

Effect of environmental pollutants on ectoparasites on three types of Tigris fish

Prof. Dr. Yassien Hussien Owaied Dr Ashraf Jamal
Mahmoud Hala Mahmood Esmaeel

Univ. of Tikrit Univ. Coll. of Education of Women Depa. Of Biology Depa.
Corresponding author; Prof. Dr. Yassien Hussien Owaied

Abstract : Two aspects were included in this study: - The first one is related to the investigation of some physical and chemical properties of the Tigris River water in the Tikrit city. The second side was the diagnosis of the parasitic animal groups on three types of Tigris river fish, and the determination of the incidence ratio of the parasites and its intensity. The study showed changes in some physical and chemical properties of the water during the study period that extended from October 2017 to the end of March 2018, as there are fluctuations in the temperature in the range between (28.7-10.2) for air and (29.0-10.2) for air wile, The pH range was between (8.9-7.8). The brownness ranged from (28.0 to 20.9) the average of sodium ions ranged from (21.6 to 14.2) mg / L, potassium was between (5.5-2.0) mg / L, the average of total dissolved solids ranged between (282-202) mg / L, the dissolved oxygen value was ranged between 8.0-4.8 mg / L, and the biological requirement was ranged from (5.2-1.8) mg / L, the value of the total fermentation was (200-300) mg / l and the value of the sulphate was between (110.4-73) mg / L, During the above period collected (633) fish belonging to three types were collected, and it related to the Cyprinidae family and the Mugilidae Family. The results of the examination showed that it was infected with 3 types of parasites, with three different types of fungi. Among these species were *Dactylogyrus vastator*, 3.1% in carp, 6.5% in pharynx and *phoxine Dactylogyrus*, 0.7% in coarse thickness, The percentage of infection in fish fish is 4.3%, and *Bychowskylla qahauri* and the ratio of the incidence of carp in the normal carp 5.8%.

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I. Introduction :

The volume of fresh water consumption from human sources has increased rapidly, far outpacing the speed of population growth over the past three centuries with the increase in water consumption (35 times). While the population rose to seven times (L'vovich and White, 1990). Water pollution is the biggest challenge for all developing countries, undermining economic growth as well as the physical and environmental damage to billions of people (Mateo-sagasta et al., 2017). Despite the importance of large water in the distribution of living organisms by nature may be a reason for the destruction of these organisms when they are contaminated, it is the environment in which the reactions of chemical and biological within the living bodies (Hoketal., 2001, 2000). Water physical and chemical properties are one of the most important determinants of the use of water for different purposes, and the organisms present in the water show a great sensitivity to any change in the physical and chemical properties of the aquatic environment in which they live. These factors effect the nature of the living organisms in which they live (Melo and Hazar, 2000). As it was found on the surface of the earth before the presence of man and since he knew it began to use force. After the scientific development and knowledge of fish, oils and vitamins and proteins have been greatly cared for (Lagler, 1962). Hence the importance of the study of fish life and the study of the conditions affecting the fish, including many health problems such as parasitic diseases. Fish disease is dependent on several factors Near the breeding and living areas of the source of pollution this includes not only chemicals but even transparency and heat. These conditions reduce the increase in fish resistance and thus reduce the increased chance of disease and parasites (Nikolsky, 1963).

Objective of the study was : study some physical and chemical characteristics of the Tigris River died in the city of Tikrit and diagnosis ecto parasitic animal group on three types of fish of that region and Determination of the severity and severity of fish infection parasites and the spread of parasites recorded on fish.

Materials and Methods of Work: A- Study Area : The study area is located in the province of Salah al-Din, located in the middle section of Iraq, and is limited between the widths 33.45-35.20 north and the longitudes of 42.30 - 45.10 east, and the river djlh where about 250 kilometers in different areas of nature composition and geomorphology. The River Tigris is one of the most important rivers in Iraq, directly into Iraqi territory from

Turkey. The river is 1,718 kilometers from the source to the estuary. The length of the river in Iraq is 1418 kilometers. It is the 39th river in the world in length.

Study stations (sampling stations) Studying Stations :**The first station (St. 1) - (control sample)** Located on the Tigris River just downstream by 150 meters the nature of the rocky bedrock bottom.

Second Station (St. 2): At the downstream area, this plant was sampled from untreated contaminated water.

Third Station (St. 3) : Located 25 meters from the downstream area.

Fourth Station (St. 4) : It is located 75 meters from the downstream area.

Fifth station (St.5): Located 150 meters from the downstream area.

Fourth Station (St. 6) : Located 300 meters from the downstream area.



Image (1) Description of the study area General description of study area

B- Sample collection: Water samples were taken from five different sites on the Tigris River (one sample per month) during the study period from October 2017 to March 2018.

C-Physical and chemical tests:**Water Temperature:** - The temperature of air and water was measured by mercury (0.2-0.0 ° C and 0.1 ° C).

Turbidity: - Water polarity was measured using HANA-LP 2000 (Turbidity Meter) and is expressed in Nephelometric Turbidity Unit (N.T.U) units.

Electrical Conductivity: Water permeability was recorded on the power transmission using Oyster Conductivity Meter

Total Dissolved Solid (T.D.S):The measurement was done using the Tester Type O.Deter Oyster electronic device

pH: Use an Oyster pH meter

Oxygen Concentration Measurement (DO) Dissolved Oxygen: Whnkler, 1882 (Mackereth, 1963) was followed to determine the dissolved oxygen expressed as (mg / l)

Biological Oxygen Demand (BOD):by (APHA,1985)

Total Hardness:by (ASTM, 1984)

Sulphate:by APHA (1985)

Sodium Ion:by (Vogel, 1961)

Potassium Ion: - The flame emission method was used using a Flame photometer

D-Fish sampling: Fish were randomly harvested three times a week during the period (October 2017 to March 2018), where 633 fish were taken back to the Carpathian and Bahia families. Fish were caught in several different ways: by Gill , Hook ,using cast nets ..

Fish Inspection:The sample was examined directly, and others were frozen until the examination within three days of freezing Installation and conservation of parasites Fixation & Preservation of Parasites: Some primary animals were diagnosed directly without any technique of pigmentation or stabilization. Parasite measurements were taken when detected through swabs taken from the host's body. The parasite was placed on a slide after placing a drop of Normal Sline solution and was dyed with a diameter of the Lugal iodine. The cover was then placed under the microscope. The slide was placed with nail polish around the lid to avoid dryness of the diaphragm during examination and diagnosis.

E-Statistical analysis: Anova used statistical data analysis to study the effect of the months of the year on quantitative alvoid properties. Use the Qi-square test by Steel & Torrie to compare the differences in the percentage of infection with the major parasite populations of the fish species studied.

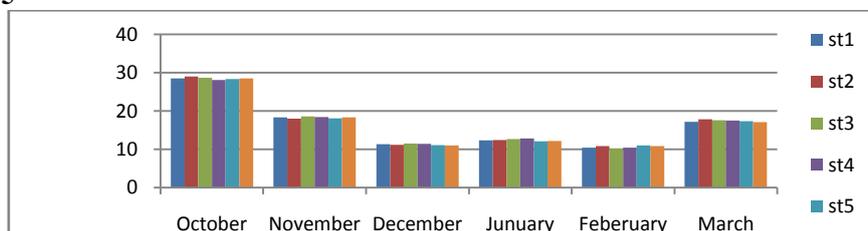
II. Results and discussion

Physical and chemical factors:

-Water Temperture:The results of the present study showed clear monthly differences in air temperatures. The chemical, pyelological and hydrological characteristics of river water are influenced by many factors including

climate, vegetation and geological properties (Wetzel, 2001) . Water temperature is an important determinant of water density directly associated with salinity, which determines the distribution of living organisms in water bodies (Smith, 2004)

The results of the statistical analysis of water temperature showed no significant spatial differences between the stations, but there were significant temporal differences between the stations at a significant level of $P < 0.05$



Figure(1) Spatial and temporal variation in water temperature

Turbidity: The results showed varying levels of brownness ranging from 28.0 to 20.9, with the highest value being 28.0 in February 2018 at the fifth station (150 meters) and the lowest value of 20.9 in December 2017 at the fourth station (75 meters) 3-4 that the brownness in the water of the stations did not match the standard specifications for Iraqi drinking water (Central Agency for Standardization and Quality Control, 1996) and the World - (CEOH, 2003; US-EPA, 2003; NTU 10>. **The results of the statistical analysis of the watercolor showed significant spatial differences between the stations but there were no significant temporal differences between the stations at a significant level of $0.05 P <$**

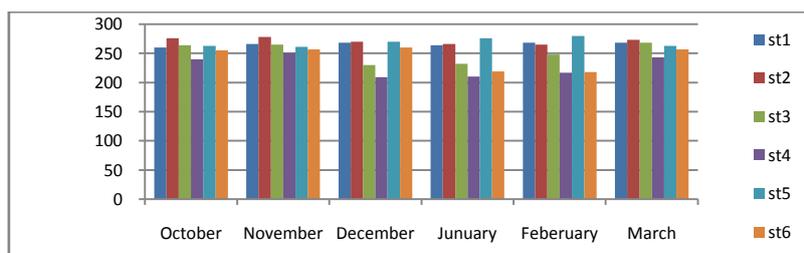


Figure (2) Temporal and spatial Turbidity of water

Hynes (1974) explained that brownness in river water is often high when the level of water and the flow velocity increase, which causes the increase of suspended matter in the water.

Electrical conductivity (EC): The results showed values of conductivity ranging between (565-370) $\mu\text{m}/\text{cm}$. The highest value was 565 in March at the second station (downstream) and the lowest value was 370 in October at the sixth station (about 300 meters) as shown in Figure 4-4. When comparing the values of electrical conductivity in our current study with the national standards for the quality of water suitable for the aquatic environment, we find that it does not exceed the permissible limits of the Iraqi Standards No. 417 of 2001 and the World (WHO, 2004), which determined the validity of water for drinking that does not exceed the values of electrical conductivity About 1000 Micro Siemens / cm. while they were related to the findings Taling (1980)(515-310) Micro-Siemens / cm).

The results of the statistical analysis showed significant temporal and spatial differences between the stations at a significant level $P < 0.05$.

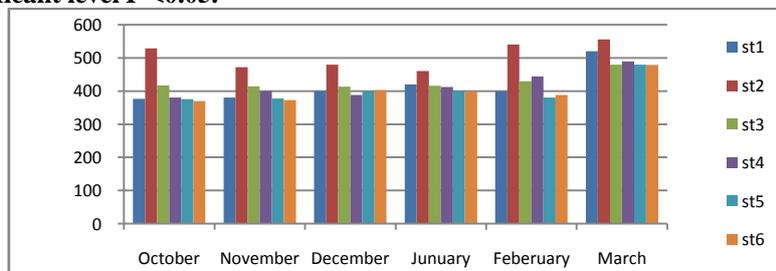


Figure (3) Spatial and temporal variation in Electrical conductivity

Total Dissolved Solids: The results showed that the soluble solids ranged between 282-202 mg / L, the highest of 282 in March at the second station (downstream) and the lowest value of 202 in November at the third station (after the downstream 25 meters) (2003); and (g) the concentration of water soluble salts found in the current

study does not meet the standards of the Iraqi Central Standardization and Quality Control (1996) and the Global (CEOH, 2003; US-EPA, 2003; WHO, 1999) 1000-430 mg / L. **The results of the statistical analysis showed high spatial and temporal differences at a significant level ($P < 0.05$).**

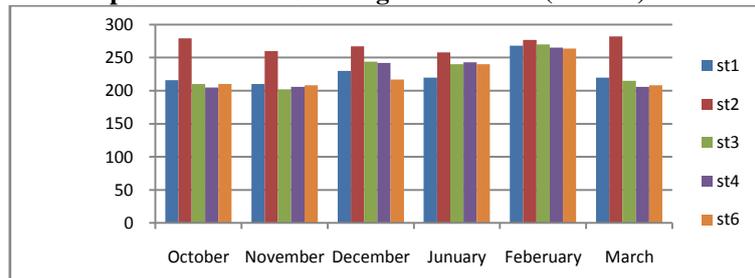


Figure (4) The spatial and temporal variation of Total Dissolved Solids

pH: The results of the current study showed that the pH values ranged between 8.9 - 7.8, with the highest value of 8.9 in January at the fifth station (125 meters from the estuary) and the lowest value was 7.8 in March in the first station (downstream) The decrease in pH values in the summer months and their increase in winter may be due to the reduction in water levels and the increase in rainfall (Julan, 2005). At the same time, the World Health Organization (WHO, 2004) The increase in pH values from (7.2) negatively affects the work of chlorine (Goyal et al., 1977). Drinking water 8.5 - 6.5 according to Iraqi specifications for potable water No. 417 of 1996. **The results showed no statistically significant differences at $P < 0.05$**

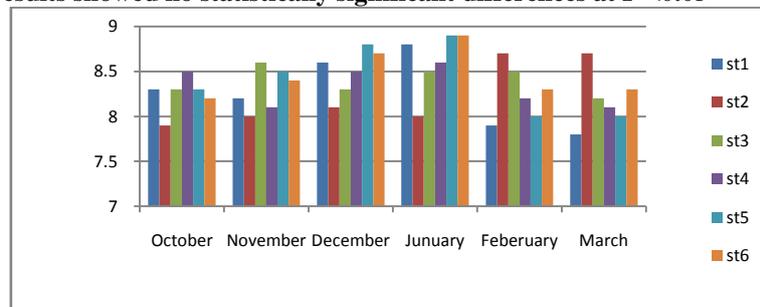


Figure (5) The spatial and temporal variation of the pH

The high pH values of river water in the rainy seasons are due to the low heat as it increases the melting of carbon dioxide in the water made up of carbonic acid (Bochnke and Delumyea, 2000)

Dissolved Oxygen: The results showed an increase in dissolved oxygen values during the winter and low in the summer. The dissolved oxygen values varied between 8.0-4.8 mg / L and were 4.8 in October 2017 at the second station (downstream) and 8.0 in January 2018 Figure (9-4) Appendix (I) conforms to the standards of Iraqi water quality, Central Bureau of Standardization and Quality Control, 1996 (CEOH, 2003; US-EPA, 2003; WHO, 1999), ranging between 6.5-4 mg / L. The results of the statistical analysis showed significant differences and no significant temporal differences at $P < 0.05$. This is due to the decrease in temperature and the slow functioning of bacteria as the levels of dissolved oxygen vary according to temperature changes (Wetzel and Linkens, 2000).

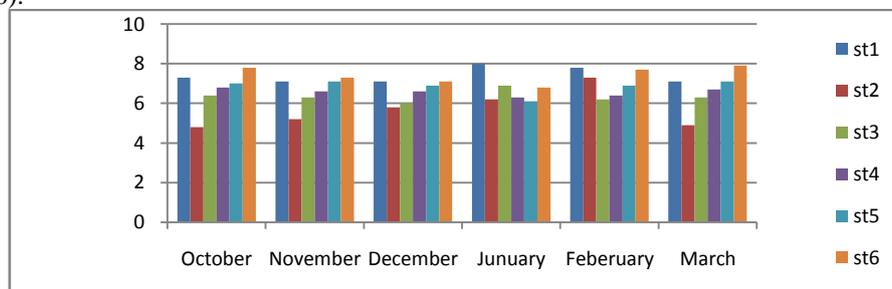


Figure (6) The spatial and temporal variation of dissolved oxygen

BOD5: The values of the biological requirement for oxygen ranged between 5.2-1.8 mg / L, with the highest value of 5.2 in March 2018 at the second station and 1.8 in October 2017 in the third and fourth stations (25 meters and 75 meters) The results of the statistical analysis showed that there were significant spatial differences and that there were no significant differences in conformity with the standards of the Iraqi Central Agency for

Standardization and Quality Control, 1996 (CEOH, 2003; US-EPA, 2003;) Mg / L. The results of the statistical analysis showed significant spatial differences and no significant differences ($P < 0.05$).

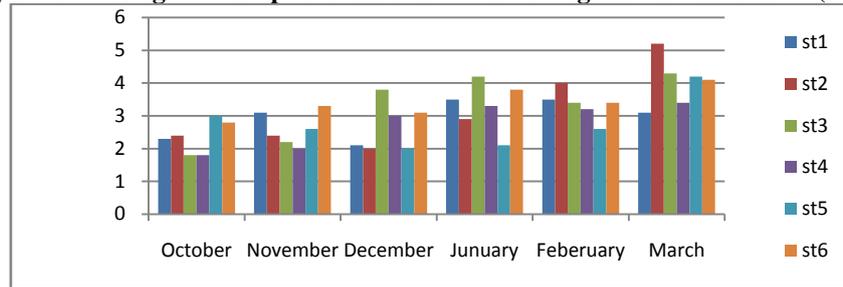


Figure (7) The spatial and temporal variation of the BOD5

Total Hardness : During the current study, the Tigris was classified as very difficult according to the classification of Handa (1964) (Appendix). The values of the total fermentation ranged between 300-200 mg /L. However, the highest value of 300 for total precipitation in March 2018 at the second station (downstream) 200 mg / L in November 2017 at the first station (downstream)

Table (1) Classification of water hardness (Handa, 1964)

Total calcification of CaCO ₃ (mg / L)	Adjective
60-0	Soft
120-60	medium hard
180-120	hard
>180	Very hard

The results of the total hardness values in the present study met the standards of Iraqi drinking water (Central Organization for Standardization and Quality Control, 1996) and global (CEOH, 2003; US-EPA, 2003; WHO, 1999) The results of the statistical analysis showed significant spatial and temporal differences at a significant level $P < 0.05$

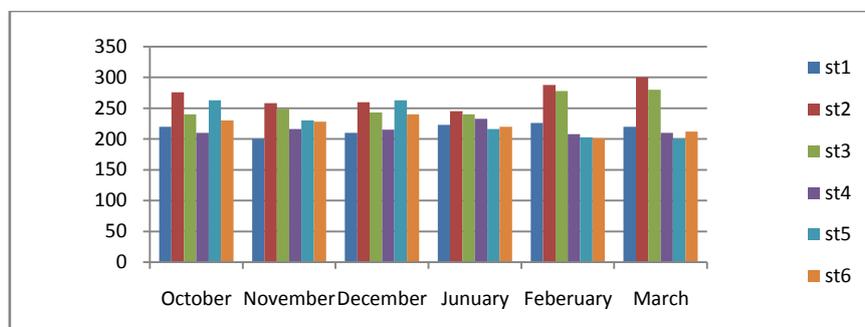


Figure (9): Spatial and temporal variation of the Total Hardness

Many researchers have pointed out that soil quality, geological characteristics and climatic nature have an impact on the harsh values of any ecosystem (Maulood et al., 1991; Ruttner, 1973; Buringt, 1960).

The ecto of parasitic on Tigris River fish Tikritcity : During the study, 636 fish were collected at the bottom of the Tikrit Rehabilitation Hospital, which is based on three types of common carp: Cyprinioncarpio, Barbusluteus, and Liza abu known in Iraq. The results showed three types of ectoparasites.

Monogenidea:In this study, two types of single-origin macrophages, belonging to one genus, were listed below for each species:

The genus Dactyogysvastator and the infection of the genus D.phoxineThe following is a review of these species:

Dactylogyrusvastator Nyblin,1924Phylum:- Platyhelminthes

Class:-Monogenea

Order:-Dactylogyridea

Family:-Ancyrocephalida

Dactylogyrus vastator

The disease, caused by these worms, is called Dactylogyrosis and its most common type is *D. vastator* which is one millimeter long and affects the carp but the ornamental fish are rarely infected with it and other species of this species can infect all the fish that can be found in the ponds. These worms are characterized by possessing four extensions of the front end of the body and there are four spots in kind at the black end. The posterior member (rear disc) carries two middle dogs with one link on the edge of this disc showing 14 small dogs. The parasite lives mainly on the gastric filaments, but when present in large numbers, it may spread on the fish's body. No external symptoms or signs of the disease appear unless the injury is severe, as the capsule appears to be somewhat open due to the swelling of the outer edges. As for the behavior of the following signs appear fish rise to the surface of water and gather near the area of the mouth of water and then start jumping out of water (as a sign of suffocation) and finally die. The parasite infection causes the edges of the gills to become stenosis, the epithelial cells rupture and rupture the blood vessels, causing the fish to die of suffocation. The parasitic plates on which the parasite has settled are covered with a dark layer of mucosal material and destroyed epithelial cells. *Saprolegnia* is often endemic to infected parts of the tumor. These oviparous mosquitoes and hatching eggs for fry larvae gradually grow into adult animals.



Image (2) *D. vastator* of the carp fish

This log was first recorded in Iraq from the skin and gill of the large-boned *Sonya* of the Tigris River in Baghdad (Ali et al., 1987). It was subsequently recorded from 28 new hosts from northern, central and southern Iraq, including carp (Mhaisen, 2007).



Image (3) *D. vastator* with glacial attachment of carp (100x)

phoxine Bychowsky, 1936: -*Dactylogyrus*

Phylum: - Platyhelminthes

Class: - Monogenea

Order: - Monopisthocotylea

Family: - Dactylogridae

phoxine *Dactylogyrus*

Length of this incision is 0.54 mm and width is 0.085 mm and the length of the dogs is 0.047-0.040 mm length of the bare keel 0.031-0.016 mm length of the barrier link 0.004 mm and width 0.026-0.021 mm extra barrier exists and the length of intercourse member 0.026-0.021 mm and form on the letter J vaginal tube is unclear And the host flakes the fish

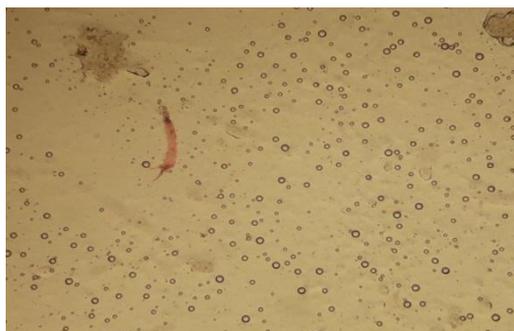


Image (4)) D.Phoxine to the scales (100x)

BychowskyllaqhuriTripathi, 1959 :-

Phylum: - Platyhelminthes

Class: - Trematoda

Order: - Monogenea

Family: - Gyrodactylidae

Bychowskyllaqhuri

The natural site has galsm fish. Worms are long and wide, with smooth skin, the maximum width of the worm is in the middle part of the worm in the location of the ovary, the area of the head Zozog of lateral lobes and a pair of lobes semi-side spots in kind are pigments scattered in the front part of the pharynx, vertical and vertical Good, healthy, well-pharyngeal pharynx, simple intestines, tubular and amphibious to the back of the testicle. The ovary is spherical, located in front of the eardrums, in the middle part of the body and oval tendons located behind the ovary. The distal ducts are highly interspersed with the intestinal tracts. The output member consists of two long helix tubes with a striped stripe help piece. The long leg resembles a cup with a pair of anchors. The dorsal pair is characterized by its lateral, rootless, and larger portion of the ventral part while the ventricular anchor is oval. The three pairs are large and four pairs smaller. The two pairs are located next to Onchium. The third pair is located between the ventral and posterior anchor. Three pairs of calipers are small in size and the side of the site, while the fourth is located next to the ears in the abdominal anchor. Next to the calipers there is a pair of installation that looks like a stick that looks like a dog without a knot. The length of the body is 807-990 mm. The maximum width is 167-113 mm The length of the pharynx 35.2-36.8 mm, width 17.8-18.5 mm, ovarian diameter 63.1-64.2, the length of the testis 88.6-91.3 mm, width 53.9-55 mm, the length of the dorsal anchor 42- 67 mm, length of the abdominal anchor 52.3-54.5 mm, length Onchium 16-16.6 mm, width 18.0-18.8 mm, the length of the large calipers 32.2-36.4 mm and small calipers 12-21 mm. The current samples are similar to those of B.qharui(Tripathi, 1959) but differ in size, as the current samples are smaller and more contractile than the Tripathis sample According to the results of large-scale parasitic studies of single-source thymatodes of freshwater fish in Iraq, it appears that the first record of B.qharui (1959) in Iraqi waters and S.triostegus fish represents a new host.



Image (3)B.qharuifrom carp fish(100x)

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دراسة تأثير الملوثات البيئية على الطفيليات الخارجية في ثلاث أنواع من أسماك نهر دجلة

أ.د ياسين حسين عويد الجبوري أم.د اشرف جمال محمود هلا محمود اسماعيل
جامعة تكريت/كلية التربية للبنات/كلية التربية للبنات/كلية التربية للبنات
قسم علوم الحياة قسم علوم الحياة قسم علوم الحياة

الخلاصة

تضمنت الدراسة الحالية جانبين الاول متعلق بالتنقيص عن بعض الصفات الفيزيائية والكيميائية لماء نهر دجلة في مدينة تكريت ،اما الجانب الثاني فيتضمن تشخيص المجموعات الحيوانية المتطفلة على ثلاث انواع من اسماك نهر دجلة وتحديد نسبة الاصابة بالطفيليات وشدتها اظهرت الدراسة حصول تغيرات في بعض الصفات الفيزيائية والكيميائية للماء ضمن مدة الدراسة الممتدة من تشرين الاول 2017 حتى نهاية شهر اذار 2018 ، إذ سجلت تذبذبات في معدل درجة الحرارة تراوحت بين 10.2-28.7 درجة مئوية للهواء 10.2-29.0 درجة مئوية للماء اما الاس الهيدروجيني تراوح ما بين 7.8-8.9، بينما الكدرة تراوحت قيمها 20.9-28.0 وايونات الصوديوم تراوحت بين 14.2-21.6 م لغم / لتر ، والبوتاسيوم كانت ما بين 2.0-5.5 ملغم / لتر ، أما معدل المواد الصلبة الذائبة الكلية فتراوحت ما بين 202-282 ملغم /لتر في حين تراوحت قيم الاوكسجين المذاب بين 4.8-8.0 ملغم /لتر وقيم المتطلب الحيوي للاوكسجين تراوحت بين 1.8-5.2 ملغم/لتر اما قيم العسرة الكلية كانت 200-300 ملغم / لتر وقيم الكبريتات ما بين 73-110.4 ملغم / لتر.

تم خلال المدة المذكورة اعلاه جمع 633 سمكة تتضمن ثلاثة انواع، تعود الى عائلتين الشبوطية Cyprinidae والعائلية البياحية Mugilidae اظهرت نتائج الفحص اصابتها بـ 3 انواع من الطفيليات ونسب اصابة مختلفة ، ثلاث انواع من المخرمات و من بين هذه الانواع المخرم Dactylogyrusvastator ونسبة اصابة 3.1% في سمك الكارب و6.5% في سمك الحمري والمخرم Dactylogyrusvastator ونسبة 0.7% في سمك الخشنى بينما كانت نسبة الاصابة في السمك الحمري 4.3% ، والمخرم Bychowskyllaqhauri ونسبة الاصابة في سمك الكارب الاعتيادي 5.8%.

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