainage water compared to fresh water; this increase can be explained by liver damage, which was previously detected in fish from the Nile[36,37]. Blood glucose level has been used as a sign of environmental stress to show changes in carbohydrate metabolism in a stressful state[30]. The levels of glucose was higher the drainage water fish as compared to fresh water ones. Chemical pollutants such as heavy metals modulate the metabolism of carbohydrates, and this causes high blood glucose by stimulating glycolysis in fish[38]. High levels of blood glucose were recorded from fish exposed to UV radiation and other pollutants[32,39]. Results in this study showed higher levels of creatinine, urea and uric acid in fish blood in waste water; similar results were reported[40].

Different pollutants, such as agricultural wastes of water, as well as different types of bacteria have histological effects on the tissues of fish gonads[41]. These effects may disturb the development of germ cells and may reduce the ability of fish to reproduce, while metal accumulation occurring in the testis, affects[42]. Also, the testis of fish collected from contaminated water revealed a defect in sperm formation and lobular structures also restricted sperm production was observed in previous studies.[43].

In the present study, during maturation stage of females live in fresh water, number of well-developed mature ova was found in normal condition, with the presence of cytoplasmic granules, yolk vesicles at the periphery and well developed thick ovarian membrane with clear distinct layers. On the other hand, the fish in the drainage water, shows severe damage to the ovary which represented by decreasing in number of mature ova. Some mature ova were observed with irregular membrane.

Also, examinations of the testis of O. niloticus in fresh water showed number of normal semineferous tubules with different spermatogenic stages and groups of sperms. On the other hand, in drainage water empty seminerferous tubules and congested blood vessels that were embedded the interstitial tissues were observed in testis of some males whereas other testes appeared with dead cloudy sperms.

CONCLUSION

From the present results it can be concluded that the change of Physico-chemical parameters of the water that are used in fish farming affect its activity. Analysis of blood profile and examination of gonads showed a significant difference in fish live in drainage water than that of fresh water, which indicates the presence of pollutants in drainage water.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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الملخص العربى

تأثير التغيرات في جودة المياه على مكونات الدم والمواد البيوكيميائيه والغدد التناسلية فى مرحله الطور اليافع فى سمكه البلطى النيلى فى نوعين من الماء

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الهدف من الدراسة: استخدام مصادر مياة مختلفه في تربية الأسماك حيث تستخدم معظم المزارع السمكية مياة نهر و في هذه الدراسة تم استخدام مياة الصرف الزراعى لمعرفه مدى ملائمتها للاستزراع عن طريق تقييم بعض مكونات الدم والتغيرات البيوكيميائيه والتغير فى الانسجه التناسليه فى موسم التفريخ اثناء الطور اليافع للاسماك محل الدراسه.

المواد والأساليب: تم أخذ عينات من الأسماك والمياه مرة كل أسبوعين خلال فترة الدراسة لقياس كل من التغيرات الفيزيائية والكيميائية للمياة ومكونات الدم . في نهاية التجربة تم أخذ عينة من 10 أسماك من كل نوع من المياه من كلا النوعين لقياس المناسل فى مرحله الطور اليافع.

النتائج: اظهرت نتائج القياس ان مياة الصرف الزراعى كانت اعلى فى كل من المواد الصلبة الذائبة (TDS) ، إجمالي المواد الصلبة العالقة (TSS) ، الرقم الهيدروجيني ، النتريت (NO2) ، النترات (NO3) والأمونيا (NH3) مقارنة إلى المياه العذبة باستثناء الأكسجين المذاب ودرجة حرارة الماء. اما بالنسبه للتغيرات البيوكيميائيه كانت اعلى فى مياة الصرف عن المياة العذبه. واظهرت نتائج مكونات الدم ان مياة العذبه سجلت قيم اعلى عن مياة الصرف الزراعى حيث كانت القيم المتوسطة لـ WBC و RBC و Hb و HCT و MCV في المياة العذبه اعلى من مياة الصرف الزراعى. في المقابل زادت MCH و MCHC في مياه الصرف الزراعى من المياه العذبة. وعند فحص الغدد التناسليه لكل من المبايض والخصيه اظهر اختلافات كبيرة بين النوعين من المياة.

الاستنتاج والتوصيات: من هذة النتائج يمكن استنتاج أن التغيير فى الصفات الفيزيائية والكيميائية للمياه المستخدمة في تربية الأسماك يؤثر على نشاطها. وأظهر تحليل مكونات الدم وفحص الغدد التناسلية اختلافًا كبيرًا في الأسماك التي تعيش في مياه الصرف الزراعى عن تلك الموجودة في المياه العذبة ، مما يشير إلى وجود ملوثات في مياه الصرف الزراعى. لذلك اثرت أكثر من المياه العذبة على مكونات الدم والتغيرات البيوكيميائية والأنسجة الغددية للأسماك. من خلال هذة الدراسه عند استخدام تلك المياة لابد من التحاليل اللازمه قبل استخدامها ومعرفه مدى ملائمتها للاستزراع.