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Prevalence of *Henneguya branchialis* in Catfish (*Clarias gariepinus*) in Ismailia, Egypt

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ABSTRACT

This study was aimed at isolation and identification of respiratory form of henneguyosis in naturally infested catfish *Clarias gariepinus.* For this purpose, 400 live catfish *C. gariepinus* were randomly collected from different water ecosystems and private fish farms in Ismailia governorate, Egypt. The clinical signs, postmortem lesions and parasitological parameters were investigated. The clinical signs and the postmortem examinations revealed respiratory manifestation, sluggish swimming, loss of appetite, congestion on gills and presence of cyst like structures on the gill filaments and the dendritic organs. Parasitological examination revealed great numbers of spores in the milky fluid inside the cysts, which were identified as *Henneguya branchialis*. Results revealed that 17.5% of the examined fish were infested with henneguyosis and the highest rate of infestation was found in spring season and in female specimens more than males. The parasitic prevalence in catfish samples caught from natural water was greater than samples from fish farms. These results concluded that Henneguyosis infection causes physical damage in gills and accessory respiratory organs, which makes infected fish unmarketable and ineligible for human consumption.

Key Words: Catfish; *Clarias gariepinus; Henneguya branchialis*; Prevalence

INTRODUCTION

Fish wealth sector is considered as one of the main principal sectors of the Egyptian national economy with an annual production of 76.760 tons (AOAD, 2003). Diseases afflicting fish are, however, a threat to its production. They could be more severe in semi-intensive and intensive culture systems where the environmental factors and human interference would allow the entry of pathogens. Lakes, rivers and seas have become the end point of the pollutants discharge (Elnwishy *et al*., 2007) leading to an increased threat of parasitic infections associated with environmental pollution (Hussain *et al.*, 2003). Myxosporeans are common parasites of fish world-wide (Lom & Dykova, 1994), which cause serious damage to economically important freshwater and marine fish species. There are approximately 1.350 species of myxosporeans in 52 genera and most of them parasitize freshwater fish (Kent *et al.*, 2001). New species are being described every year (Schlegel *et al.*, 1996), which also parasitize a wide variety of fish tissues and produce pseudocysts that contain hundreds of thousands of small spores. Among the myxosporeans, the genus *Henneguya*, which includes at least 126 species (Lom & Dykova, 1992), is one of the most important pathogens of fresh water and marine fishes and mainly the catfishes. Therefore, this study was aimed at estimation of prevalence of respiratory form of Hennguyosis in catfish (*Clarias gariepinus*), which is the most widely distributed (Skelton, 1993) and low-cost (Brewer & Friedman, 1989) fish species in Africa.

MATERIALS AND METHODS

Fish sampling: 400 live African catfish (*Clarias gariepinus*) were collected randomly from different water ways and private fish farms in Ismailia governorate, Egypt. Fish specimens of both sexes and with average body weight of 257±8.8 g, were transferred alive in polyethylene bags to the laboratory for further investigation.

Fish maintenance: Fish specimens were kept in glass aquaria (44 X 38 X 86 cm) with continuous aeration and chlorine free tap water according to Innes (1966) and they were fed on commercial diet pellets containing 30% protein as 3% of the body weight twice a day (Eurell *et al.*, 1978). Further investigations were carried out after 24 h of acclimatization.

Clinical and postmortem examinations: Clinical examination was performed according to Conroy and Hermann (1981) and after slaughter, they were examined especially the gills and the accessory respiratory organs, according to the methods of Austin and Austin (1987).

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Parasitological examination: Gills and accessory respiratory organs were exposed and were removed to be examined separately in order to detect and identify the Henneguyosis infestation (Lom & Arthur, 1989).

RESULTS

Clinical examination: Naturally infested catfish *C. gariepinus* with henneguyosis had no pathognomonic signs and the clinical signs were represented as gasping air with rapid movements of opercli, pale skin color, sluggish swimming, loss of appetite, weakness, increase of mucus production on the respiratory organs and respiratory manifestation.

Postmortem examination: The gills were characterized by marble-like appearance and small creamy white cysts were visible on the gills and accessory respiratory organs (dendritic organs) as shown in (Figs. 1), the presence of the cysts was associated with congestion on gills with excessive sliminess.

The cysts were ovoid to round and with different sizes in both sites and the intensity of nodular parasites ranged from 3-35 cyst/fish.

Parasitological examination: The cysts found in the infested fish were identified as a myxosporean and by microscopic examination for the spores in the milky fluid inside the cysts. The mature spores were characterized as sperm-like, elongated, fusiform and provided with two equal polar capsules. These spores were identified as spores of Myxosporidia, order Bivalvulida, family Myxobolidae, genus Henneguya and species of *Henneguya branchialis* as presented in Fig. 2.

Henneguyosis prevalence in catfish *C. gariepinus*: 17.5% of a total of 400 catfish examined were infested with *H. branchialis*, with seasonal prevalence 19, 16 and 8% in winter, summer and autumn, respectively. The highest rate of infestation (27%) was recorded in spring (Table I). Rate of infestation with Henneguyosis was higher in fish specimens with body weight between 300-350 g (Table II) and in female than in male fish specimens (Table III). Moreover, *H. branchialis* was more prevalent in catfish from natural water ecosystems than in fish from fish farms (Table IV).

Table I. Total and seasonal prevalence of Henneguyosis in catfish *C. gariepinus*

Season	No. of Examined fish	Total infestation	
		No. of infested fish	%
Winter	100	19	19
Spring	100	27	27
Summer	100	16	16
Autumn	100	8	8
Total	400	70	17.5

Table II. Infestation of Henneguyosis in relation to body weight of catfish *C. gariepinus*

Fish Weight (g)	No. of Examined fish	No. of infested fish	% of infested fish
less than 200	90	8	8.9
200-250	80	14	17.5
250-300	100	16	16
300-350	50	23	46

Table III. Infestation of Henneguyosis in relation to sex of *C. gariepinus*

Fish sex	No. of examined fish	No. of Infested fish	% of infested fish
Female	168	32	19
Male	232	38	16

Table IV: Infestation of Henneguyosis in relation to site of *C. gariepinus*

Site	No. of examined fish	No. of infested fish	% of infested fish
Fish farms	183	29	15.9
Natural water ecosystems	217	41	18.9

DISCUSSION

Henneguyosis in catfish is one of the most dangerous diseases (Kabata, 1985) and the heavily infested fish with the respiratory form of henneguyosis are unmarketable, because of the large visible cysts on the gills and the dendritic organs (Eissa, 2002; Wagner, 2002), which are ineligible for consumption according to food hygiene regulations (Betke *et al*., 2001).

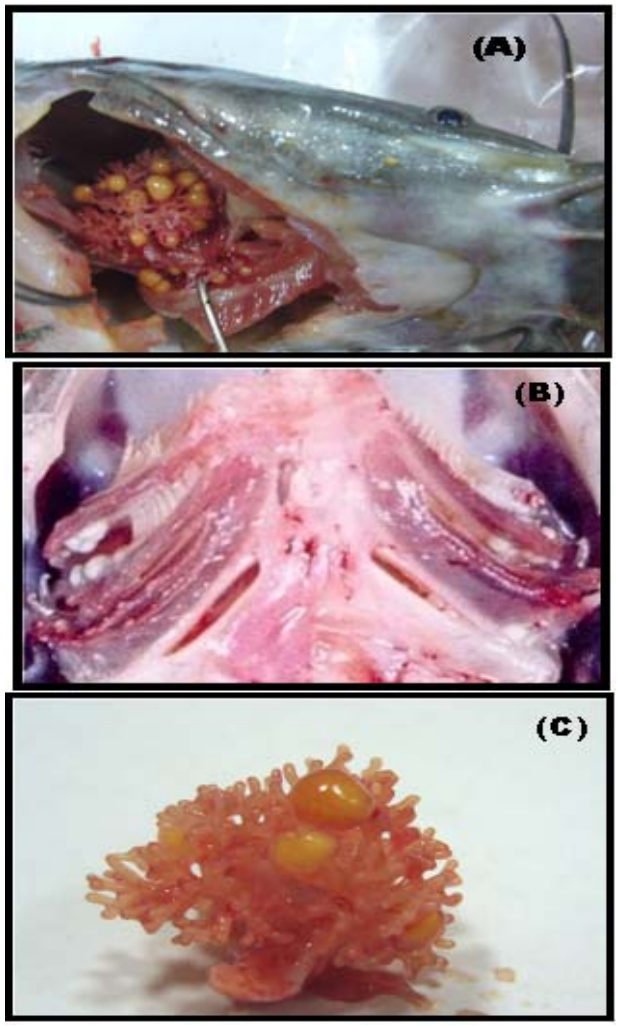
The respiratory manifestation on the respiratory organs was recorded as a result of the structural damage and surface inflammation of gills leading to difficulties in osmoregulation and respiration causing decrease in oxygen uptake that causes hypoxia (Kabata, 1985; Lebelo *et al.*, 2001) and many other physiological alterations such as reduction in RBCs count and Hb value that often cause anaemia (Sabri, 2009).

The presence of the cysts was combined with congestion on gills with excessive sliminess excretion as inflammatory response of irritations on gills caused by movements and fixation of the parasite (Meyer, 1968). All such damages make gills and accessory respiratory organs less functioning by reducing the respiratory surface (Eissa, 2002).

The spores of the isolated parasite were identified as spores of Myxosporidia, order Bivalvulida, family Myxobolidae, genus Henneguya and species of *H. branchialis* as described previously (Paperna, 1996; Eissa *et al.*, 2002; Hassen, 2002; Badran & Hashem, 2002).

The prevalence of the parasite showed seasonal cycle of *H. branchialis* development, as parasite start forming nodules from winter reaching the maximum number in spring then starting decrease by the rupture of the cysts to release the spores in the environment to start infestation. Seasonal reproductive cycles have also been reported earlier for other species of Henneguya (Molnàr, 1998; Cone, 1994; Barassa *et al.*, 2003). Higher rate of infestation with

Fig. 1: (A): Heavy infestation of Henneguyosis nodules in the dendritic organs of *C. gariepinus*, (B): Henneguyosis infestation on the gill lamellae of *C. gariepinus*, (C): Henneguyosis nodules on a separated part of the dendritic organs



Henneguyosis in fish specimens with body weight between 300-350 g and in female fish recorded in the current study has also been reported by Barassa *et al.* (2003).

The higher prevalence of *H. branchialis* in catfish from natural water ecosystems was due to different kinds of pollutants threatening the natural water. Accumulation of toxic substances and water eutrophication with algae blooms contribute to the poor water quality that acts as stress factor in increasing fish susceptibility to parasites and stimulates an unbalanced state of the host/parasite/environment system (Coutant, 1998).

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Fig. 2: Showing *Henneguya branchialis* spores

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