



ISSN: 2141 – 3290  
www.wojast.com

## FOOD, COMPOSITION AND INTESTINAL HELMINTH PARASITES OF *Ethmslosa fimbriata* FROM QUA IBOE RIVER ESTUARY, NIGERIA.

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### ABSTRACT

The food and intestinal helminth parasites of *Ethmalosa fimbriata* from Quo Iboe River estuary, Ibeno, Akwa Ibom State, Nigeria were investigated between May and October 2013. Total length of the fish ranged from 10.2 to 21.3cm, standard length ranged from 7.1 to 17.2cm and weight varied between 12.1 and 80.7g. Frequency of occurrence and relative dominance methods, were used for analyzing the food items. Of the 300 specimens examined, 16 (5.3%) had empty stomach while 45 (15.0%) had fully loaded stomach. Males had more empty stomachs than females. The main food items were algae, including blue green algae 153 (15.2%), green algae 142 (14.1%) *Navicula*-sp 129 (12.8%), *Sceredemus* 92 (9.1%) and *Peridinium* sp 73 (7.2%). Others were diatom, 103 (10.2%), detritus 170 (1.68%), insect parts 25(2.5%) and sand grain 122 (12.1%). Parasitological examination of 300 specimens showed 32 (10.7%) harboured parasites. The parasites recovered were mainly cestodes such as *Polygonchobothrium* sp. 13 (40.6%) and *Procamallanus* sp. 15 (46.9%) and the nematodes such as *Contracaecum* sp. 4(2.5%). There was no significant difference in the prevalence of parasites between males and females and non parasites were encountered in the month of July. The study has revealed that *Ethmalosa fimbriata* from the Qua Iboe River Estuary fed primarily on algae and phytoplankton, secondarily on detritus and sand grains and incidentally on insect part but harboured low numbers of intestinal helminth parasites.

### INTRODUCTION

Fish is important source of income and food in Nigeria and other countries in the sub-Saharan Africa, where some 35 million people depend wholly or partly on the fisheries sector for their livelihood (FAO, 1996). In Nigeria, consumption and demand for fish protein is increasing due to its affordability. The vast majority of the supply of fish in Nigeria comes from river systems where fish are landed at fishing jetties and purchased for distribution by large and small scale fish dealers (Ekanem *et al*, 2011).

Food and parasites play an important role in the ecology of aquatic ecosystem as well as in the aquaculture and mariculture industries. The availability of the food of fish species can influence the species distribution (Fagade and Olaniyan, 1973). Some fish species feed on macroscopic animals (predatory species), some feed on detritus, diatoms, blue-green algae and macrophytes (omnivorous species) (Alfred-Ockiya, 2000). The fish *Ethmalosa fimbriata* is one of the clupeids commonly found in West Africa from Mauritania to Angola, as a surface inshore fish (Fagade and Olaniyan, 1972). It has been reported in places such as Sierra Leone (Bainbridge, 1957), Ghana and Nigeria (Fagade and Olaniyan, 1972, Ikomi, 1991). It is known to constitute a greater part of the artisanal fisheries of the Niger Delta of Nigeria because of abundant substrate of silt and mud from rivers (Bayagbona, 1974). It is very adaptable to environmental change and tolerates wide variation in salinity (Guyonnet *et al*, 2003).

*Ethmalosa fimbriata*, a species with a very efficient filtration system (Blay and Eyeson, 1982), feeds both on phytoplankton and zooplankton. The food at any one time appears to depend on the density and composition of the plankton and thus, on the seasonally dependent oceanographic condition and not on any specific selection mechanism (Ikomi 1991). Albaret

and Charles Dominique (1982), reported that *Ethmalosa fimbriata* which is also a prey to other larger fishes, prey on other smaller marine animals like the crustacean and copepod which in turn feed on silver fishes. Bainbridge (1963) found a close relationship between the stomach content of *E. fimbriata* and plankton in the Sierra Leone estuary; the main food of *E. fimbriata* over an annual period being phytoplankton.

Fagade and Olaniyan (1972) observed that the food of *E. fimbriata* in Lagos Lagoon consist of both phytoplankton and zooplankton but with the tendency that the intake of phytoplankton increases greatly with the increase in length of the fish while Blay and Eyeson (1982) reported that detritus and phytoplankton tropho-composition is enhanced by the efficient filter feeding mechanism of *E. fimbriata*.

According to Akpan *et al*, (2003), *Ethmolosa fimbriata* of Cross River estuary feeds primarily on detritus and phytoplankton, the commonest phytoplankton belonged to the genera *coscinosira*, *stephanodiscus* and *pleurosigma*. On the other hand, White (1975), reported that the successful coexistence of individual of different sizes of *E. fimbriata* in the same environment is enhance by ontogenetic diet shift which reduces intra-specific composition for food resources between small and large sized groups.

Parasites of fish are of concern since they often produce a weakening of the host's immune system thereby increasing their susceptibility to secondary infection, resulting in the nutritive devaluation of fish and subsequent economic losses (Onyedineke *et al*, 2010). Also there is possibility of disease transmittal from fish to humans through the consumption of poorly cooked fish. (Mehl 1970)

The possibility of disease transmittal from fish to humans through fish consumption has been recorded as a public health concern (Ibiwoye *et al*, 2006). Kabata (1985) reported that *Clinostomum* (Acanthocephalans) when ingested with poorly cooked fish is capable of producing laryngoharyngitis which is and unpleasant inflammatory condition in man. Ekanem *et al* (2011) recorded 0% incidence of parasite for *E. fimbriata* from Great Kwa River in Calabar, Nigeria. The survey of parasites infection of commercial fishes in Cross River estuary showed that fish fry and fingerlings were parasitized by a large number of monogeneans (Obiekezie *et al*, 1988).

This work was undertaken to provide information on the food and parasites of *Ethmalosa fimbriata* from Qua Iboe River Estuary, in Ibeno Local Government Area of Akwa Ibom State.

## MATERIALS AND METHOD

The Qua Iboe River rises near Umuahia in Abia State, Nigeria and flows in a south eastern direction through Akwa Ibom State to the Atlantic Ocean. The river runs through the grounds of the Michael Okpara University of agriculture in Umudike, the estuarine portion of the river feeds a zone of mangrove swamps linked by Creeks and lagoons that is separated from the sea by a low and narrow ridge of sand. Ibeno, on the eastern side of the Qua Iboe Estuary about 3 kilometers from the river mouth, is one of the largest fishing settlements on the Nigerian coast.

### Collection and Measurement of Specimens

A total of 300 specimens of *E. fimbriata* were bought from fishermen at the fishing jetty in Ibeno for a period of 6 months (between May and October 2013). The fish specimens were kept chilled under ice-blocks in a plastic cooler and were taken to the laboratory for examination. In the laboratory, fish specimens were pooled and identified to species levels using the keys and description of Scheider (1990) Khalil and Polling (1997), and Olaosebikan and Raji (1998). The total length (TL) and standard length (SL) were measured to the nearest 0.1cm using meter rule. Weights (W) were also determined to the nearest 0.1g using electronic weighing balance.

**Examination of Gut contents**

Using a pair of scissors, fish specimens were dissected and the stomachs were removed and slit opened. The stomach fullness indices were noted. The number of items ingested was considered as food richness. The frequency of each items as dominant and non-dominant stomach contents were noted. The relative frequency (%RF) and relative dominance (%RD) of each item were estimated (King 1982). The percentage occurrence of each food item (0-100%) was used in grading the food. Items with percentage occurrence > 20% were considered primary dietaries, those with % occurrence between 20 and 10% as secondary and those with % occurrence < 10% and incidentally.

The food items were identified using the key and identification method of Hynes (1950). Identification of parasites was carried out according to and Obiekezie and Ekanem (1995).

**RESULTS**

Out of the 300 specimens of *Ethmalosa fimbriata* collected, 126 were males and 174 were females. Total length ranged between 10.2 and 21.3cm, standard length ranged between 7.1 and 17.2 cm and the total weight ranged from 12.1 to 80.7g.

Table 1: Summary of Stomach Fullness

Months	No of Stomach Examined	(Empty Stomach	25% Full	50 % Full	75 % Full	100% Full
May	50	1	8	17	10	14
June	50	3	5	21	13	8
July	50	1	10	19	14	6
August	50	2	4	23	15	6
September	50	4	6	22	13	5
October	50	5	4	23	12	6
Total	300	16 (5.3%)	37 (12.3%)	125 (41.7%)	77 (25.7%)	45 (15.0%)

The result of stomach fullness (table 1) showed that out of 300 specimens of *E. fimbriata* examined for six months, 16 (5.3%) had empty stomach, 37. (12.3%) had 25% full stomach, 125 (41.7%) had 50%full stomach, 77 (25.7%) had 75 full stomach and 45 (15.0% had 100% full stomach.

Table 2: Summary of food composition of *E.fimbriata* using occurrence method

Food Items	Number of Fish Examined	Frequency of Occurrence	Percentage of Occurrence
<i>Algae</i>			
Blue green algae	300	153	15.2
Green algae	300	142	14.1
		295	29.3
<i>Phytoplankton</i>			
Navicula	300	129	12.8
Scenedesmus	300	92	9.1
Peridinium	300	73	7.2
		294	29.1
Diatom	300	103	10.2
Detritus	300	170	16.8
Insect part	300	25	2.5
Sand grain	300	122	12.1
Total		1,009	

The result of food composition of *E. fimbriata* using the occurrence method (Table 2) indicates that the food of *E. fimbriata* varied from Algae (blue-green algae and green algae) phytoplankton (*Navicula*, sp *Scenedesmus* sp and *Peridinium* sp), diatom, detritus, insect parts and sand grains with 29.3%, 29.1%, 10.2%, 16.8%, 2.5% and 12.1% occurrence rates respectively.

Table 3: summary of food composition of *E. fimbriata* using dominance method

Food Items	Number of Fish Examined	Frequency of Occurrence	Percentage of Occurrence
<i>Algae</i>			
Blue green algae	300	53	18.7
Green algae	300	38	13.4
		91	32.1
<i>Phytoplankton</i>			
Navicula	300	45	15.8
Scenedesmus	300	32	11.3
Peridinium	300	10	3.5
		87	30.6
Diatom	300	23	8.1
Detritus	300	74	26.1
Insect part	300	3	1.0
Sand grain	300	6	2.1
Total		284	

Analysis of food composition of *E. fimbriata* using Dominance method (Table 3) revealed that Algae (blue-green algae and green algae) had the highest percentage of dominance with 32.1%, followed by phytoplankton (*Navicula* sp *Scenedesmus* sp and *Peridinium* sp) with 30.6%, detritus with 26.1%, diatom with 8.1%, sand grain with 2.1% while insect part had the lowest percentage of dominance with 1.0%.

Table 4: Prevalence of parasite infection in relation to sex of fish and period of study

Months	No. Examined	No. Infected	Male		Female	
			No Examined	No Infected	No Examined	No Infected
May	50	4	19	2	31	2
June	50	7	21	5	29	2
July	50	9	22	4	28	5
August	50	5	21	3	29	2
September	50	4	22	1	28	3
October	50	3	21	2	29	1
Total	300	32(10.7%)	126	17(5.7%)	174	15(5.0%)

The prevalence of parasites in *Etimalosa fimbriata* (Table 4) indicates that out of 300 specimens of *E. fimbriata* examined, a total of 32 (10.7%) specimens were infected, 17 (5.7%) were males and 15(5.0%) were females. The highest number of 9 parasites was recorded in July, followed by 7 parasites in June and 5 parasites in August while May and September recorded 4 parasites each and October recorded the lowest number of parasites (3 parasites).

Table 5: Summary of helminth parasites abundance in relation to sex of fish.

Parasite Species	No/% Recovered	No.	
		In Male	In Female
<i>Polyonchobothrium</i> sp.	13 (40.6%)	6	7
<i>Procamalanus</i> sp.	15 (46.9%)	9	6
<i>Contraecaecum</i> sp.	4(12.5%)	2	2
Total	32 (100%)	17 (53.1%)	15(46.9%)

Helminth parasites abundance in relation to sex of fish (Table 5) revealed that out of 32 parasites recovered, 13 (40.6%) were *Polyonchobothrium* sp. (Cestode) 15 (46.9%) were *Procamallanus* sp. and 4(12.5%) were *Contraecaecum* sp. (Nematodes). Out of 32 fishes infected by helminth parasites, 17 (51.1%) were males and 15 (46.9%) were females.

## DISCUSSION

*Ethmalosa fimbriata* of Qua Iboe River Estuary feeds on variety of food items including algae (blue-green algae and green algae), phytoplankton (the commonest phytoplankton belonged to the

genera *Navicula*, *Scenedesmus* and *Peridinium*), diatom, detritus, insect parts and sand grains. The presence of sand grains suggests that the fish probably browses on benthic materials. Even though the sand grain does not have nutritive value to be considered food item, it may serve in internal trituration (Akpan *et al*, 2003). Algae and phytoplankton were considered primary food items, detritus, diatom and sand grains were considered as secondary items while insect part was considered as incidental items as was previously reported by Fagede and Olaniyan (1972). The food composition remained the same throughout the period of study. Males and females consumed the same number of diateries, but males had more empty stomach than females.

However, the result of the present study shows a low helminth parasites infection rate of 10.7% out of 300 specimens of *E. fimbriata* examined. All recovered parasite helminthes was cestode and nematodes, but the number of nematode recovered was higher than cestode. This is similar to low infection rate (13.6%) reported elsewhere in Imo River (Ugwuzor, 1987; Blay and Eyeson 1982, Ikomi 1991). Comparing the prevalence of parasites in relation to sex of fish, the test statistics (T-test) reveled that there was no significant difference in the prevalence of parasites between males and females *E. fimbriata*, although relation with month of study revealed that the highest number of parasites was recovered in July. This might be attributed to high influx of waste into the river through storm water run off in July. (Guyonnet *et al*, 2003)

### CONCLUSION

In Qua Iboe River Estuary, Ibeno, Akwa Ibom State, the food of *Ethmalosa fimbriata* constitute algae and phytoplankton as primary food items, detritus, diatom and sand grain as secondary food items and insect part as incidental food. However, the low incidence of parasites recorded for *E. fimbriata* harvested from Qua Iboe Estuary should not be taken for granted, fishes from this location should be properly cooked to avoid ingestion of parasite by fish consumers.

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