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SOME STUDIES ON EYE AFFECTIONS IN ORECHROMIS NILOTICUS IN EGYPT

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SUMMARY

A total number of 950 *Orechromis niloticus (O. niloticus)* fish, 500 wild *O. niloticus* fish from River Nile at Giza Governorate and 450 cultured *O. niloticus* fish from Abbasa farm at Sharkia Governorate were collected at different seasons, to study the incidence of eye lesions, their clinical signs and etiologic agents. The incidence of the parasitiic infestation was highest (42.7%) and (39%) followed by Bacterial infection (25.1%) and (14.4%), while the fungal infection was the least (10.4%), (10%) in cultured and wild *O. niloticus*. Eye lesions were higher in cultured *O. niloticus* fish (78.2%) than that in wild (63.4%).

The eye lesions appeared as uni or bilateral exophthalmae, sink eye and cataract in most parasitic cases, cotton like growth from eye or exophathlmae were lesions accompanied with fungal causes . In bacterial diseases red eye cases were noticed beside all previous signs. The most common parasitic agents isolated from wild and cultured *O. niloticus* were the metacercariae of the genera Clinostomum (9%, 20%), *Diplostomum paracaudm* (6%,15.6%), *Diplostomum spathaceum* (14%, 2.7%), and sporozoan Myxobolus sp. (10%, 4.4%). The bacterial agents were *Aeromonas hydrophila* (6%.11.1). *Yersenia ruckeri* ((4%, 6.4%), Staphylococcus sp. (3%, 4%) and Streptococcus sp. (1.4%, 3.6%) respectively . Two mycotic isolates in wild and culture *O. niloticus* fish comprised of Saprolegnae sp., (2%, 2.2%) and *Ichthyophonus hoferi* (30%, 8.2%). The prevalence of parasitic infestation in eye affections was highest in summer (63%), (76.2%) and the least at winter (14.8%), (16.3%) in wild and cultured *O. niloticus* fish..

INTRODUCTION

The eye of fish is made up of the same elements as the human eye except that its accommodation which is done by changing the distance between the lens and the object (Duijn, 1973). The paucity of information on diseases of the fish eye results, not from any lack of ocular disease, but rather from the rarity of people who combine a professional interest in fish with a measure of competence in ophthalmology (Ferguson, 1989). Fish needs senses of smell, touch, vision and taste for seeking food, so eye affection leads to a degree of falling to reach food and return that as a result of decrease in body weight. The general health of fish is judged by simple test (ocular

reflex) in which eye of sick fish will follow the turning of the body (Post, 1987). The pathogenic causes of ocular disease can be broadly grouped into those resulting from intralenticular invasion by trematodes parasitic cataract (eye fluke) and bacteremic diseases particularly those with endothelial tropism such as aeromonas or yersina sp. May result in endophthalmitis lesions as may wandering protozoan or metazoan (Ferguson, 1989). Furngus infection of the eye is much more dangerous than one of the skin, since disease origination on the eye may easily penetrate in the brain and in such cases, nothing can save the victim (Sindermann, 1970 and Der Kinderen, 1965).

The present study was carried out to determine the incidence of eye lesions, their clinical signs and the aeteiological agents in wild and cultured *O. niloticus* at different seasons.

MATERIAL AND METHODS

1- Fish

This study was conducted on (500) *O. niloticus* fish collected from River Nile at Giza Governorate and 450 fish from Abbasa fish farm at Sharkia Governorate during the period from October 1995 to September 1996. Fish were transported alive to the laboratory and examined clinically in glass aquaria, supplied with aerated chlorine free tap water.

2- Laboratory Examination

A- Clinical And Post-Mortem Examination Of Fish

Clinical examination was done on the alive fish by using magnifying lens, the incidence of eye changes was recorded . The fish were subjected to P. M and microscopical examination by using smear preparation from eye to detect the parasitic, mycotic and or some bacterial agents (Amlacher, 1970).

B- Bacteriological Examination

Under complete aseptic conditions samples were taken from eye, skin, gills as well as internal organs (liver, kidney and spleen). Each sample was inoculated in 2 tubes of nutrient broth which were incubated at 22-25°C for 18-24 hr. A loopful from each inoculated broth was seeded in duplicated paltes of nutrient agar medium (N.A), trypticase Soya agar (T. S. A. Oxoid), Rimlers Shott agar (R. S. media) sheep blood agar (Difco) and Shotts Waltman agar (S.W. media). These plates were incubated aerobically at 25°C for 24 hr. The isolates obtained were identified morphologically by Gram stain and motility was tested on semisolid medium, Biochemical identification was done using the API-20 system (AL-Kan) according to Austin and Austin (1987).

C. Mycotic Examination:-

Samples were taken from affected eye and internal organs cultured on sabouraud dextrose agar media supplemented with 1% bovine serum and other with hemp seeds while 2 plates left without any addition. The inoculated plates were incubated at 15-20°C for 15-21 days Identification

of isolated fungus was carried out according to Neish and Hughes (1980).

D- Parasitic Examination:

By using magnifying lens, eye and eye socket were visualizing examined and any macroscopic parasites were picked up and examined under microscope. Stained parasites were identified according to Yamgute (1958) and Kruse and Pritchard (1982).

RESULTS

1. Causative agents of eye affection:

A- Parasitic agents:

The results in table (1) revealed that the incidence of parasitic infestation in wild and culture *O. niloticus* were 39% and 42.7% respectively. Three different parasitic genera were recorded in examined disease fish including Clinostomatid, Diplostomatid melacercarea and Myxobolus sp.

B- Bacterial agents:

In the present study 72 and 113 bacterial isoaltes were recovered from Both wild and cultured *O. niloticus;* respectively. The distribution of bacterial isolates in diferent organs was mentioned in Table (3). The bacterial isolates were identified by morphological features and by using API-20E system into four bacterial genera *A. hydrophita, Y. ruckeri,* Staph sp. and Strept. Sp. (Table 4).

C- Fungal agents:

Ninety seven isolates were recovered from both wild and culture *O. niloticus* 50 and 47 respectively. The distribution of fungal isoaltes in different organs was mentioned in Table (3). The fungal isolates were identified by morphological characters of lactophenol cotton blue stained smears, into two different genera Saprolengia sp. and Ichthyophonus hoferi.

Prevalence of isolated causes in wild and cultured *O. niloticus* fish:

As showen in table (1) the higherst rate of eye affection was reported in cultured *O. niloicus* (78.2%) while in wild *O. niloticus* was (63.54%). The parasitic agents were the most common (39%, 42.7%) in wild and cultured *O. niloticus* respectively, followed by bacterial agents 25.1% and 14.4% successively. While the fungal infection was the least 10.4 and 10% in both cultured and wild *O. niloticus* respectively. Concerning the parasitic causes the encysted metacercariae of *Diplostomum spithaceum* were found to be the highest 14% and 27% in wild and cultured *O. niloticus*, followed by sporozoan Myxobolus sp., encysted metacercariae of Clinostomum sp. and *Deplostomum paracaudum* (10%, 9%, 6%) respectively in wild *O. niloticus* and 20%, 15.6% 4.4% respectivley in cultured *O. niloticus.*

The eye affection due to fungal agents, Icthyophonus hoferi was higher than Saprolegnae sp. (6% and 4% respectively in wild *O. niloticus*) and (8.2% and 2.2% respectively in cultured *O. niloticus.*

(1) Causative Agent of eye affection in wild and culture O. niloticus

Causative Agent	wild O. niloticus			culture O. niloticus		
	NO. Of examined fish	infected NO.	%	NO. Of examined fish	infected NO.	%
I-Parasitic agents						
1-Diplostomum spathaceum		70	14		12	2.7
2- Diplostomum paracaudum		30	6		70	15.6
3-Clinostomum sp.		45	9		90	20
4-Myxosporadia sp.		50	10		20	4.4
Total Of Parasitic Infestation		195	39		192	42.7
II-Bacterial agents	500			450		
1-Aeromonas hydrphila		30	6		50	11.1
2-Yersania ruckeri		20	4		29	6.4
3-Staphylococcus sp.		15	3		18	4
4-Streptoccous sp.		7	1.4		16	3.6
Total Of Bacterial Infection		72	14.4		113	25.1
III-Fungal agents						
1-Saprolegnae sp.		20	4		10	2.2
2-Ichthyophonus hoferi		30	6		37	8.2
Total Of Fungal Infection		50	10		47	10.4
Total Of Eye Affection	500	317	63.4	450	352	78.2

Table (2) Prevalence of Protozoa and Treamatoda in eye affections of wild and culture O. niloticus at different seasons

SEASONS	TOTAL EXAMINED	Infected No.	%	Treamatoda						Protozoa	
				1-Diplostomum spathaceum		2- Diplostomum paracaudum		3-Clinostomum sp.		Myxosporadia sp.	
				Infected No.	%	Infected No.	%	Infected No.	%	Infected No.	%
Autumn											
wild O. Niloticus	105	40	38.1	7	17.5	8	20	10	25	15	37.5
culture O. niloticus	85	30	35.3	6	20	5	16.7	7	23.3	12	40
Winter											
wild O. Niloticus	135	20	14.8	3	15	3	15	4	20	10	50
culture O. niloticus	135	22	16.3	2	9	2	9	3	13.6	15	68.2
Spring											
wild O. Niloticus	125	50	40	12	24	11	22	18	36	9	18
culture O. niloticus	125	60	48	18	30	13	21.7	16	26.7	13	21.7
Summer											
wild O. Niloticus	135	85	63	25	29.4	20	23.2	30	35.3	10	11.8
culture O. niloticus	105	80	76.2	19	23.8	18	22.5	29	36.3	14	17.5

Table(3):Distribution of isolates in different organs of naturally infected wild and culturerd <u>O. niloticus</u> with eye lesions

Isolates	Wild Fish								Cultured Fish							
	No. of exam.	No. of Isolate	Sites of Isolation						No. of exam.	No. of Isolate	Sites of Isolation					
			Eye	Skin	Gills	Kid.	Liver	Spleen			Eye	Skin	Gills	Kid.	Liver	Spleen
Bacterial isolates	500								450							
1. A. hydrophila		30	-	9	5	8	5	3		50	-	12	10	10	9	9
2. Y. ruckei		20	-	-	-	7	7	6		29	-	-	-	10	10	9
3. Staph. sp.		15	15	-	-	-	-	-		18	18	-	-	-	-	-
4. Strept. sp.		7	-	-	-	7	-	-		16	-	-	-	16	-	-
Fungal isolates:	500								450							
1. Saprolegnae sp.		20	20	+	+	-	-	-		10	10	+	+	-	-	-
2. I. hoferi		30	30	-	-	+	+	+		37	37	-	-	+	+	+

- = negative isolation.

+ = positive isolation

Table (4) Biochemical characterization for Bacterial isolates recovered from eye lesions O. niloticus fish by the API- 20 E system

Biochemical reaction	A. hydrophite	Y. ruckeri	Staph. sp	Strept. sp
Gram stain	-	-	+	+
B- galactosidase	+	+	+	-
Arginine dihydrolase	+	-	-	-
Lysin decarboxylase	+	+	-	-
Ornithine decarboxylase	-	+	-	-
Citrate utiliztion	+	+	-	-
H_2S production	-	-	-	-
Ureas production	-	-	+	-
Tryptophan deaminase	-	-	n	n
Indole production	+	-	--	-
Voges - proskauer reaction	+	v	+	n
Gelatin hydrolysis	+	+	+	-
Glucose	+	+	+	+
Mannitol	+	+	+	-
Inositol	-	-	-	n
Sorbitol	-	v	n	-
Rhamnose	-	-	-	-
Sucrose	+	-	+	-
Melibiose	-	-	n	n
Amygdalin	+	-	n	n
Arabinose	+	-	n	n
Oxidase production	+	-	-	-

n = not done , v = variable result

Fig (1) : O. niloticus fish showing eye opacity (Diplostomum infection).

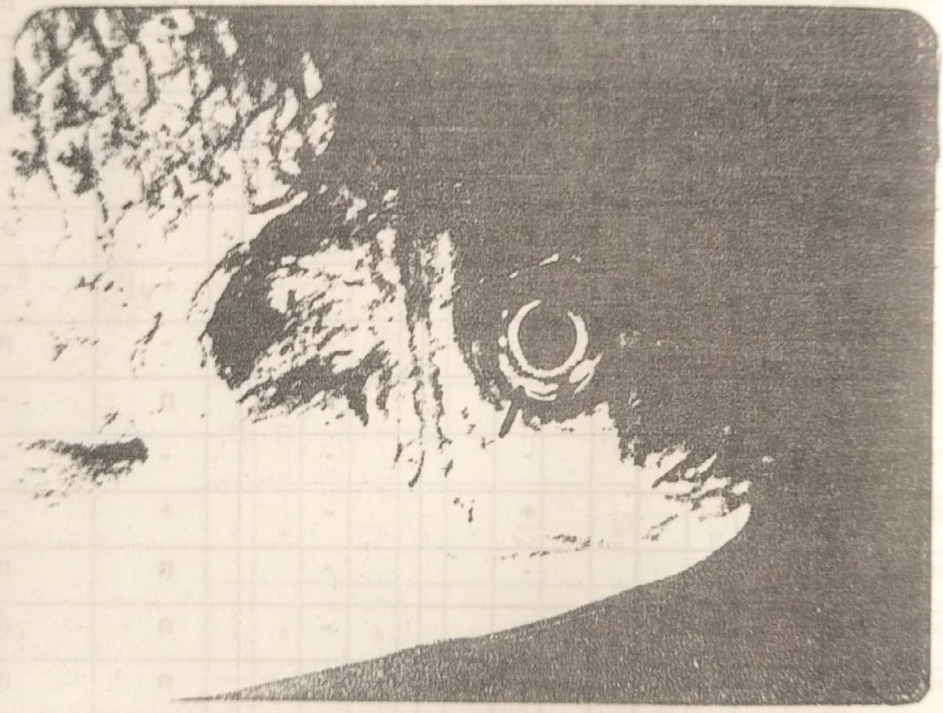

Fig (2) : O. niloticus fish showing pinhead cysts scattard in cornea (Myxospordia infection).

Fig (3) : O. niloticus fish showing Clinostomum infestation in eye socket

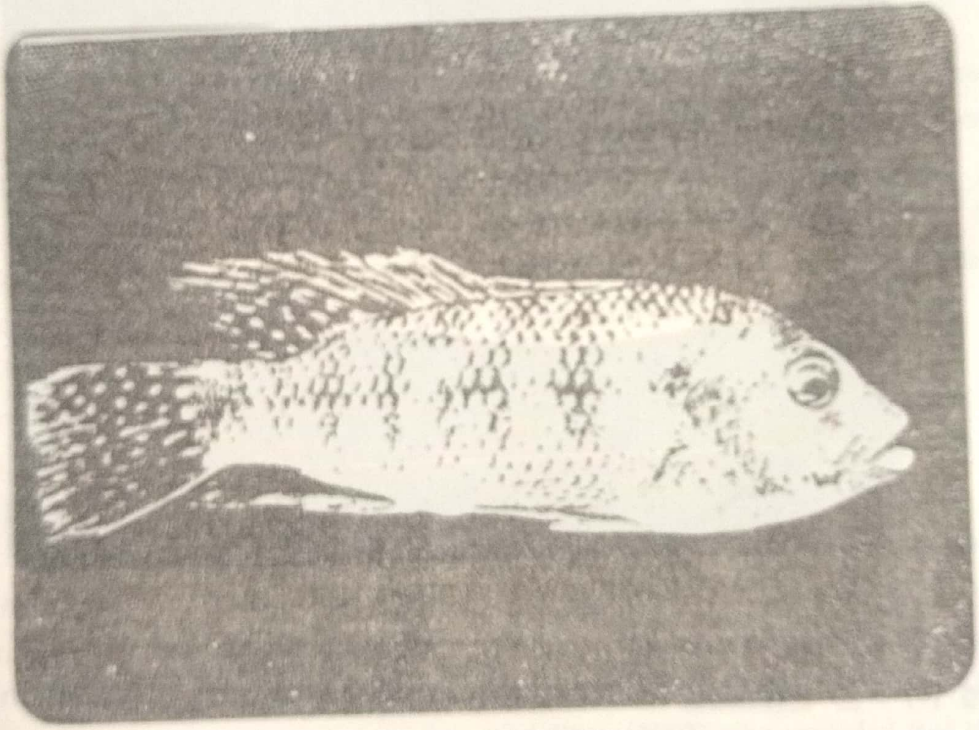

Fig (4) : O. niloticus fish showing red eye due to Y.ruckeri infection

Meanwhile, the bacterial causes of eye affection were Aeromonas hydrophila, Yersenia ruckeri, Staphylococcus sp. and Streptococcus sp., (6%, 4%, 3% and 1.4%), respectively in wild *O. niloticus* and (11.1%, 6.4% and 3.6%) respectively in culture *O. niloticus*.

3- Clinical signs in ocular affection:

The most obvious clinical signs observed among parasitic eye affection differd from light degree of cataract (small dots) to complete white eye lens (boiled eyes) as shown in figure (1) or pin headed cysts scattered in cornea fig (2 & 3). While in bacterial affection uni or bilateral exophthalmia was noticed. as shown in figure (4). On the other hand, fungal infection in wild and cultured *O. niloticus* fish was characterized by cotton wool like lesion or exophthalmia (Fig. 5).

4. Effect of seasonal variation on the prevalence of protozoa and trematode in eye affection of wild and cultured *O. niloticus* fish:

As shown in Table (2), genus Clinostomum and Diplostumum reached their maximum infestation rates at summer and spring seasons. While the peak of Myxosporidea was recorded at winter and autumn seasons.

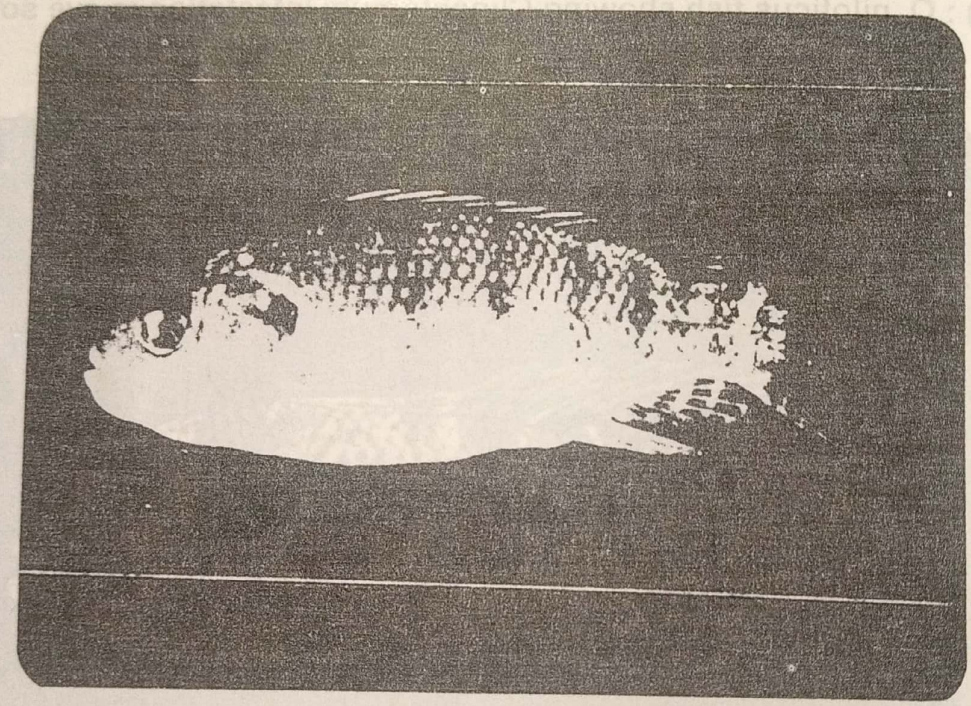

Fig (5) : O. niloticus fish showing exophthalmia due to infection with I.hoferi.

DISCUSSION

The rarity of information on diseases of the fish eye results in not from any lack of ocular disease, but rather from rare people who combine a professional interest in fish with a measure of competence in ophthalmology (Freguson, 1989).

The results concerning the causative agents of eye affection revealed that the parasitic agents were the most common in both cultured and wild *O. niloticus* fish (42.7%) and (39%) respectively, followed by bacterial agents (25.1%), (14.4%), while the fungal infection was the least (10.4%) and (10%) in cultured and wild *O. niloticus* fish respectively as shown in Table (1). These results coincide with (Sinderman, 1970, and Ferguson, 1989) who mention that the pathogenic causes of ocular diseases can be broadly grouped into trematodes parasitic cataract (eye fluke). bactermic diseases such as Aeromonas and Yersina sp, and fungi.

The results of the present investigation revealed that the highest rats of eye affection was reproted in cultured *O. niloticus* (78.2%) while in wild *O. niloticus* was (63.4%). These finding supported those of Badran and Eissa (1991), Jihan (1993), Nagib (1994) and Ebtsam (1997), who recorded that the infection rates in culture *O. niloticus* fish were higher han those in River Nile fish, which may be due to water self purification of pathogens in River Nile.

Encysted metacercaria of four parasitic species were identified from the examined fish by morphological identification, they were belonging to the genera Clinostomum, Diplostomum and Myxobolus, these results were in agreement with Kabata (1985) Buckmann (1986). Ashmawy (!989) and Amer and Gattas (1993).

Concerning, the seasonal variation of parasitic infestation table (2) showed that genus Clinostomum and Diplostomum reached their maximum infestation rate at summer and spring seasons while the peak of Myxobolus infection was recorded at winter and autumn seasons. These results agreed with those reported by Jihan (1993) and Ebtsam (1997).

The morphological and biochemical characters of isolated bacterial agents, were similar to those of Waltman and Shotts (1984)., Austin and Austin (1987), Badran and Eissa (1991) (Table, 4).

Morphological characters of Lactophenol cotton blue (LPCB) stained smears of isolated fungal agents proved to be Saprolegnia sp. And Ichthyophonus hoferi. These results supported those of Neish and Hughes (1980), Badran (1989) and Manal et al. (1996).

The results of clinical examination cleared that parasitic eye affection differs from a light degree of cataract (small dots) to a complete white eye lens (boiled eye) as shown in Fig. (1) or pin head cysts scattered in cornea (Figs. 2 & 3). This picture of eye signs agreed with that described by Amlacher (1970), El-Naffar (1979), Alfat (1991) and Jihan (1993) who recorded that the highest infestation rates of *Diplostomatid metacercariae* and *Hetrophatid metacercariae* were in the tissues of Tilapia fish eye causing eye opacily in 91.5%

from River Nile. Ebtsam (1997) recorded (15.7%) eye opacity cases by *Diplostomatid metacercariae* in Tilapia fish from Abbassa farm.

In bacterial affection, unilateral exophthalmia was noticed, a finding coinciding with that recorded by Badran and Eissa (1991) who recorded exophthalmia in naturally infected *O. niloticus* cultured fish infected with *A. hydrophila*. Pop eye sings were recorded in Strept. sp. infection as that reported in Rainbow trout farm in Australia, Israel, Italy and South Africa (Barhan et al., 1979). Carson and Munday (1990) and Ceschia et al. (1992). Exophthalmia was characteristic in fish infected with Staph. Sp. pathogens, these results agreed with Austin and Austin (1987) and Laila et al. (1990).

Fungal infections in wild and cultured *O. niloticus* fish were in the form of characteristic cotton like lesions or exophthalmal Fig. (5) or no eye changes appeared, these results were in agreement with Van Dujin (1973), Badran (1989) Nagib (1994) and Mandal et al. (1996).

The present study clearead that eye is a valuable target organ in many microbial and parasitic diseases, so it could be considered as an important aid in diagnosis of cases where more characteristic symptoms are lacking Also, it is necessary to remove the dead fish as soon as possible to avoid spread of infection by water or complete cycle by water birds.

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