

STUDIES ON ARGULOSIS IN CULTURED MUGIL CEPHALUS

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ABSTRACT

The present study deals with a problem of great economic importance, the crustacean disease Argulosis in cultured *Mugil cephalus*. Samples were collected from private fish farms in Dakahlia and Kafr El-Shekh Provinces. The causative parasite is isolated from the external body surface as it found attached under the gill cover and at the base of fins. The parasite is identified parasitologically as a branchiuran crustacean that belonged to family Argulidae (fish lice) *Argulus foliaceus*. The total prevalence of Argulosis was 8% where the prevalence in Dakahlia was 20% with no infestation in Kafr-El-Sheikh Province. Infection is found to predominate in summer followed by spring. The clinical signs and postmortem lesions of such affection were recorded. In addition, the histopathological alterations of the infested fish were described.

INTRODUCTION

Both external and internal parasitic diseases cause a severe economical losses in pisciculture in Egypt. However, there are long periods of optimum warm weather, that enable external parasites for more reproduction (Eissa, 2002). Crustacean parasites are increasingly serious problems in cultured fish and can also impact wild populations (Noga, 1996). Most parasitic copepods are external but others have colonized more sheltered microhabitat on their hosts such as gills and mouth (Kabata, 1985) and few penetrate deep in host tissues (Noga, 1996). Many species are parasitic on fish while others are associated with marine invertebrates (Kabata, 1992 & Gotto, 1993). From the most parasitic crustaceans, *Argulus* species is considered as an endemic adapted crustacean parasite that lead to high economic losses in African cultured fishes (Pappas, 1996). Therefore, the present investigation was undertaken to provide more information about such problem in our cultured mullet fish *Mugil cephalus*.

MATERIAL AND METHODS

A total number of 100 cultured *Mugil cephalus* with an average body weight of 200 ± 20 gm were randomly collected in three different seasons (cultured period) from a private fish farms in Dakahlia and Kafr El-Sheikh Provinces. They were transported alive to the wet laboratory where they were examined.

Clinical examination:

The clinical signs and postmortem lesions of naturally infested live *M. cephalus* were recorded immediately after collection to investigate any abnormalities indicating Argulosis using the methods described by Lucky (1977).

Parasitological examination :

The external body surfaces were dissected and examined grossly with a hand lens. The detected parasites were collected from the base of fins and under the gill cover. They were washed in warm saline solution and fixed in 70% alcohol-glycerin. The isolated parasites were examined microscopically using the guideline of Lucky (1977). The prevalence of such parasites were recorded.

Histopathological examination:

The affected tissues of fish specimens were fixed in 10% phosphate buffered formalin, then dehydrated in ascending grades of alcohol and cleaned in xylol, embedded in paraffin wax and sectioned as (5um) thickness and floated on warm water (just below the melting point of the paraffin). The sections were taken from the water bath on a glass slides, coated with a minimal amount of Myer's albumin. The slides dried, hydrated in alcohol absolute, 90, 70 and 40% alcohol and distilled water and stained with Delafield's haematoxylin (2 - 3 minutes) and washed in distilled water and stained with 1% aqueous eosin (30 seconds) then washed in distilled water and cleaned in xylol and finally mounted in Canada balsam (Robert , 1989) .

RESULTS

Clinical picture :

The first signs of the infestation in the affected mullet fish were imbalanced swimming be-

haviour. They revealed sluggish movement, try to rub their bodies against hard objects . Most of these fish showed dark discoloration of the skin, loss of appetite and eventually loss of escape reflex. The postmortem examinations showed presence of adult female branchiura attached under the gill cover at near the base of fins. Abraded areas and ulcerations appeared on the external body surface, loosened scales with skin splits and fissures , haemorrhagic and erythemic surface with ring-shaped wall forms around the parasites and circular red depressions on the manner of linear haemorrhages Plat I (A-B-C)

Morphological description:

The parasite has a dorsoventrally flattened body, disc-shaped, the body length of adults ranged from 5 to 15 mm. The anterior part constitutes the cephalothorax that was covered with a broad dorsal carapace which extends laterally and posteriorly from the head forming a shallow-shield. The lateral flaps of carapace can moved up and down a little like wings. The abdomen was fin-shaped and medially notched which act as an accessory heart . On the underside of the carapace, there were two laterally situated areas to which the four pairs jointed swimming appendages .

The first pair of maxillae was modified into a pair of large sucking discs , used in the attachment of parasites to the fish. As well, the basal part of first and second antennae ends in a strong hook and the second maxillae carries spines; all were used for subsidiary attachment.

The feeding apparatus of *Argulus* species consists of two parts united at the base. The posterior part was a proboscis-like mouth tube. The anterior part was a tube that forms a sheath around a long, sharp piercing organ, named as the pre-oral sting or stylet. There was a pair of movable black faceted compound eyes and a single nauplius eye on the center of the dorsal surface.

Based on the morphological and parasitological examinations , these crustaceans were belonged to family Argulidae, (fish lice) *Argulus foliaceus* Plate I (D-E-F)

Prevalence and intensity:

Examination of the investigated samples revealed natural infestation with *Argulus foliaceus* in 8 out of 40 (20%) examined cultured *M. cephalus* in Dakahlia province. On the other hand, samples examined from Kafr El- Sheth province are found free from *Argulus* infestation (0.00%). Table (1).

Data displayed in table (2) shows that the parasitic prevalence, of the revealed *Argulus foliaceus*, is increased during spring season (12%) toward summer (20%) while disappeared during cold months (Autumn and winter).

Histopathological picture:

Microscopical examination of Mugil cephalus infested with *Argulus foliaceus* revealed that the lesions were confined to epidermis. They were represented as infiltration with macrophages, lymphocytes and few eosinophils in addition to hyperplasia and hydropic degeneration of epidermal epithelial cells as well as fibroblastic proliferation Plate 1 (C-H).

DISCUSSION

The overexploitation of fish has greatly increased the demand for intensive and semi-intensive pisciculture systems as an excellent source of high quality proteins. Unfortunately, in addition to the relatively high water temperature, the more human interference (high densities, feeding, fertilization,.....), the more pathogens in water are existing thus, external parasites flourish especially crustacean copepods, from which *Argulus* species attack many cultured and wild freshwater fishes (Bowers et al., 2000, Raef et al., 2000 and Eissa, 2002).

Based on the morphological and parasitological examinations the detected female argulus was found to be morphologically similar to the previous description given by Lucky, (1977) and Ole et al., (2007) as *Argulus foliaceus*.

Branchiurans are ectoparasitic attached to fish hosts by their highly modified mouthparts, but the relationship is not permanent. Fish lice (*Argulus*) are in fact a small crustacean that attaches itself to its host and then proceeds to feed on its blood.

The direct effects of this parasite on its host depend on the number of parasites and the size of the host. One or two parasites on a small fish cause the local damage on the epithelia. Several parasites have a very significant effect. Fish with heavy infestations become lethargic, can cease feeding and show a general deterioration in their condition as reduced pigmentation, fins drooping (Lester and Roubal 1995).

In this study, it is shown that skin, base of fins and under gill cover appeared with hemorrhagic areas, abrasions and ulceration on the body surface which may attributed to irritation caused by *Argulus foliaceus* Also, general deterioration in their condition as reduced pigmentation, these nearly agreed with Richards (1977); Al-Hamdanne and Tacc (1995); Lester and Roubal (1995) and Alexandrino et al., (2000).

Argulids infestations cause the skin irritation manifested by flicking of the fins (Richards 1977 and Bauer 1991). This is often accompanied by increased mucus production over the skin surface and the appearance of small haemorrhages (Richards, 1977). In this study, abnormal swimming, rubbing themselves against the wall of tank and lack of appetite were observed in diseased mullet fish. The skin and fins have numerous brownish grey points and hemorrhagic areas.

Argulids infecting the skin of fish induce severe local damage to the integument. Damage is caused by the piercing proboscis stylet which enters deep into the skin's dermal layer and secretes lytic and toxic substances resulting in acute haemorrhagic, inflamed wounds. Attachment to and crawling on the skin also causes irritation and abrasions leading first to proliferation and later to desquamation and erosion of the epithelium. (Kabata, 1970, 1985; Paperna & Zwerner, 1978). This behaviour explains the clinical signs found by the present study.

The total prevalence of Argulosis in *Mugil cephalus* was recorded as 20% in Dakahlia province. Several authors Manahar and Omprakasam (1992) recorded the infestation of *Argulus* species as 12 % in *Labeo rohita* and 2% in *Catla catla* and Ozturk (2002) who identified *Argulus foliaceus* on the gills of Tinch fish with prevalence of 4.5%.

Regarding the prevalence of such crustacean parasites in relation to localities, the result revealed that, the highest level of infestation was in Dakahlia province (20%). While there was no *Argulus* sp. isolated from Kafer El-Shieh. This may be attributed to the hygienic status of the fish farms and the high experience in fish culture in Kafr El-Shiekh province.

Regarding the seasonal prevalence of *Argulus* sp. in *Mugil cephalus* it was highly prevailed in Summer (20 %) followed by Spring (12 %). These results nearly agree with Ozturk (2002) .

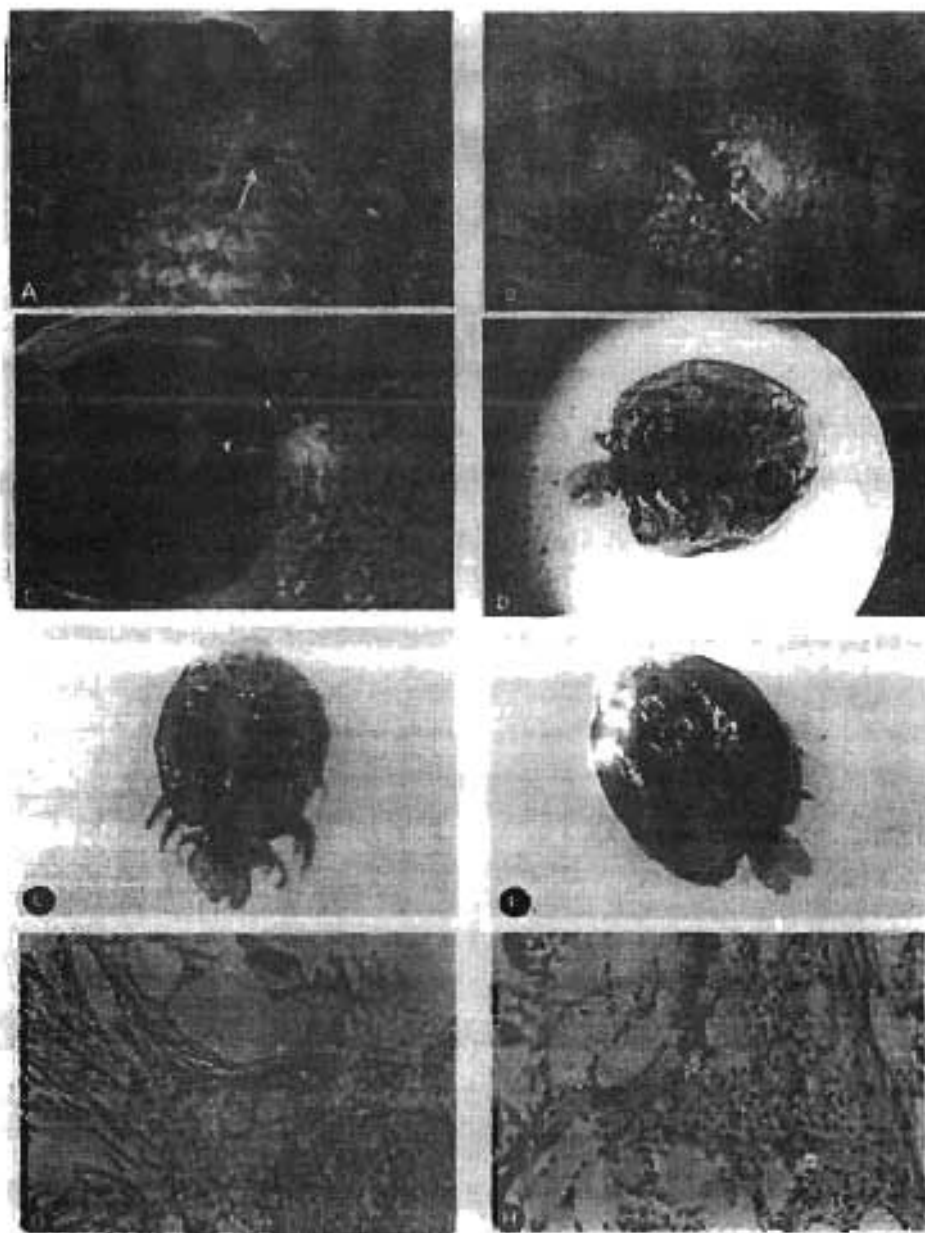
Concerning the histopathological view, the skin of *Mugil cephalus* infested with *Argulus* spp. showed lesions confined to epidermis and were represented as infiltration with macrophages lymphocytes and few eosinophils with hyperplasia and hydropic degeneration of epidermal epithelial cells and fibroblastic proliferation. These results are in agreement with that obtained by Al-Hamdanne and Taree (1995) , Lester and Roubals 1995) and Oprean and Vulpe (2002) who described the histopathological lesions of ulcerative dermatitis, haemorrhagic-necrotic dermatitis, suppurative dermatitis and hyperplastic dermatitis .

Table (1) Prevalence and intensity of *Argulus foliaceus* in the examined *M.cephalus*

Location	No. of examined fish	No. of infested fish	% of parasitic infestation	Intensity
Dakahlia province	40	8	20%	1 - 3
Kafr El-Sheikh province	60	0	0.00%	0

Table (2) Seasonal prevalence of *Argulus foliaceus* in *M.cephalus*.

Season	Number of examined fish <i>M.cephalus</i>	No. of infested fish	%
Spring	25	3	12
Summer	25	5	20
Autumn	25	0	0
Winter	25	0	0
Total	100	8	8



Plate(1) (A-B-C) Photograph showing *M. cephalus* attacked by *A. foliaceus* on the base of fin and under the gill cover.

(D-E) *Argulus foliaceus* (Ventral surface) .

(F) *Argulus foliaceus* (Dorsal surface) .

(G,H) skin of *Mugil cephalus* infested with *Argulus foliaceus* showing ulceration, hydropic degeneration of epidermal epithellum cells and severe infiltration of epidermis by macrophages and lymphocytes. H&E.

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الملخص العربي

دراسات عن الإصابة بمرض الأرجيولس في أسماك البورى المستزرعة

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تناولت الدراسة مشكلة مرضية ذات أهمية إقتصادية عالية وهى الإصابة بالفشريات الطفيلية من نوع الأرجيولس فولياس فى البورى المستزرع فى مزارع محافظة الدقهلية وكفر الشيخ، الطفيل المسبب لهذه الحالة المرضية تم عزله من تحت الغطاء المحبوس والزعانف، وكانت نسبة الإصابة الكلية بالأرجيولس من محافظة الدقهلية بنسبة ٢٠٪ ولم يتم عزل الطفيل من أسماك محافظة كفر الشيخ، وقد تبين أن معدل الإصابة عالياً فى فصل الصيف ثم فصل الربيع، وقد تم تسجيل العلامات المرضية والعصف التشريحية التى ظهرت على الأسماك المصابة، وكذلك أظهرت الفحوص الهستولوجية وجود إرتشاح بالخلايا الانتهازية وجيدة الخلية وتحلل نفاص فى خلايا الجلد.