PREVALENCE OF GASTROINTESTINAL PARASITES INFECTING FISH (*CLARIAS GARIEPINUS*) IN QENA GOVERNORATE

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ABSTRACT

Parasites of fish are of concern since they often produce a weakening of the host`s immune system thereby increasing their susceptibility to the secondary infections, resulting in the nutritive devaluation of fish ,compete for food, depriving fish of essential nutrients, inhibiting growth leading to morbidity and mortality and subsequent economic losses. Few data has been reported to identify major parasite of fish in Qena Governorate,Egypt. Accordingly,the study aimed to estimate the prevalence of gastrointestinal parasite infecting fish. Afield study was conducted during the period from the beginning of January 2015 to the end of December 2016.A total of 144 Clarias gariepinus (Carmoot) fish samples were collected either alive from fishermen or fresh as possible from fish markets at Qena Governorate for parasitological studies. Parasite collected and prepared then identified under the microscope. Out of 144 examined fish 84 (58.3%) samples were infected with different gastrointestinal parasites. The obtained results found that the most frequent parasitic infection among examined fish was cstodes with an infection rate of (35.4%) ,followed by trematodes infection (27%), while the lowest infection rate, were recorded in nematodes infection(16.7%),Regarding to the seasonal prevalence of the recovered parasites, we concluded that the highest rate of parasite infection was observed during Spring season (83.3%), followed by Winter (66.7%), Summer recorded (50%) and Autumn season which represented the lowest rate of infection (33.3%). The most common species of cestodes were Monobothrium sp which recorded the highest infection rate (27.8%) and Polyonchobothrium clarias (5.6%), followed by trematode species Orientocreadium batrachoides (24.3%) and nematode species Paracamallanus cyathopharynx (10.4%) and Procamallanus laevionchus (5.6%).

INTRODUCTION

Fish represents a very important food source for low income populations for whom it is often the only source of protein, particularly in towns where large scale animal husbandry is rare ***(Tombi and Bilong, 2004)***. Moreover , fish have been extensively used as a cheap source of protein rich diet for human consumption in Egypt ***(Sabri et al., 2009)*** especially *Clarias gariepinus* ***(Burchell, 1822)*** which considered to be one of the most important tropical catfish for aquaculture in West Africa ***(Clay, 1979)***.

Parasitic infection has been raised one of the most important problems against fish breeding and production at commercial scales ***(Abdel-Ghaffar et al., 2009)***. Furthermore ,parasites act as predisposing factors for other infection through a weakening of the host`s immune system thereby increasing their susceptibility to the secondary infections, resulting in the nutritive devaluation of fish and subsequent economic losses ***(Onyedineke et al., 2010)***. Meanwhile, parasites compete for food, depriving fish of essential nutrients and inhibiting growth leading to morbidity and mortality with consequent economic losses ***(Khalil and Polling, 1997)***.

Therefore ,the knowledge about the prevalence of such parasites in fish is of interest and important goal to implement future strategies on public health program. So our study was performed for surveying the parasites of *Clarias gariepinus* fish in Qena Governorate, Egypt as a one of key steps to control the parasitic diseases of fish through finding suitable treatment.

MATERIALS AND METHODS

1. Collection and preparation of fish samples:

A total of 144 *Clarias gariepinus* (Carmoot) fish samples were collected either alive from fishermen or fresh as possible from fish markets at Qena Governorate and submitted for parasitological investigation fish during the period from the beginning of January 2015 to the end of December 2016. The collected samples were transferred to the laboratory of Parasitology, Faculty of Veterinary Medicine, South Valley University, in an ice box after packed in plastic bags, labeled with different data about the investigated fish specimens as date, weight, length and the site of collection.

2. Parasitological examination:

2.1. Examination of gastrointestinal tract and internal organs:

The identified fish samples were quickly dissected. The abdominal cavity was opened by making a longitudinal incision in the ventral line from anus to buccal aperture, and then it was examined for parasitic cysts and larvae of Nematodes on the surface. Alimentary tract was opened by a fine scissor and left in saline solution (0.9%) in a suitable jar for few minutes with frequent shaking.

The contents were washed several times with normal saline to get rid of coarse particles and mucus that may be attached to the parasites. Then, the sediment was examined using dissecting microscope for detection of helminth parasites. Additionally, the outer and the inner surfaces of the gas-bladder were examined. The intensity of infection (average number of parasites per infected fish) was calculated.

2.1. Collection and preparation of the detected parasites:

2.2.A.Trematodes and Cestodes collection:

The collected helminths were washed several times by physiological saline to be free from mucus and debris and then left in the refrigerator for complete relaxation. Then, they were gently compressed between two glass slides then Fixed by putting the pressed worms, in formalin acetic acid alcohol fixative (FAA fixative) for 24 hours ,followed by Staining in dilute acetoalum carmine ***(Fleck and Moody, 1993*** for(30 minutes to several hours),then dehydrated through passage in ascending grades of ethyl alcohol (30, 50, 70, 80, 90 and 100%).The clearance was done by using clove oil followed by xylene for few minutes and finally mounted in Canada balsam ***(Kruse and Pritchard, 1982)***.

2.2.B. Nematodes:

Nematodes were collected, washed by shaking in normal saline and immediately killed and stretched in hot 70% ethyl alcohol then the sample preserved in 70% alcohol and 5% glyecrin solution. ***(Fleck and Moody, 1993)*** and clearance was carried out by using lacto-phenol mixture for few minutes, followed by mounting in glycerol jelly ***(Belding, 1965)***.

3. Microscopic examination:

Prepared slides were carefully examined under a light microscopy using different magnifications using X4, X10, X20 and X 40 objectives.

4. Morphological identification:

The recovered parasites were identified according to the keys of ***Rudolphi (1809), Rudolphi (1819), Wedl (1862), Baylis (1923), Fuhrman and Bear (1925), Woodland (1925), Tubangui (1931), Chandler (1935), Capart (1944), Hargis (1955), La Rue (1957), Paperna (1960), Ukoli (1966), Khalifa et al. (1972), Mandour et al. (1988) and Lamarck (1801).***

RESULTS

1- Prevalence, Intensity and Abundance of the parasitic infection in *Clarias gariepinus* at Qena Governorate:

The present investigation displayed that out of (144) examined fish, (84) samples proved to be infected with different gastrointestinal parasites at Qena Governorate with total infection rate of (58.3%) while the mean intensity was (10.7) and the abundance was (6.3) as shown in **Table(1).**

The obtained results found that the most frequent parasitic infection among examined fish was Cestode with an infection rate of (35.4%) with highest intensity (11.6) and abundance (4.1), followed by Trematode infection (27%) with intensity (7) and Abundance (1.9) while the lowest infection rate, Intensity and Abundance (16.7%), (1.5) and (0.3) respectively were recorded in Nematode infection as shown in **Table (1).**

2- Seasonal prevalence and Intensity of the parasitic infection in *Clarias gariepinus* at Qena Governorate:

Table (2) summarized the seasonal prevalence of the recovered parasites in *Clarias gariepinus*, it was concluded that the highest rate of

parasite infection was observed during Spring season with infection rates of (83.3%), followed by Winter (66.7%) while Summer recorded (50%) and Autumn season which represented the lowest rate of infection (33.3%).

The highest intensity rate of parasite was recorded in Summer (12.8), followed by Winter (11.5), Spring (10.9) and Autumn season which represented the lowest rate of intensity (4.9).

3- Intensity of infection of different parasite species in *Clarias gariepinus* at Qena Governorate:

In respect to the kind of parasite infection, the obtained results showed that the highest intensity of Trematode species was recorded in Summer season (9), followed by Winter and Spring and where the intensity was (8.4), (5.6) respectively, while Autumn season was free from infection.

The Cestode species showed a high intensity during Spring season with an infection rate of (15.5), followed by Summer, Winter and Autumn seasons were the intensity were (13), (11.5) and (6.9) respectively. On the other hand, Nematode species showed a low intensity and closely related range during the four seasons as the intensity were the same in Summer and Autumn season (1.8), followed by Spring and Winter season (1.6) and (1.5) respectively all shown in **Table (3).**

The intensity of Trematode and Nematode infection of male nearly closed to female while Cestode infection of female (14.6%) was higher than male (10.5%) as recorded in **Table (7).**

4- Prevalence of different species of helminth parasites of *Clarias gariepinus* at Qena Governorate:

Monobothrium sp recorded the highest infection rate (27.8%) and intensity (15.3) followed with *Orientocreadium batrachoides* where the prevalence rate was (24.3%) and the intensity was (7.6) while the other different parasites species infection rate and intensity had closely rates which were *Orientocreadium* sp (2.1%) & (3.3); *Aspidogaster conchicola* (1.4%) & (3); *Polyonchobothrium clarias* (5.6%) & (1.5); *Capingenioidts singhl* (1.4%) & (2.5); *Paracamallanus cyathopharynx*(10.4%) & (1.9); *Procamallanus laevionchus* (5.6) & (1.3) respectively as illustrated in **Table (4)**

Table (1): Prevalence, Intensity and Abundance of the parasitic infection in *Clarias gariepinus* at Qena governorate

Items	No. of Examined	No.Parasite recovered	No. of infected fish	Prevalence %	Intensity	Abundance
Trematode	144	273	39	27	7	1.9
Cestode		592	51	35.4	11.6	4.1
Nematode		37	24	16.7	1.5	0.3
Total		902	84	58.3	10.7	6.3

Prevalence rate= No. of host infected/Total No. of fish examined X100.

Intensity= Total No. of parasites recovered /No. of fish infected.

Abundance=Total No. of parasites recovered/Total No. of fish examined.

Table (2): Seasonal prevalence of the recovered parasites in *Clarias gariepinus* at Qena Governorate:

Season	No. examined fish	No. of infected fish		Intensity
		No	%	
Winter	36	24	66.7	11.5
Spring	36	30	83.3	10.9
Summer	36	18	50	12.8
Autumn	36	12	33.3	4.9

Table (3): Intensity of infection of different parasite species in *Clarias gariepinus* at Qena Governorate:-

Season	Trematode			Cestode			Nematode		
	No.	No. Parasite	Intensity Infected	No.	No. Parasite	Intensity Infected	No.	No. Parasite	Intensity Infected
Winter	134	16	8.4	150	13	11.5	3	2	1.5
Spring	112	20	5.6	294	19	15.5	18	11	1.6
Summer	36	4	9	130	10	13	9	5	1.8
autumn	0	0	0	55	8	6.9	9	5	1.8
Total	**282**	**40**	**7.1**	**629**	**50**	**12.58**	**39**	**23**	**1.7**

Table (4): Prevalence of different species of helminth parasites of *Clarias gariepinus* at Qena Governorate:-

Helminth species	Parasite group	Infected fish		No. parasite	Intensity
		No.	%		
A-*Orientocreadium batrachoides*	Trematode	35	24.3	266	7.6
D-*Polyonchobothrium clarias*	Cestode	8	5.6	12	1.5
E-*Monobothrium* sp	Cestode	40	27.8	612	15.3
G-*Paracamallanus cyathopharynx*	Nematode	15	10.4	29	1.9
H-*Procamallanus laevionchus*	Nematode	8	5.6	10	1.3

5-MORPHOLOGICAL DESCRIPTION OF TREMATODE:

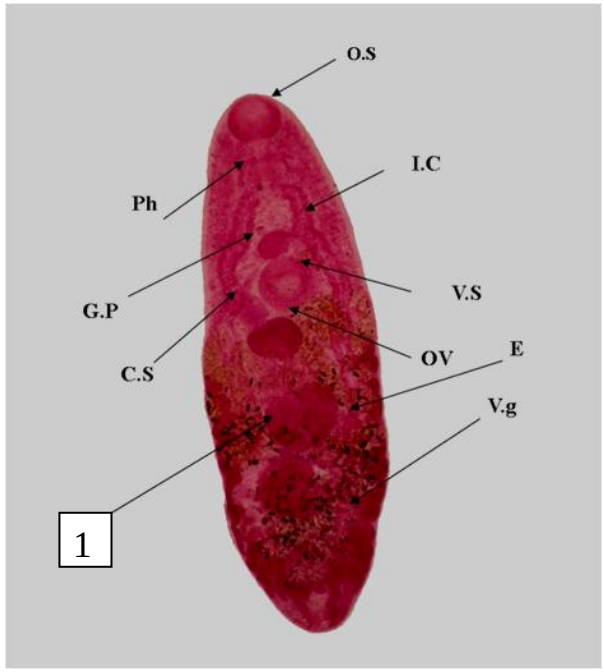
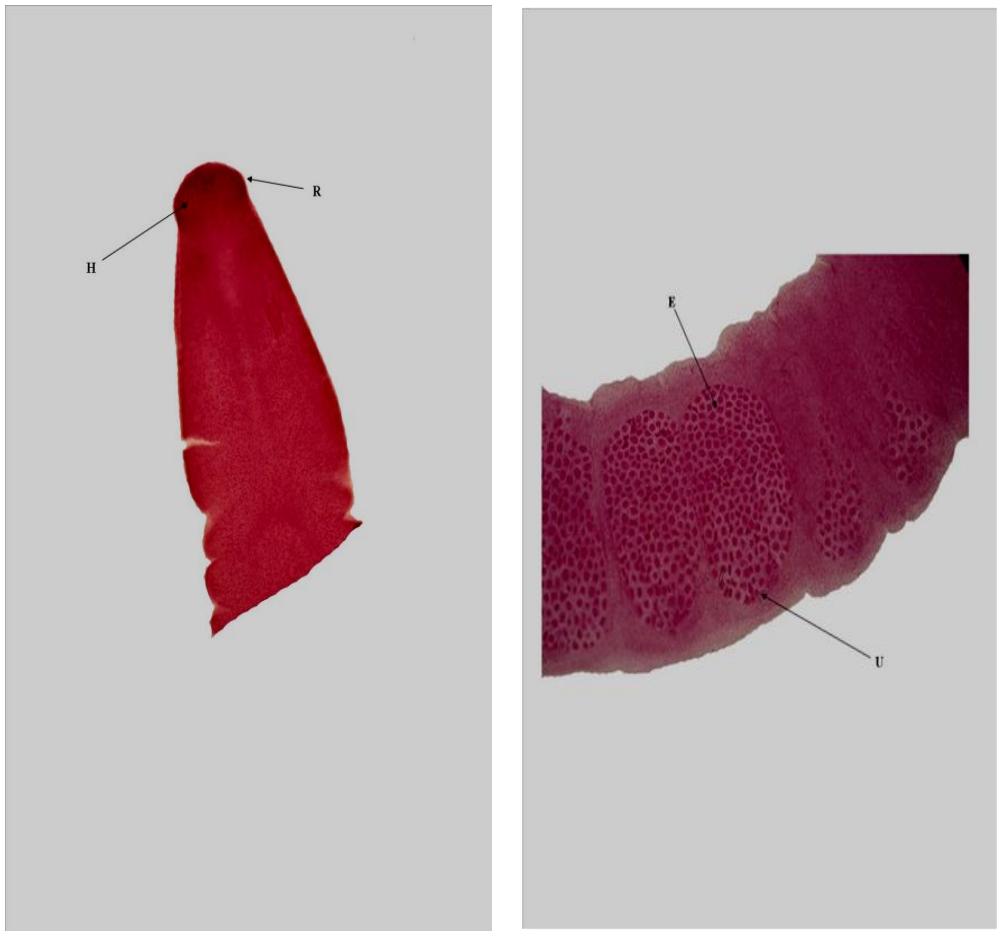


Fig. (A) 1: ***Orientocreadium .batrachoides*****(Tubangui, 1931)(X10):** is located in the intestine of fish and characterized by*:* The body was elongated**,** oral sucker subterminal and the pharynx is well-developed,the ventral sucker had the same size of the oral sucker and lies at about one third of body length,intestinal caeca extend behind uterine coils almost to posterior body margin, testes were large, rounded, tandem in position**,** common genital pore median, situated between ventral sucker and bifurcation of intestine. Ovary rounded, Uterine coils separated from posterior body margin by vitelline follicles. Vitelline follicles are irregular in shape and extending from level of ventral sucker to posterior extremity.

PH: Pharynx, **G.P** Genital pore, **O.S:** Oral sucker **,I.C:** Intestinal ceca, **OV:** Ovary, **V.g:** Vetilline gland, **T:** Testis, **C.S:** Cirrus sac, **V.S:** Ventral sucker, **E:** Egg

6- MORPHOLOGICAL DESCRIPTION OF CESTODE:



(1) **(2)**

Fig. (B):1*: Polyonchobothrium clarias* scolex (woodland, 1925) (X40): is located in the intestine and characterise by elongated triangular shape with a flat to slightly raised rostellum armed with a crown of 26–30 hooks. No neck detected. **2*:Polyonchobothrium clarias* gravid segement(X40):** characterise by squarish shape, the uterus appeared as oval sac occupying the whole segments and filled with eggs. **R:** Rostellum, **H**; Hooks

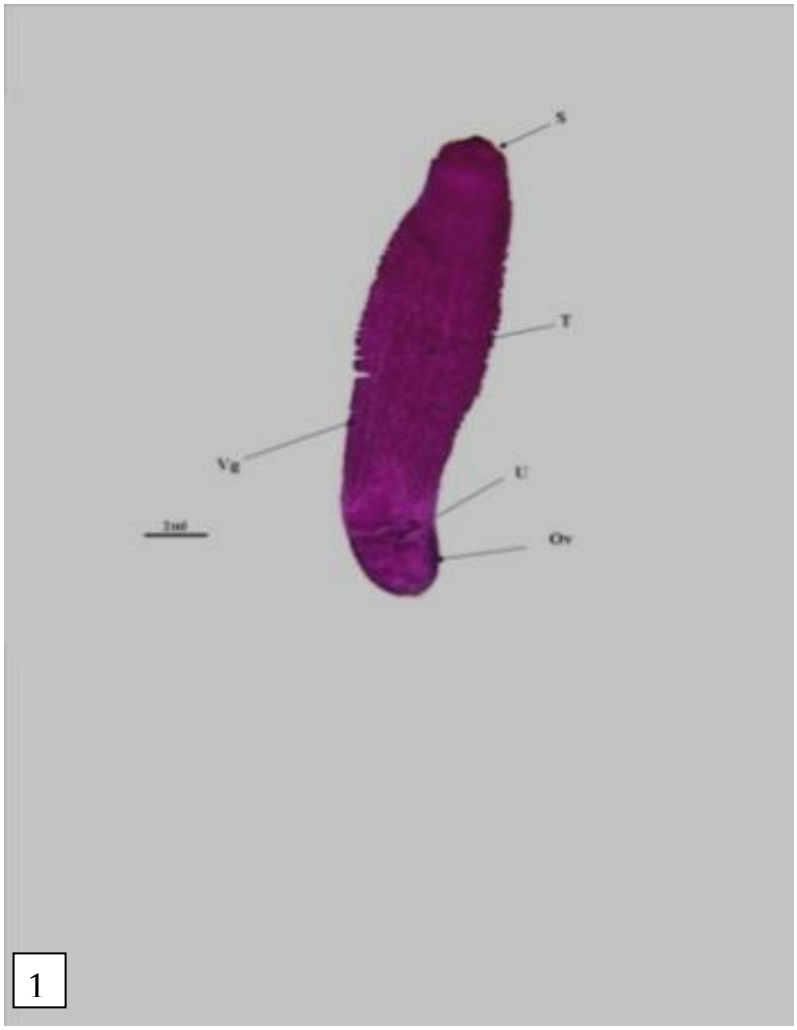
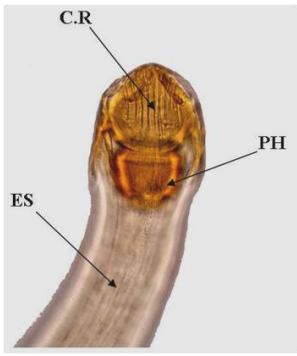
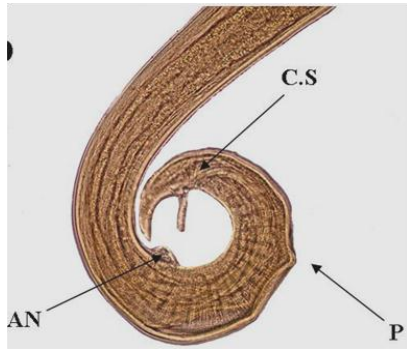


Fig. ***(C):1: Monobothrium*** **sp (Fuhrman and Bear, 1925)** ***(X40)*** **scolex:** in the intestine of *Clarias gariepinus*and characterise by the body is elongated fusiform in shape.The scolex is hexagonal, testes occupy the whole medullary parenchyma.The ovary is occupied the whole the posterior region of the worm .The vitellaria are composed of follicles which extended anterior to the testes .The uterus formed of coils distended in the posterior extremity.

7-MORPHOLOGICAL DESCRIPTION OF NEMATODE:



(1)



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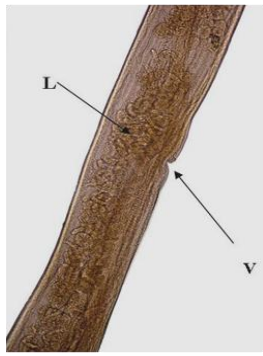

(4)

Fig. (D):1:*Paracamallanus cyathopharynx* Ant.end *(Wedl, 1862)*(X40): it's in Stomach and intestine and characterise byBuccal capsule, large , funnel-shaped, strong sclerotized contains two lateral valves strengthened on inner surface by numerous, thin longitudinal thickening (ribs) .2: ***Paracamallanus cyathopharynx* post.end male(X40) :**with a curved posterior end and provided with transverse cuticular striations. There are two spicules.scerotized..3:. ***Paracamallanus cyathopharynx* post.end female (X40) :**has Tail is conical in shape, ended by three small cone-shaped processes.4: ***Paracamallanus cyathopharynx* female(X40):** Uterus of fully mature one is filled with first stage larvae (larviparous). Vulva is almost equatorial near the middle of the body. **An:** Anus, **C.R:** Cutical striation, **C.S:** Copulatory spicules, **L:** Larvae, **Es:** Esophagus, **V:** Vulva, **Ph:** Pharynx

(1)

(2)

(3)

Fig. (E):1:*Procamallanus laevionchus* anterior end(X40) : its in the Stomach and characterise by presence of buccal capsules which is chitinous and the mouth opening is quadripapillated.2: ***Procamallanus laevionchus*** **posterior end of female(X40) :** is characterized by: presence of sunken papilla-like structure and shows apparent segmentation, and this observation has not been made before. 3: ***Procamallanus laevionchus*** **vulva of female(X40) :**is situated anterior to the middle of the body and it is provided with a lip

DISCUSSION

The present study revealed that 58.3% of examined fish found to be infected with different parasites. It is however important to mention that the incidence of parasites among fishes in this study is high. The reason for this might be due to the presence of their intermediate host such as copepods which would have been eaten by *C. gariepinus* due to their omnivorous feeding habit.This result was in line for some extent with that previously reported by ***Fagbenro et al. (1993)*** who recorded 59.8% prevalence in *C. gariepinus* from Jos Plateau, Nigeria; and ***Aliyu et al. (2012)*** recorded 59.38% infection rate in *C. gariepinus* at lower Usman dam, Abuja.However, the present study was lower than that recorded by ***Admed et al. (2013)*** and ***Hassan et al. (2010)*** whose recorded that the overall prevalence of intestinal helminth in *C. gariepinus* were 75% from Ogun River, South west Nigeria and 69.70% from Lekki lagoon respectively, and higher than that recorded by ***Lebari et al. (2016)*** who recorded 35.9% an overall prevalence of the gastrointestinal parasite burden of *C. gariepinus* in five fish farms in Port Harcourt, Nigeria. These variations might be due to the ecological and environmental factors as the localities, from which the fish were collected ,the nature of the water which is reflected in the human use and the endemicity of infection in the area.

Seasonal prevalence of the recovered parasites in *Clarias .gariepinus*, it was concluded that the highest rate of parasite infection was observed during Spring season (83.3%), followed by Winter (66.7%) while Summer recorded (50%) and Autumn season which represented the lowest rate of infection (33.3%) . This was agreed with that reported formerly by ***Eissa et al.(2010)***who recorded the highest rate of parasite infection was recorded in Spring season (88%) in *Clarias.garipinus* at Ismailia province.

The obtained results found that the most frequent parasitic infection among examined fish was Cestode with an infection rate of (35.4%), which it was agreed with that reported formerly by ***Eissa et al. (2012)*** 32.5%, However, this result was higher than that recorded by ***Walaa(2004); Ahmed et al (2012), Goselle et al. (2008); Ugbor et al. (2014); Ayanda (2009a); Mokhtar (2000); Abu El-Hag (1985)*** and **Alyain *et al. (1994)*** whose concluded that the infection percentage were(18.7%), from Abraham dam , (28%) at Lamingo dam, Jos, Nigeria, (15.56%) Anambra River,(5%) from Asa Dam River in Nigeria, (4.9%) ,(12.7%) and (11.1%) in Upper Egypt repectively. On the contrary, the present investigation was lower than that recorded by ***Laboni et al. (2012)*** (83.78%) from Bangladash and ***Barson and Avenant-oldewange (2006)***whose reported (71%) prevalence of Cestode from the Rietvlei Dam, South Africa.This difference could be due to life cycles of Cestodes need more than one intermediate host ***(Zaidi and Khan, 1976)***.

With reference to Trematode, the present work concluded that the infection rate was 27%. This result was nearly similar to that obtained by***Rasha (2010);Lamloom (1990)***and ***Eissa (2013)*** whose concluded the overall prevalence of Trematode was (24.2%), (32%) and (32.2%) respectively .On the contrary, the present investigation was lower than that recorded by ***Lashien (1993)*** and ***Mokhtar (2000)***whose concluded the overall prevalence was 77.6%, and 70.5% and lower than prevalence recorded by ***Ahmed et al. (2013)*** and ***Samia et al.(2012)*** whose recoded , 2.9% and 8.3% prevalence rate to Trematode respectivly.

These variations might be attributed to the environment of host , the behaviour and life history of both the parasites and host fish. Furthermore, due to the omnivorous feeding habits of the fish species.

The seasonal prevalence of Trematode showed that the highest prevalence was recorded in Spring season with an infection rate of (55.5%), followed by Winter and Summer and where the infection rates were (44.4%),(11%) respectively, while Autumn seasons was free from infection.This result was agreed with ***Eissa et al. (2010)*** who recorded the highest rate was during spring.But, it was not in line with that mentioned that ***Rasha (2010)*** who reported the prevalence rate was higher in Summer (55%) than Spring (23.3%), Autumn (13.3%) and Winter (5%), and ***Amal (2006)*** who found that the peak was in Winter and the lowest in Spring. Thus due to the activity of the first intermediate hosts (snails) which disseminate infestation to fish.

Meanwhile, the prevalence rate of *Orientocreadium.batrachoides* was (24.3%),this result was in the line with ***Erhan andYılmaz (2005)*** (31.5%) in Antalya, Turkey.On the contrary, the present investigation was not in line with that obtained by ***Eissa et al. (2010)*** from Ismailia Province with prevalence of 39%, ***Wahab and Mutaqin(2008)*** (70.5%) and ***Rewaida et al. (2015)***(8.33%) in Lake Manzala, Egypt.

The Cestode species showed a high occurrence during Spring season with an infection rate of (52.7%), followed by Winter, Summer and Autumn seasons were the infection rates (36%),(27.8%) and (22.2%) respectively.These results was in accordance with that reported formerly by ***Rasha (2010)*** who stated that the highest prevalence rate among *C. gariepinus* was noticed in Spring (53.3%), then followed by Summer and Autumn (38.3%) and the lowest rate was recorded in Winter (36.7%) at Assuit governorate,.On the other hand, the present investigation was not in line with that recorded by ***Mahfouz (1991)*** who recorded the highest seasonal prevalence in Winter and the lowest prevalence occurred in

Autumn in *Clarias gariepinus*.. Additionally, ***Alyain et al. (1994)*** recorded the seasonal prevalence of Cestodes in Summer, Autumn, Winter and Spring were (1.5%), (1%), (1%) and (1.5%)respectively at El-Minia Governorate. These variations might be attributed to the physical factors of water body where the fish inhabits.

Regarding to the Cestode species, *Polyonchobothrium clarai*; the overall infection rate was (5.6%).This result was nearly similar to that obtained by ***Oniye et al. (2004)*** in Zaria, Nigeria. On the contrary, the present investigation was lower than that recorded by ***Imam (1971)*** (42%) in Cairo and Giza provinces, ***Sahlab (1982)*** (22.2%) from Manzala Lake Egypt, ***Eissa et al. (2012)*** (50.5 %) in Kafr El-Sheikh Governorate.

Regarding to the prevalence rate of *Monobothrium*sp. in *Clarias.gariepinus* was (27.8%), this result was nearly similar to that mentioned by ***Magami et al. (2016)*** (27.3) at River Rima, Sokoto Nigeria.On contrary, these results were not in line with that recorded formerly by ***Mahfouz (1991)*** (1.5%), and ***Eissa et al. (2012)*** (14.5 %) in Kafr El-Sheikh Governorate.Thus differ due to life cycles of Cestodes need more than one intermediate hostwhich differ from place to another one.

On the other hand, Nematode species showed a low occurrence during the study period particularly all over the four seasons as in spring the infection rate reached (30.5%), followed by summer and autumn seasons were same infection rate reached (13.9%), finally winter season with infection rate (5.6%). This result was not in line with that revealed by ***Walaa (2004)*** who found that the maximum infection rate of Nematode was during summer (12.6%) and their minimum rate in

autumn (2.5%). Seasonal changes in the water environment (such as temperature, conductivity and pH) can affect the occurrence of aquatic host parasites and infection rate of the parasites ***(Chubb, 1977)***.

In respect to the Nematode species, 2 species were identified in this study infecting *Clariasgariepinus* at Qena Governorate.The prevalence of *Paracamallanus.cyathopharynx* in *Clariasgariepinus* was(10.4%). This result was nearly in line with that reported by ***Akisanya (2013)*** who found the infection rate was (4.75%). But it was not in line with ***Imam (1971)***who found the infection rate was (29.02%) in Egypt, ***Magami et al. (2016)*** (36.4%) at River Rima, Sokoto Nigeria; and ***Eissa et al (2010)***who found the infection rate was (31%) from Ismailia Province. While, the prevalence of *Procamallanus. laeviconchus* in *Clariasgariepinus* was(5.6%). This result was higher than that mentioned by ***Oniye et al. (2004)*** who recorded the prevalence was (0.83%) in Zaria, Nigeria . On the contrary, the present investigation was lower than that recorded by ***Imam (1971)***who recorded the prevalence was (20.45%) and ***Eissa et al. (2010)*** who recorded the prevalence was (26%) from Ismailia Province.

CONCLUSION

This work has identified different helminthes infection in *Clariasgariepinus fish* at Qena Governorate.it has been found that the most common species of Cestode we found were *Monobothrium* sp which recorded the highest infection rate (27.8%) and *Polyonchobothrium clarias* (5.6%), followed by Trematode species *Orientocreadium batrachoides* (24.3%) and Nematode species *Paracamallanus cyathopharynx* (10.4%) and *Procamallanus laevionchus* (5.6%).

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