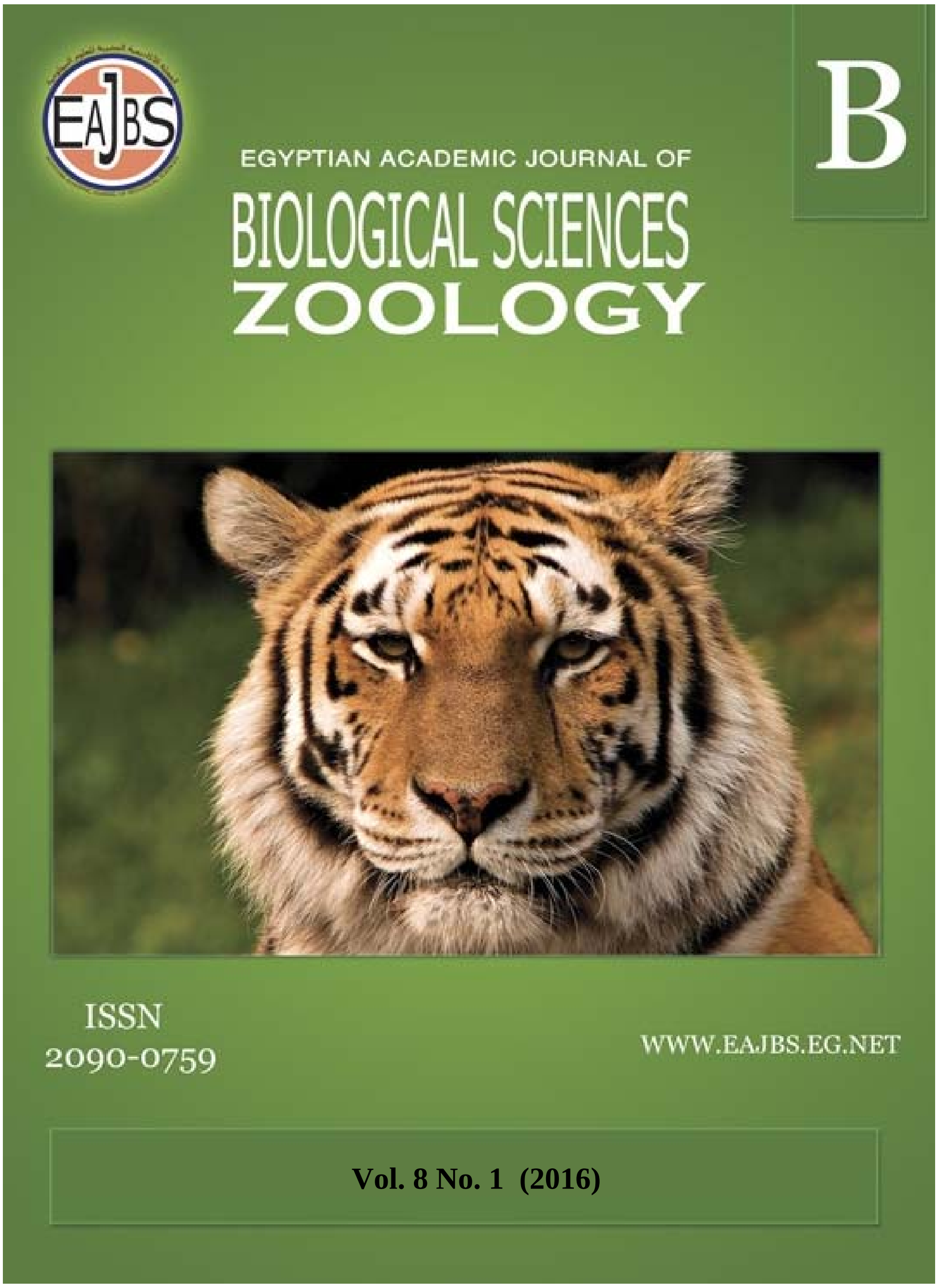

Egyptian Academic Journal of Biological Sciences is the official English language journal of the Egyptian Society of Biological Sciences, Department of Entomology, Faculty of Sciences Ain Shams University.

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www.eajbs.eg.net

Citation: *Egypt. Acad. J. Biolog. Sci. (B. Zoology) Vol. 8(1)pp33-37 (2016)*

Egypt. Acad. J. Biolog. Sci., 8(1): 33- 37 (2016)

Egyptian Academic Journal of Biological Sciences
B. Zoology
ISSN: 2090 – 0759
www.eajbs.eg.net

The Effect of Some Biological Factors on Helminthes infecting *Clarias gariepinus* from Lake Manzala, Port Said, Egypt

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ARTICLE INFO
Article History
Received: 6/1/2016
Accepted: 24/2/2016

***Keywords*:**
C. gariepinus
cestodes
Acanthocephalan
metacercariae, sex
weight
length

ABSTRACT

This work aimed to study the effect of host biological factors on the different parasitic helminthes in *Clarias gariepinus* from Lake Manzala. The sex, weight and length of fish were determined. Examination of *C. gariepinus* fish for helminthes revealed the presence of three morphologically distinct adult helminthes in the digestive tract which were *Polyonchobothrium clarias* and *Monobothrium wageneri* (Cestodes) and *Neoechinorhynchus rutili* (Acanthocephala) and there were also the cestodes larvae (Plerocercoid) and undifferentiated cestodes. Two types of defined mataceracariae were observed in the different tissues which were *Ornithodiplostomum sp.* and *Prohemistomum sp.* (trematodes). The undifferentiated metacercariae were also recorded. Results showed that the highest prevalence of infection was found in smaller fish (weight and length) and in females (sex). The occurrence of each of the helminthes gives a different response to these factors as discussed in this work.

INTRODUCTION

C. gariepinus is one of the most plentiful and widely distributed fish species in the River Nile, its tributaries and lakes (Boulanger, 1907). Abdel-gaber *et al.* (2015) observed 249 helminthes belonging to four different genera from *C. gariepinus* collected from Lake Manzala. They were digenea *O. batrachoides*, cestode *P. clariae*, and nematode *P. laevionchus* and *C. polypteri*.

There were minor variations in prevalence and mean intensity between male and female *C. gariepinus* fish infected with metacercariae (Shotter, 1980; Nkwengulila, 1995; Mwita, 2002; Musiba, 2004; and Musiba and Nkwengulila, 2006).

Abdel-gaber*et al.* (2015) found that female fish of *C. gariepinus* collected from Lake Manzala had higher prevalence value than males and there was no significant difference in infestation rate between the two different sexes. The relationship of host size (weight/length) and parasite infection showed absence of significant difference in the parasitic infection among three classes, although fish of larger sizes had more infections.

This work aimed to study the effect of host biologi0cal factors on the different parasitic helminthes in *Clarias gariepinus* from Lake Manzala.

MATERIALS AND METHODS

30 specimens of *C. gariepinu*s were collected from Lake Manzala in Port Said Governorate and transported in ice boxes to the laboratory for parasitological examination. The total length of *C. gariepinus* was determined by measuring the distance from the tip of the longest jaw to the center of the fork in the caudal fin (Miller and Lea, 1982). *C. gariepinus* species were divided into two length classes; as follows: Class 1 (<33cm) and Class 2 (>33cm). The weights of the collected fish species were determined using (CY) balance and *C. gariepinus* species were divided into two weight classes; as follows: Class 1 (<340g) and Class 2 (>340g). Fish sex was determined according to Guerrero and Shelton (1974). Body cavity was opened to determine the sex, and the gonads were isolated. Small pieces of the gonads were placed on a glass slide, then pressed (squashed) with a glass cover slip and observed under dissecting microscope.

The muscles and internal viscera including liver, kidney, gonads and digestive tract were examined for the possible presence of trematode metacercariae (MC). These organs were kept in saline solution for few minutes for possible recover of any parasites. Tissues were screened for the presence of MC by compression method in which 0.1 gm were taken from muscles and visceral organs. Each piece was compressed between two microscopic glass slides and examined for the presence of MC (Sayasone *et al*., 2007; and Elsheikha and Elshazly, 2008).

The gastrointestinal tract of the collected fishes was separated from the other internal organs then the stomach was separated from the intestine and each part examined in clean Petri dish, stomach and intestine were opened and mucosa, position of large helminthes attachment, was stripped off by scalpel and washed with normal saline in another clean dry Petri dish and then the collected helminthes were examined under a binocular microscope (Woodland, 2006).

Metacercariae were separately sorted out according the general features and were tentatively identified to genus level based on different morphological details. The cestodes were identified based on the size of the proglottids, the presence of the neck and general characteristics of the scolex the presence and shape of bothria and the movement of the scolex. The acanthocephala were identified based on Proboscis shape and external shape of the body.

The prevalence, mean intensity and abundance of recovered helminthes according to each factor considered were calculated according Margolis *et al*. (1982). To satisfy the assumption of the statistical analysis used, all the data were normalized by log (x+1) transformation to achieve linearity.

RESULTS AND DISCUSSION

Examination of *C. gariepinus* fish for helminthes revealed the presence of three morphologically distinct adult helminthes in the digestive tract which were *P. clarias* and *M. wageneri* (Cestodes) and *N. rutili* (Acanthocephala) and there were also the cestodes larvae (Plerocercoid) and undifferentiated cestodes. Two types of defined mataceracariae were observed in the different tissues which were *Ornithodiplostomum* *sp.* and *Prohemistomum sp.* (trematodes). The undifferentiated metacercariae were also recorded.

The effect of fish length and weight on the prevalence, abundance and intensity of different helminthes infecting *C. gariepinus* is shown in Table (1).

Table 1 Prevalence, mean abundance (±SE) and mean intensity (±SE) of helminthes infecting *C. gariepinu*s according to host length and weight.

Helminthes	**Length**						**Weight**					
	prevalence		**Mean abundance**		**Mean intensity**		**Prevalence**		**Mean abundance**		**Mean intensity**	
	Class 1 (N=16)	**Class2 (N=14)**	**Class 1 (N=16)**	**Class2 (N=14)**	**Class 1 (N=16)**	**Class2 (N=14)**	**Class 1 (N=16)**	**Class2 (N=14)**	**Class 1 (N=16)**	**Class2 (N=14)**	**Class 1 (N=16)**	**Class2 (N=14)**
P. clarias	31.3%	35.7%	1.1±0.6	2.8±1.3	3.5±1.3	7.2±2.5	25%	42.9%	1.1±0.6	2.8±1.3	4.3±1.5	5.2±2.3
M. wageneri	18.8%	28.6%	2 n=2	3.2±1.4	2 n=2	10.7±1.7	12.5%	35.7%	1 n=2	4.1±1.5	1 n=2	11±1.2
N. rutili	6.3%	21.4%	7 n=1	1.6±1.1	7 n=1	7±3.8	0	28.6%	0	2.2±1.2	0	7±2.7
Plerocercoid	12.5%	0	1 n=2	0	1 n=2	0	12.5%	0	1 n=2	0	1 n=2	0
undifferentiated cestodes	12.5%	21.4%	2 n=2	0.5±0.3	2 n=2	1.8±0.9	12.5%	21.4%	2 n=2	0.5±0.3	2 n=2	2.3±0.9
Ornithodiplostomum sp.	12.5%	7.1%	4.4±3.3	150 n=1	35±15	150 n=1	12.5%	7.1%	4.4±3.3	150 n=1	35±15	150 n=1
Prohemistomum sp.	6.3%	14.3%	10 n=1	35 n=2	10 n=1	35 n=2	6.3%	14.3%	10 n=1	35 n=2	10 n=1	35 n=2
undifferentiated metacercariae	6.3%	21.4%	160 n=1	10±8.5	160 n=1	100±43.6	12.5%	14.3%	90 n=2	140 n=2	90 n=2	140 n=2
Total	62.5%	57.1%	4.1±1.6	9.1±3.5	8±3.3	23±4.2	62.5%	57.1%	2.9±1.1	10.5±3.5	5±1.7	22.5±3.5

n = number of infected fish.

The results showed that the prevalence was the highest (62.5%) in fish within class 1 (<33 cm) (<340 gm) and lowest (57.1%) in fish within class 2(>33 cm) (>340 gm). Aliyu and Solomon (2012) found that the infection was higher in fish ranging from 30-36 cm and fish samples that were lighter in weight were free from infection, but those found with high number of parasites ranging from 300g-350g.

In this study, the total mean intensity and abundance of infection was directly proportional to *C. gariepinus* length and weight and inversely proportional to the prevalence. The highest total mean abundance and intensity of infection (9.1±3.5) and (23±4.2) respectively were recorded in fish within length class 2 (>33) and the lowest (4.1±1.6) and (8±3.3) respectively in fish within length class 1 (<33). The highest total mean abundance and intensity of infection (10.5±3.5) and (22.5±3.5) respectively were recorded in fish within weight class 2 (>340) and the lowest (2.9±1.1) and (5±1.7) respectively in fish within weight class 1 (<340).

The cause of the highest value of the prevalence in smaller fish may be due to the lower resistance to infections and as they grow in size they acquire an increased immunity to different infections (Grutter*et al.*, 2002).The abundance and intensity were higher in larger fish may be because the larger fish consume larger quantities of food and if one parasite overcomes the immune system, it will cause high infection as the host consumes large quantities of this parasites during feeding.

The effect of fish sex on the prevalence, abundance and intensity of different helminthes infecting *C. gariepinus* is shown in Table (2).

The host sex in *C. gariepinus* affect the prevalence, abundance and intensity of the studied parasites as they were found higher in the females than in males with a direct relationship between prevalence, abundance and intensity. The prevalence with helminthes was higher in female specimens (62.5%) than in male ones (57.1%). The total mean abundance of infection was slightly higher in females (5.9±2.8) than males (5.7±2.4). The total mean intensity of infection was higher in females (16.7±4.8) than in males (13.8±5.9). This disagrees with Aliyu and Solomon (2012) and Domo and Ester (2015) who found that the males were more infected than females and they suggested that there were simply more males available for infestation. The females were more susceptible to infection than the males because they maybe simply larger in size than the males or because they live in communities and so they infect each other's. Reimchen and Nosil (2001) reported that fish males and females can differ in the levels of the infection and such differences may be mediated by the costs of sexual selection or by ecological differences between the genders.

Table 2: Prevalence, mean abundance (±SE) and mean intensity (±SE) of helminthes infecting *C. gariepinus* according to host sex.

Helminthes	**Prevalence**		**Mean abundance**		**Mean intensity**	
	Male (N=14)	**Female (N=16)**	**Male (N=14)**	**Female (N=16)**	**Male (N=14)**	**Female (N=16)**
P. clarias	28.6%	37.5%	2±1.1	1.7±0.8	7±2.7	4.3±1.7
M. wageneri	14.3%	31.3%	9 n=2	2.5±1.3	9 n=2	13±1
N. rutile	14.3%	12.5%	9 n=2	1.4±1	9 n=2	10.5±3.5
Plerocercoid	7.1%	6.3%	1 n=1	1 n=1	1 n=1	1 n=1
undifferentiated cestodes	21.4%	12.5%	15±1.1	2 n=2	1.5±0.6	2 n=2
Ornithodiplostomum sp.	14.3%	6.3%	5±3.7	150 n=1	35±15	150 n=1
Prohemistomum sp.	7.1%	12.5%	10 n=1	35 n=2	10 n=1	35 n=2
undifferentiated metacercariae	7.1%	18.8%	160 n=1	8.7±7.4	160 n=1	100±43.5
Total	57.1%	62.5%	5.7±2.4	5.9±2.8	13.8±5.9	16.7±4.8

N = number of examined fish, n = number of infected fish.

In conclusion, the prevalence was higher in smaller fish (length and weight) while abundance and intensity were higher in larger ones. The females were more susceptible to infection than the males. The occurrence of each of the helminthes gives a different response to these factors

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