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PREVALENCE OF PARASITIC INFESTATION IN THE BLUE CRAB *PORTUNUS PELAGICUS*, DAMIETTA, EGYPT

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Abstract

The present study focused on parasites that infected the blue crab *Portunus pelagicus*. This crab is a very popular sea food for the inhabitants of the costal sea of Egypt. Samples were seasonally collected from Mediterranean Sea, Ras El Bar, Damietta, Egypt. The present study exhibited that 2 parasitic species (protozoa and larval nematode) infested the crab. The infestation rate varied according to the infected tissue of the host, seasons and sexes. Gills were found to be higher infected (65%) than gonads. Seasonal variation in the parasitic infection showed that the highest prevalence was during winter (37%) and summer (35%). Sex of the host crab also affected the infestation with the parasites. Male crabs were found to be higher infected (78%) than females (22%). So, the current study provides a contribution to our knowledge of the parasites that infesting one of the most important economic sea foods.

Keywords : Parasites, Protozoa, Larval Nematode, Mediterranean Sea, Blue Crab, *Portunus pelagicus*.

Introduction

Decapoda are an order of crustaceans including shrimps, crayfishes, lobsters, and crabs (Hobbs and Lodge, 2010). The crab considered as one of the greatest important nutritious aquatic animals in the world as well as other seafood (Ng *et al,* 2008; Mohammad and Yusuf, 2016). Crab meat is a good source of protein, vitamins and essential minerals (Emmanuel, 2008). Also, crabs contain chromium which acts with insulin in the metabolism of sugar helping the body to maintain normal blood glucose level (Kim, 2014). Hence, crabs are exploited by man and other animals for food (Vogan *et al*, 2001). Blue swimming crab inhabits Middle Eastern coast of the Mediterranean Sea (Mehanna and El-Aiatt, 2011). Also, it was reported in the Red Sea and Suez Canal (Mehanna, 2005). *Portunus pelagicus* is one of the most famous blue crab from family Portunidae. It is considered as an important seafood species owing to its potential market value as a soft-shell crab (Hungria *et al,* 2017; Tavares *et al,* 2017). Crabs are an intermediate host to numerous parasites (Alsaqabi *et al,* **2010).** It was found that parasitic infestation and its associated diseases are the most important factor threatening fishery industries worldwide (Schmidt *et al,* 2000). *Trichodina* and nematodes were isolated from the blue crab *Callinectes amnicola* (Ekanem *et al,* 2013). Whilest, *Hematodinium perezi* was isolated from *Callinectes sapidus* as stated by Lycett *et al.* (2018). Al-Behbehani (2007) investigated the presence of nematode larvae in blue crab *P. pelagicus*. Parasitic infections of crabs reduce their nutritional value, marketability and abundance. These infections especially high parasitic infections cause loss of color, appearance of dots, making crabs unattractive and may lead to death. Parasitic infection of crabs also causes a reduction in their protein content, destruction of reproductive organs, deformation of nervous system and increased juvenile mortality. Infection of gills reduced the respiration rate (Siddeek *et al,* 2010).

The present study aimed to: a) identify the parasites that infest the blue crab *Portunus pelagicus*, b) study the effect of seasonal change and host sex on the prevalence of the parasites.

Materials and Methods

The present study was carried out in the coastal area of the Mediterranean Sea, Ras

El Bar, Damietta, Egypt during 2018. Ras El Bar lying in a peninsula on the shore of the Mediterranean Sea. It is surrounded from the western by the Damietta Nile branch. The region of "Lessan" is sited in the extreme northern part of this peninsula. At this point Damietta Nile arm flows in the Mediterranean Sea, which gives Ras El Bar the figure of a triangle (Fig. 1).

Soft tissue was dissected; gills and gonads were perfectly separated. A small piece of tissue was squashed between two glass slides and examined under light microscope (XSZ-107BN) For Parasites Identification.

Results

The present work revealed that 30% of *P. pelagicus* was infected with two different parasites (protozoa and nematode larvae). The prevalence of their infection was shown (Fig. 2). The gills and gonads were found infected with the two different parasites. The abundance of parasites in different parts of *P. pelagicus* was shown (Fig. 3). In gills, protozoa was the dominant (with 26 individuals), followed by nematode larvae (with 9 individuals). On the other hand, gonads infected with 17 individuals of protozoa and 2 individuals of nematode larvae.

Prevalence of the parasites in both gills and gonads was represented (Fig. 4). Gill parasites were the dominant (65%), followed by gonad parasites (35%).

Seasonal prevalence of the two parasites was represented (Fig. 5). Maximum prevalence of protozoa was recorded in summer (31%). It was 17% for nematode larvae in winter. Nematode larvae were declined to reach its minimum one during summer (4%) and disappeared in spring and autumn. Seasonal variations of the total parasitic infection during the investigated period were represented (Fig. 6). The highest infection was in winter (37%), followed by summer (35%) and autumn (17%), then spring (11%). Seasonal prevalence of parasites in each sex of *P. pelagicus* was given (Fig. 7). The highest percentage of parasites in male (45%) was recorded in summer, while that of females was detected in spring (50%). But, the lowest infection (17%) was in autumn for both sexes. Each parasite species in both sexes of *P. pelagicus* was shown (Fig. 8). Protozoa infested both sexes (31 & 12 individuals for males & females respectively).

The nematode larvae were isolated only from male crabs (11 individuals). Generally, the prevalence of parasites in males (78%) was higher than in females (22%).

Discussion

Portunid or swimming crabs are a commercially important food source in most coastal waters. However, crab considered as an intermediate host to a lot of parasites **(**Alsaqabi *et al,* 2010). The present study focused on *P. pelagicus* that considered as one of the most valuable fishery resources. A total of 30% of crabs were infected with parasites. This was higher than that (12.4%) was reported by Elumalai *et al*. (2012). This may be due to the difference in water conditions between the two study areas. However, the present study recorded 2 different parasite species: protozoa and nematode larvae. The infection with nematode larvae was previously recorded in other crabs such as *Macrophthalmus hirtipes* (Moravec ***et al,*** 2003) and *Uca uruguayensis* & *Chasmagnathus granulatus* **(**Cremonte ***et al,*** 2007). Ekanem *et al.* (2013) reported that the overall prevalence of nematode parasites and other ciliates in blue crab *Callinectes amnicola* was 12.38%. This percentage was lower than that recorded in the present study (20.37%). The difference in parasites prevalence may resulted from the difference in the crab species as well as from the study area. The peak of parasite infection in the present work varied from tissue to another one. It was highly recorded in the gills (65%) followed by gonads (35%). The infestation rate changed also according to the seasons. The highest infection with parasites was observed in winter (37%) and summer (35%), while the lowest was in spring (11%). The highest infection of *Callinectes sapidus* with parasites was in summer and spring (Lycett

et al, 2018). Jeffrey and Overstreet (2003) suggested that the distribution of parasites varied from one habitat to another. This variation could be due to host parasite relationship and abiotic factors such as temperature and salinity. Increase temperature causes thermal stress on aquatic animals, so reduced growth, sub-optimal behaviors and caused immunocompetence (Roessig ***et al,*** 2004).

In the present study, variation in the infection with parasite may be attributed to the host species. So, the *Portunus pelagicus* could not withstand the increase in water temperature as well as the decline in it. Alternatively, the crab may be in a bad condition that led to its infection with parasites. Also, Huchin-Mian *et al.* (2018) found high density infections and increasing host mortality of the infected blue crabs at low temperature. When water temperatures were relatively cooler; this may be the optimal temperatures for parasite proliferation (Messick and Shields, 2000). Also, feeding on crustacea, fish remains and molluscs infected with parasites, may affect the prevalence of parasites in *P. pelagicus* that feeds mainly on them (Lee and Frischer, 2004).

In the current study, the infection in male crabs was higher (78%) than females (22%). This agreed with Elumalai *et al*. (2012) who found that infection of male and female *P. sanquinolentus* with parasites was 66.3% & 33.7% respectively. High infection in males is due to being more active than females which tend to be inactive and burrow into soft sediment (Young ***et al,*** 2017). So, parasites increase the susceptibility of crabs to diseases, causing nutritive reduction. So, parasites had negative effect on crustaceans, by reducing growth, reproduction, egg survival, longevity, and marketability (Jeffrey and Overstreet, 2003), which are zoonotic parasites **(**Youssef and Uga, 2014).

Conclusion

Consumption of not well cooked crabs causes zoonotic infection. Thus, it is one of the mode of transmitting fish protozoa and nematode larvae to man.

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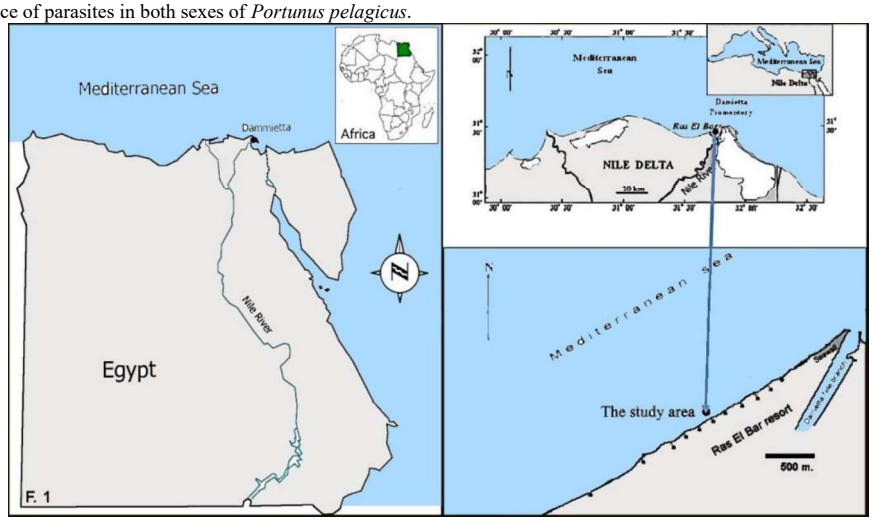
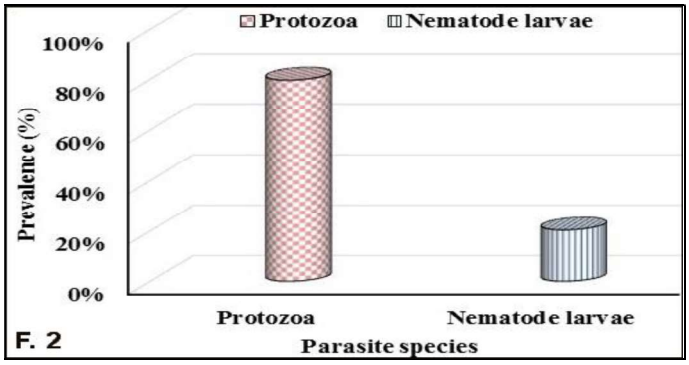
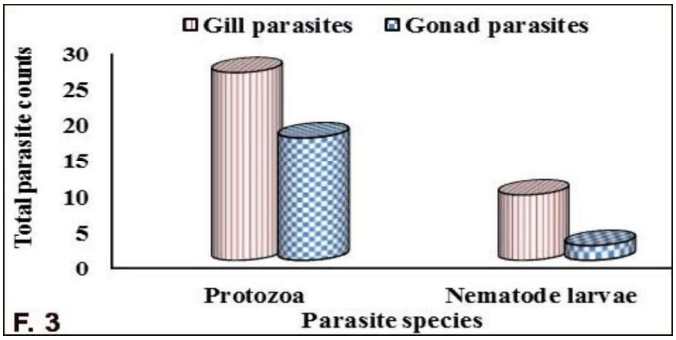
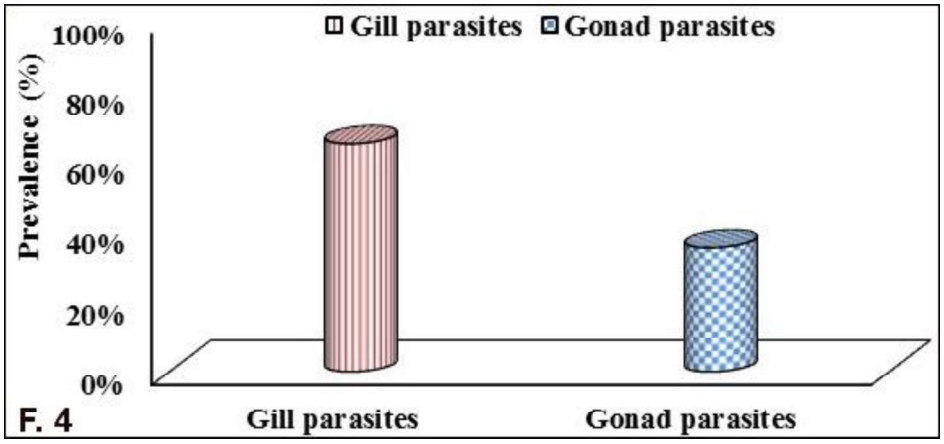
Explanation of figures

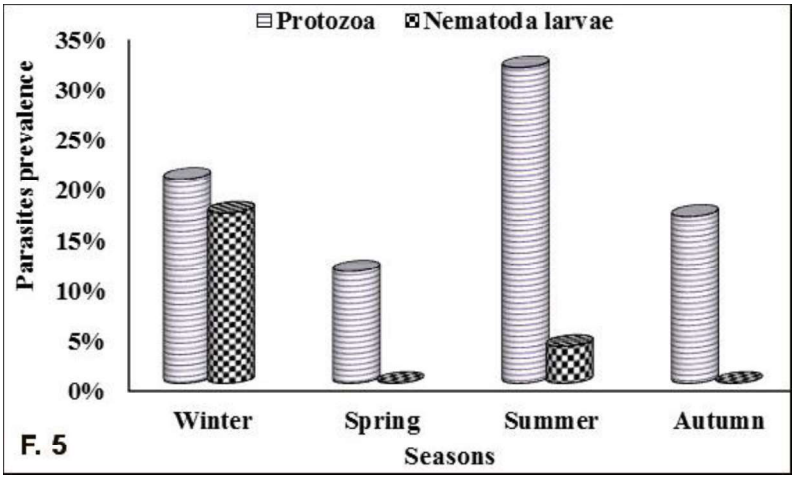
Fig. 1: Map showing the study area in the Mediterranean Sea.
Fig. 2: Prevalence of different parasites in *P. pelagicus*.
Fig. 3: Abundance of parasites in gills and gonads of *P. pelagicus*.
Fig. 4: Prevalence of parasites in gills and gonads of *P. pelagicus*.
Fig. 5: Seasonal prevalence of infestation of the parasites in *P. pelagicus*.
Fig. 6: Seasonal variations of total parasitic infection in *P. pelagicus* during investigated period.
Fig. 7: Seasonal prevalence of parasites in male (left) and female (right) *P. pelagicus.*
Fig. 8: Abundance of parasites in both sexes of *Portunus pelagicus*.

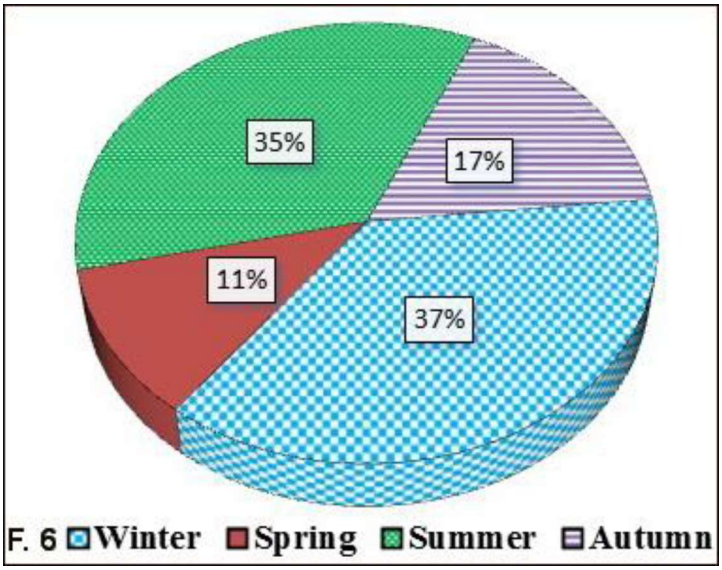


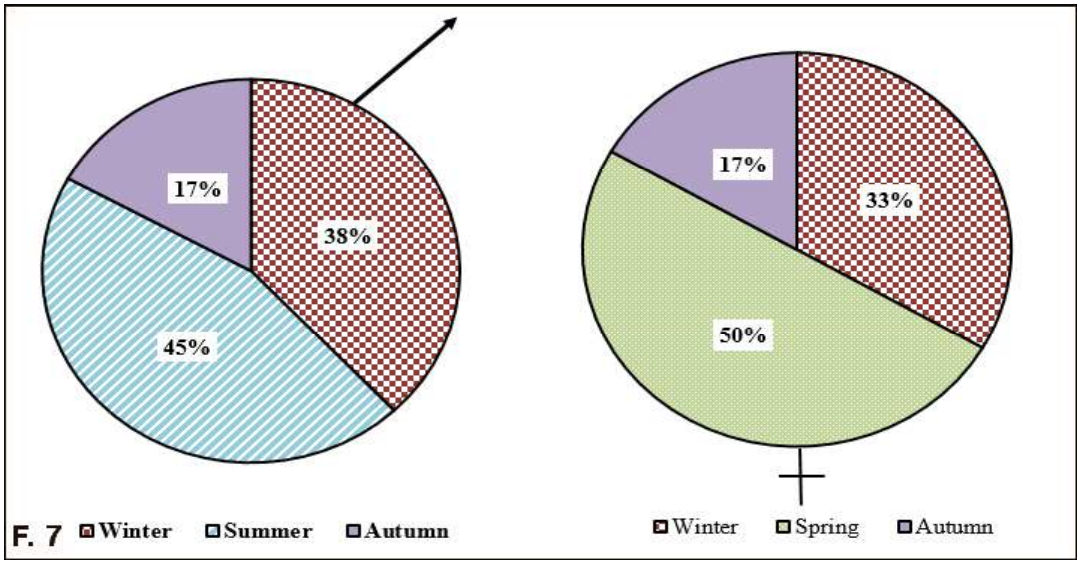

Protozoa
Nematode larvae
100%
80%
60%
40%
20%
0%
Prevalence (%)
Protozoa
Nematode larvae
Parasite species
F. 2

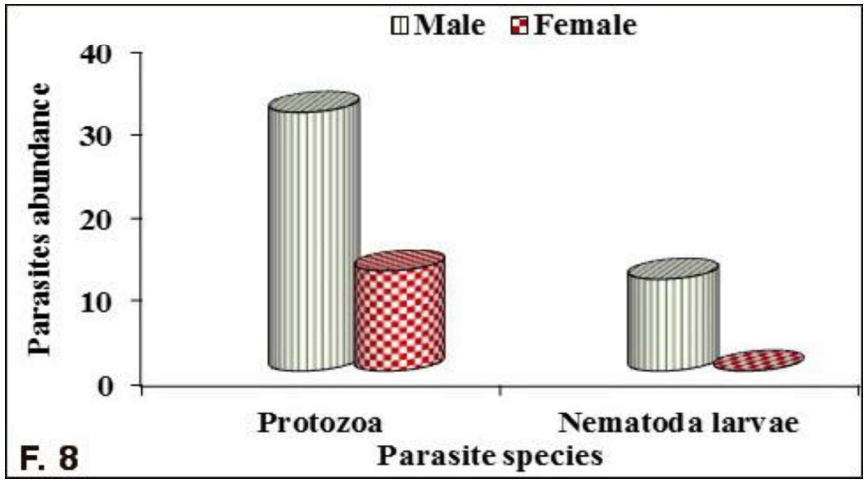

Gill parasites
Gonad parasites
30
25
20
15
10
5
0
Total parasite counts
Protozoa
Nematode larvae
Parasite species
F. 3


Gill parasites
Gonad parasites
100%
80%
60%
40%
20%
0%
Prevalence (%)
Gill parasites
Gonad parasites
F. 4


Protozoa
Nematoda larvae
35%
30%
25%
20%
15%
10%
5%
0%
Parasites prevalence
Winter
Spring
Summer
Autumn
Seasons
F. 5


35%
17%
11%
37%
F. 6 Winter Spring Summer Autumn


17%
38%
45%
F. 7 Winter Summer Autumn
17%
33%
50%
Winter Spring Autumn


Male Female
Parasites abundance
40
30
20
10
0
Protozoa
Nematoda larvae
Parasite species
F. 8