How to Cite:
Arif, S. M., & Sheriff, H. A. (2022). Study of infection intensity of Copepods parasites from the genus (Ergasilus) on gills of carp fishes (Cyprinus carpio L) (endoparasites), and on fish's tail region (exoparasites) for big sizes and small sizes (Fingerlings) at three seasons (summer, winte. *International Journal of Health Sciences*, *6*(S6), 671–670. https://doi.org/10.53730/ijhs.v6nS6.10397

Study of infection intensity of Copepods parasites from the genus (Ergasilus) on gills of carp fishes (Cyprinus carpio L) (endoparasites), and on fish's tail region (exoparasites) for big sizes and small sizes (Fingerlings) at three seasons (summer, winter and autumn)

Saad M. Arif
AL-Rasheed University College / Iraq
*Corresponding author email: mustafasaleam6@gmail.com

Hussain A. Sheriff
AL-Rasheed University College / Iraq

***Abstract*---**This study was conducted to determine the infection intensity of Copepods parasites from the genus (Ergasilus) on gills of carp fishes (Cyprinus carpio L.) (endoparasites), and on fish's tail region (exoparasites). For big sizes and small sizes (Fingerlings) at three seasons (summer, winter and autumn), specimens were collected from Martyr monument pond, Baghdad Iraq. Results showed the high infection intensity by this copepods and less infection intensity on the fish's tail region for big and small specimens. The study also showed a high infection intensity at summer season and less on autumn season, and very short infection intensity on winter season, this is may be can explain by the different on pond water temperature seasonally, food supplying and the fishes movement activities. Results were showed that the infection intensity was higher at the fingerlings than in big fishes, that was may be due to the ability of small sizes fingerlings to move and touch with the algae (Spirogyra, horse tails) and other aquatic plants living near the edge of the pond comparing with the middle and deep water of the pond.

***Keywords*---**copepods, ergasilus, carp fish, infection intensity.

Introduction

Planktonic copepods are important to global ecology and the carbon cycle. They are usually the dominant members of the zooplankton, and are major food organisms for small fish such as marine and fresh water fish and some other organisms. Some scientists say that copepods are the largest animal biomass on earth (1). Usually there are few parasites present on fish and they are go unnoticed, however occasionally they can become numerous and evident on gills of fish, in the mouth and at the base of the fish's fins and fish's tail (2). Most free-living copepods feed directly on phytoplankton, catching cells singly. Some the larger species are predators of their smaller relatives. Many benthic copepods eat organic detritus or bacteria that grow on it, and their mouth parts are adapted for scraping and biting, so most of them distributing between many aquatic algae and other submerged plants (3). Copepods are important pathogens of fish, especially farmed fish, inflicting damage by their attachment and feeding mechanisms (4). Zmerzlaya (5) agree that the life-span of some ergasilids are one year and that two generations occur annually whereas Kashkovsky and Kashkovskaya (6) have suggested a possible third generation at some oligotrophic lakes. Most copepods are 0.5 to 2 mm (0.02 to 0.06 inch) long. The largest species Pennla balaenopterae, which is parasitic on the fin whole of some whales grows to a length of 32 cm (about 13 inches). Male of Sphaeronellospsis monothrix, a parasite of marine ostracods are among the smallest copepods attaining lengths of only 0.11 mm (7).

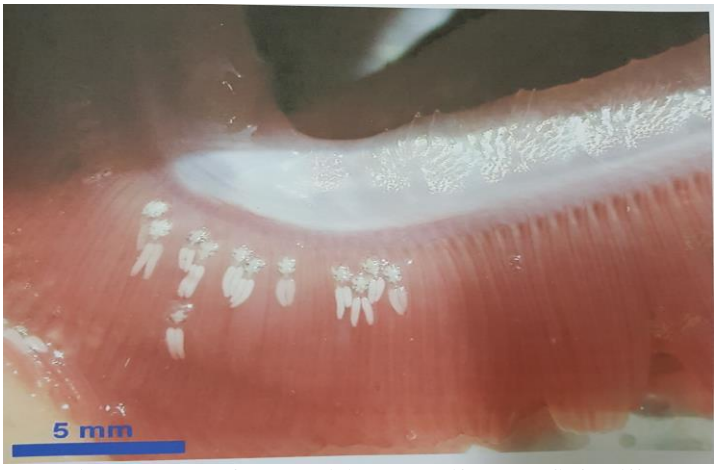

Figure 1. Endoparasitic Ergasilus on fish gills

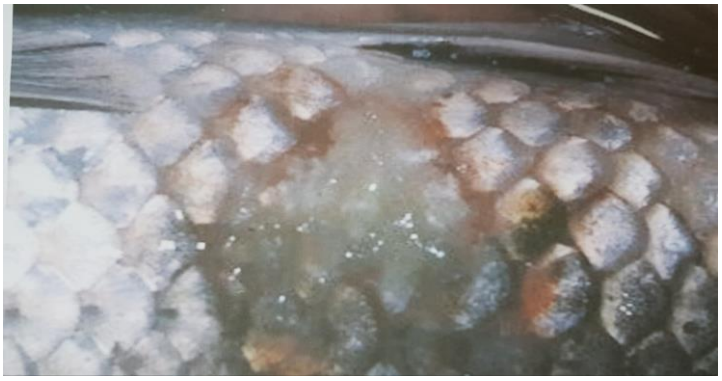

Figure 2. Exoparasitic Ergasillus on fish tail skin

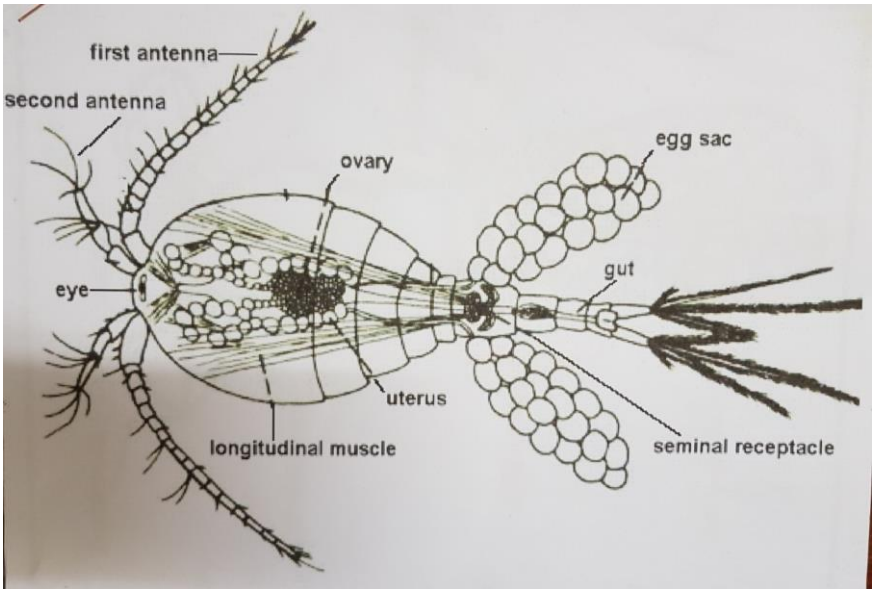

Figure 3. Schematic drawing Ergasilus parasite

Materials and Methods

The external fish body surface (fish tail region) was examined, searching for the numbers of attached copepods parasites and then counted by using a dissection microscope (a high magnification lens), parasites were counted by using counting watch. The infected gills of all examined fishes were removed and preserved in 70% industrial methylated spirit. The copepods were removed from the gill's filaments, mounted in lactophenol on slides and counted under the same dissecting microscope (8). The mean infection intensity is the mean number of parasites found in the infected hosts (Fishes). The zeros of uninfected hosts must be excluded. The equation of infection intensity is:

$$\% \text{ Infection intensity} = \frac{\text{Total number of parasite}}{\text{Size number of infected hosts examined (5 fishes) (9), (10).}}$$

Fish samples were collected from one site of southern edge of the lake, small fishes (Fingerlings), 3-5 cm length from 0.5-1m far from the lake edge by using small manual hand net and big fishes, 10-25 cm length from 5 m far from the lake edge by using big submerge net. The specimens of 5 fishes were choosed randomly for the two studied sizes. ***** Biostatistic analysis was made to fix the significance in order to discuss the gained results (Statistical analysis system SAS 2012).

Table 1
Numbers of parasites and % infection intensity at three studded seasons in small fishes (Fingerlings)

Type of examination	Fish numbers	%Infection intensity	%Infection intensity	% Infection intensity
Fish Gills Small fishes (Fingerling)	5	07 73 66 %77 48 94 Total parasites 386	22 84 62 %49 38 41 Total parasites 247	40 15 12 %19 10 20 Total parasites 97
		Summer	Autumn	Winter

Type of examination	Fish numbers	%Infection intensity	%Infection intensity	%Infection intensity
Fish tails Small fishes (Fingerling)	5	26 62 44 %54 18 20 Total parasites 271	17 42 50 %40 82 12 Total parasites 204	0.0 0.0 0.0 %0.0 0.0 0.0 Total parasites 0.0
		Summer	Autumn	Winter

Table 2
Numbers of parasites and % infection intensity at three studded seasons in big fishes

Type of examination	Fish numbers	%Infection intensity	%Infection intensity	%Infection intensity
Fish gills Big Fishes	5	66 102 46 %58 52 28 Total parasites 294	27 72 33 %35 16 26 Total parasites 175	13 25 12 %13 10 06 Total parasites 66

		Summer	Autumn	Winter

Type of examination	Fish numbers	%Infection intensity	%Infection intensity	%Infection intensity
Fish tails Big Fishes	5	26 62 44 18 %34 20 Total parasites 170	22 17 18 20 %18 16 Total parasites 93	16 05 10 0.8 %11 18 Total parasites 57
		Summer	Autumn	Winter

Note: All results numbers rounded up the nearest integer

Table 3
Air and water temperature of three studded seasons

Temperature	Summer	Autumn	Winter
Air	50 C°	18 C°	8 C°
Water	30 C°	12 C°	5 C°

Result and Discussions

Present study showed that there was a clear variance on infection intensity between small and big infected fishes. In general it was large infection intensity on small fish (Fingerlings) than on big fish that was for both infected regions (gills and tails). The results showed for small fish about 77% infection intensity at summer season, comparing with 40% at autumn season and 19% at winter season for gills. It was very clear that all those degrees at gills were highest than them at tails when they were 54% at summer and decreased into 49% at autumn, while it reached into 0.0 at winter (Table 1.). It seemed that the temperature degrees of the air temperature and especially water temperature influencing on the movement activity of both, the parasites and their hosts (fish), when they were swim searching for the decayed organic matters, plants, algae and detritus, which they are main food of carp fish rather than other kinds of fish, that was explain the successful of this fish on Iraqi water ecology (11).

The lack parasitism in winter season indicated that this season was not suitable at least for tails exoparasitism with the fingerlings only, that was may be because the most of parasites run toward the gills rather than staying outside (in tails). This case was not clear for the big fish and that may be related to the wide movement of this fish for a long distances and deep places inside the pond's water escaping from the cold water of the pond edge (12). The clear variances of infection intensity may be related to the values of population density of fish, this density will be at a high level in summer because of the eggs hatching of the fish from the sprig time (matrimonial spring season) this density will decrease at

winter and reach the lowest degree at winter. The values of this density will effect on higher or lower touching between the fish and all kind of plants, algae that were in high density as well, this case then will help to transfer the parasites toward the gills, rather than the tails (13).

The infection density for the big fishes was variance also, in the same ways. It was affected by the different seasons, different air and water temperature on gills more than on tails. For summer season it was 58% on gills, then it was decreased to 35% on autumn and the lowest degree was at winter as 13%. It was very clear that the big fishes swim always far from the pond edge, this is enable them to be away from the highest density of copepods parasites which are gathered in a high density near the edge with the different ecological conditions. For the same reasons it can easy says that on big fishes the infection intensity found at a lower levels, 34% on summer, 18% on autumn and 11% on winter season (Table 2.). Finally the present study may open the door toward a more researches to a new studies about the copepods parasites on other kind of fishes and about another crustaceans parasite on carps and another fresh water hosts. Statistically results showed a significance variance between big and small fishes, for gills and tails infections and between different seasons ($P \geq o.o1$). The present results make it clear that more research should be focused on parasitic ergasilids in order to fill gabs in our knowledge, even of their distribution and basic ecology. Long term research is especially needed when trying to understand parasite like ergasilids, the population sizes of which fluctuate greatly in association with the varying conditions encountered in nature. Our fresh water ponds, rivers must be faced such a studies in order to preserve our types of fish from the infections of parasitic copepods and other crustaceans. Finally we would like to thank Professor Dr. Farhan M. Thamad the specialist on fish parasitism for our personal communication and good scientific dialog.

References

1. Johannes Durbaum, Thorsten Kunnermann (November 5, 1997). Biology of copepods: An Introducton". Carlvon Ossietzky University of Oldenburg. Retrieved December 8, 12009.
2. Witeska, M; Knodera; E; Lugowsky, K. (2010). The effect of Ichthyophthriasis on some hematological parameters in common carp. Turkish J. Veterinary Animal Science, 34 (3): 267-271.
3. Paperna, I and Zwerner, D.E. (1982). Host parasite relationship of Ergasilus labracis kroyer (Cyclopoidea: Ergasilidae) and the striped bass, Morone saxatilis (Walbaum) from the lower Chesapeake Bay Annalsles de Parasitologic Humaine et Comparee. 57, 3393-405.
4. Fryer, G (1982). The parasitic copepod and branchiura of British freshwater fishes, a handbook and key. Freshwater biological association science publication, 6:1-87.
5. Zmerzlaya, E.I. (1972). [Ergasilus siebold:Nordmann 1932, its development, Biology and epizootic significant]. Izv. Gosud mauchno-issled. Inst. Ozern. Rybn. Khoz. 80: 132-177. (In Russian with English summary).
6. Koshkovsky, V. V. and Koshkovskaya-Solomatova,V. P. (1985). [A study of Ergasilus sieboldi population (Copepoda. Ergasilidae) in lake Arakul] Parasitologiya 19: 195-200 [In Russian translated summary to English].

7. Biodiversity: "Pity the copepods" The Economist 16, 2012 PP 8-9.
8. Fryer, G and Andrews, G. (1983).The parasitic copepods, Ergasilus briani Markewitsch in Yorkshire: An addition to the British fauna. Naturalist. 108, 7-10.
9. Wikipedia (2017). Quantitative parasitology. Wikipedia (2017). Quantitative parasitology.
10. Croften H. D. (1971) A quantitative approach to parasitism. Parasitology, 86, 228-232.
11. Abd-Ali A. Z. (1915). Seasonal variation of ecological factors and their effects on fingerlings of Cyprinus carpio L., fish in Martyr monument pond. Baghdad.
12. Ph. Thesis pp 192.
13. Sherif and Abd-Ali (2015). Ecological study of some heavy metals and their effects on survival and biology of carp fish (fingerlings) Cyprinus carpio L. that was collected from Martyr monument pond, Baghdad. (In Arabic). J. of The College of basic education. V. 21: No 90. 137-155.
14. Boxshall G. A., Montu. (1997): Copepods parasitic on Brazilian co. fishes: a handbook. Nauplins. Rio Grande 5:1-225.
15. Widana, I.K., Dewi, G.A.O.C., Suryasa, W. (2020). Ergonomics approach to improve student concentration on learning process of professional ethics. *Journal of Advanced Research in Dynamical and Control Systems*, *12*(7), 429-445.
16. Widana, I.K., Sumetri, N.W., Sutapa, I.K., Suryasa, W. (2021). Anthropometric measures for better cardiovascular and musculoskeletal health. *Computer Applications in Engineering Education*, *29*(3), 550–561. https://doi.org/10.1002/cae.22202