Keywords
Prevalence, Helminth Parasites, Health Management, Tilapia zilli, Ebonyi River

Prevalence of Helminth Parasites of Tilapia zilli in Ebonyi River, Southeastern Nigeria: Implication for Health Management and Policy

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Citation

Abstract
The study on the prevalence of helminth parasites of Tilapia zilli in Ebonyi River, Southeastern Nigeria was carried out between August-October 2014 using standard parasitological technique of sodium chloride flotation method and microscopy. The investigation revealed that the length and weight of the fish were strong factors which showed that smaller fish and fish with low body weight harbor more parasites than older, larger fish. The analysis also revealed that out of 120 fish samples examined, 48.33% were infected. Different classes of intestinal parasites isolated were nematodes, trematodes, and cestodes with nematode parasites showing the highest prevalence. However, since fish is served as meal for mankind, it is advised that it should be processed and cooked properly to reduce infection associated with the parasites. Raw fish for consumption as delicacies could pose as hazardous to public health.

1. Introduction

Fish has a remarkable impact on the lives of many individuals and communities in almost all continents of the world, primarily as a major source of relatively cheap and affordable essential animal protein. Fish interacts with the various levels of food chain and influence the structures of lakes, streams and estuaries since they are usually restricted to particular modes of life related to their food sources and reproductive requirements [1]. The role of freshwater fish in transmitting parasites to humans had been known for a long time. Fish parasites and diseases remain some of the most important problems confronting the fishery biologist [2]. According to [3], a parasite is an organism that lives on or within a part of another species from which it obtain nutrients. Parasites of fish constitute one of the major problems confronting the modern fish culturists, and pathological conditions arising from parasitic infections assume a high magnitude especially under crowded conditions. All fishes are potential host to many different species that cause significant mortalities among captive and wild fish stocks. Accurate identification of parasites is therefore important so that a build-up of parasite number can be prevented. Information about the mode of transmission and potential intermediate hosts is often crucial to select the most appropriate management action to reduce or eliminate the problem. Present approach to treatment of parasitic diseases is largely limited to those in internal surfaces and the intestinal lumen [3]. The importance of pathology has been realized and efforts are being made to intensify work...
in this field in various part of the world especially in Africa. Fresh water fishes require urgent attention; particularly those that infect economically important fishes which in many cases devalue their aesthetic quality and palatability [4]. Under natural conditions 50-90% of fresh water fishes harbor at least one species of parasites. Parasitism is much more common and diversified in the wild than in the farms, ponds and hatcheries. Infections occur not only due to overcrowding but also to environmental stress. As a result, fish exposed to virulent pathogens under environmental stress such as temperature, sewage, metabolic waste products of fishes, pollution and pesticides are easily infected [4]. Several studies suggest that parasite burden in an ecosystem poses high risk of infection to both fish and man especially when fish serve as intermediate host of human parasites or where fish is a co-host of zoonotic parasites [5]; [6]; [7]; [8]. Due to the importance of fish as one of the major source of obtaining cheap protein, studies on this aspect of biology, morphology and diseases of fish is very important. Fish culture provides a large reservoir of parasitic pathogen common to both wild and cultured fish. As yet no epidemic has been reported in Nigeria but it is likely that as the culture of fish becomes intensive and more widespread, parasites will be liable to become a menace. Therefore this study is aimed at isolating the helminth parasites of *T.* *zilli*, to determine the parasites prevalence and to develop a base line study on the helminth parasitosis in *T.* *zilli* of Ebonyi River.

2. Materials and Methods

2.1. Study Area

![Figure 1. Map of Ebonyi river showing study area.](image)

The Ebonyi river in this study is located in Abakaliki local government area of Ebonyi State. The Ebonyi river (Figure 1) is located in the forest zones. Ebonyi river is located in Onu-Ebonyi Izzi, north-eastern part of Ebonyi State, between latitude of 06°4’N and longitude 08°7’E. The river is a source of water to Izzi village, utilized for both domestic and agricultural purpose. The river is about 5km from Abakaliki, the capital of Ebonyi state. The river flows throughout the
year but flows heavily during the rainy season. The river is affected by the season of the year which is dry and rainy season. During the raining season (April-October) the water level increase so rapidly and the water body becomes muddy due to the resultant flood, and the transparency is reduced while during the dry water level season (November-May) the water level reduces and transparency increases. The vegetation around the river is characterized by shrub are oil palms (*Elaeis guineesis*). There is relative amount of zooplanktons and phytoplankton which dry up during the period of November to March annually. The river is known to support agricultural and fishery activities as well as other domestic purposes. Farmers bring their harvested fishes and other products to the market close to the river (Ebonyi River). Some activities engage by people are usually in the dry season when water level in the river has reduced drastically. They also cultivate farm crops like cassava, maize, yam, melon, groundnut etc, during the wet season at the river bank. There is also water fluctuation in the river with season which goes a long way to determine the agricultural activities of the inhabitants during each period. During the dry season (November to March) some area of the river floor is seen and covered with sand, there by fishing activities are abandoned and most of fisherman would change over to another agricultural activities. But during the raining season, (April to September) water level will increase and the reverses the activities of the people. Several fishes are caught by different fishing methods used by the local fishermen who fish the river. The fishes are caught and sold to local market women who came from different communities located around the river. The fishing methods used include: Cast nets, hook and line, set line, drag nets, life nets and traps.

### 2.2. Sample Collection

The fish samples were purchased from every other fisherman who caught the fish using cast nets, hook and line, set net, long line scoop net and other fishing gears. Samples were preserved in 10% formalin and transported to the Department of Applied Biology laboratory in Ebonyi State University.

#### 2.3. Laboratory Analysis

The weight of the fish was taken using the electron weighing balance, the length of the fish measured with meter rule. The alimentary canals were dissected out and straightened in a clean petri dish. Each section of the alimentary canal was examined for parasites the various regions were carefully opened into a separate petri dish. Then each gill was washed with normal saline and put in a test tube, it was then spun in a centrifuge for ten minutes, the supernatant was discarded and spread in a slide and covered with a cover slip and examined under a microscope of x40 magnification [9].

### 3. Results

The result showed that out of 120 fish of *T. zilli* 48.3% were infected by helminth parasites while 51.7% were uninfected. Parasites of three classes of helminthes were identified in the fish samples (Table 1). The prevalence of helminth parasites of *T. zilli* from Ebonyi River showed the following parasites *Diphyllobothrium sp, Hymenolepis nana, Camallanus sp, Capillaria sp, Procamallanus sp* and *Trichostrongylus sp* (Table 2). *T. zilli* with the length ranges from 7-9.5 and 15.6-16.5 were most prone to the parasite infection while those from 16.6-20.5 showed reduced parasite infection while those from 20.6 and above were least infected (r = -0.8985, r² = 0.8074) (Figure 2). The weight of the fish showed that the range of weight of fish with low body weight had the highest prevalence of parasites infection than the once with high weight (r = -0.7638, r² = 0.5834) (Figure 3).

### Table 1. Helminth parasites of *T. zilli* based on their classes.

<table>
<thead>
<tr>
<th>Class of parasites</th>
<th>Different species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cestodes</td>
<td><em>Diphyllobothrium sp, Hymenolepis nana</em></td>
</tr>
<tr>
<td>Nematodes</td>
<td><em>Camallanus sp, Capillaria sp, Procamallanus</em></td>
</tr>
<tr>
<td>Trematodes</td>
<td><em>Trichostrongylus sp</em></td>
</tr>
</tbody>
</table>

![Figure 2. Prevalence of helminth parasites in respect to the length of fish from Ebonyi River.](image-url)
Prevalence rate of helminth parasites of *T. zilli* from Ebonyi River was relatively high and showed that the following parasites, *Diphyllobothrium sp*, *Hymenolepis nana*, *Camallanus sp*, *Capillaria sp*, *Procamallanus sp* and *Trichostrongylus sp* were isolated. This can be due to high rain influx during the onset of rainy season and low rain influx during the dry season. It is also supported according to [10] and [11] who reported that fishes are susceptible to heavy infection with parasites mainly in the early rain when fishes are weakened by hibernation (a state of exhaustion). [4] also indicated that total parasitic load of the fish samples (from the wild) decreased from the first sampling during March (early rainy season) to the eight sampling during June (peak rainy season). Smaller sized *T. zilli* with the length ranges from 7-9.5 and 15.6-16.5 were more prone to parasite infection while those from 16.6-17.5 and above were less infected. The prevalence of the parasites in respect to the weight of the fish shows that the range of weight of fish with low body weight had the highest prevalence of parasites infection than the once with high weight. The correlation between length of fish and number of parasites was significant. Correlation between weight of fish and number of parasites was highly significant. However, negative coefficient values for both length and weight indicated increase in length and weight with decrease in infection rate. This is in agreement with the work of [4] who reported low level of infection in older, larger sizes of fishes in Lamingo reservoir, Jos, Nigeria. This deduction may be connected to the food and feeding habits of *T. zilli* as the fingerlings and young (smaller) fish are planktivores feeding on the larvae of helminthes while adult and older (larger) fish are herbivores. *T. zilli* are nest brooders therefore restricted in their foraging range. Also, this may be associated with the fact that the smaller and younger fish has less immunity than larger and older with higher immunity against parasite infections; however, immunological studies on parasite infections are needed to ascertain this. When fish is thoroughly cooked, it does not pose as a health concern. However, parasites are a concern when human consumers eat raw, undercooked or lightly preserved fish. The popularity of such raw fish dishes makes it important for consumers to be aware of this health risk. Raw fish should therefore be frozen to an internal temperature of about −20°C (−4°F) for at least 7 days to kill parasites. According to [12], fish that live all or part of their lives in fresh water were considered unsuitable for sashimi due to the possibility of parasites. Parasitic infections from freshwater fish are a serious problem in some parts of the world, particularly Southeast Asia. Fish that spend part of their life cycle in salt water, like salmon, can also be a problem. In conclusion, this result showed that older fish are less likely to be infected by parasites while younger fish are prone to helminth parasites infections as more fishes with low length and weight were more infected than those with higher length and weight. Therefore, consumers are encouraged to eat older and larger fishes and not younger and smaller fishes. The parasitic infection in fish has a lot of health consequences in the fish such as retardation in its growth and reproductive processes. It is also well known that helminth parasitic infections in economically important fishes such as *T. zilli* can devalue their aesthetic quality and palatability.

### References


