LENGTH – WEIGHT AND PARASITES OF *Pentanemus quinquarius* FROM QUA IBOE RIVER ESTUARY, UKPENEKANG IN IBENO LOCAL GOVERNMENT AREA, AKWA IBOM STATE, NIGERIA.

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ABSTRACT

The study describes the length-weight relationship and parasites of *Pentanemus quinquarius* from Qua Iboe River Estuary Ukpenekang, Ibeno Local Government Area of Akwa Ibom State which was conducted between May and October, 2016. A total of 720 fish specimens were examined. Data obtained were analysed using descriptive statistics. Results showed that the highest weight and length were observed in the month of October and the least in the month of September. There was no significant difference ($p > 0.05$) between the male and female infection rate. The regression exponents of length-weight of *Pentanemus quinquarius* from May to October 2016 lied between 0.5 – 0.8 representing out of 720 fish specimens examined allometric growth. 276 (38.33%) were infected with parasite. The parasites spectrum of infections were *Camallanus sp.* 91(12.63%), *Procamallanus sp.* 79(10.97%), *Contracaecum sp.* 67(9.30%), *Capillaria sp.* 35(4.86%), *Aroucis Trichodina sp.* 2(0.27) *and Chilodonella sp.* 1(0.13%). Further investigation on the length – weight and parasites of *Pentanemus quinquarius* should be carried out. There were cases of eagle infection 77% double infection 19.9 and triple infection 4% out of the 276 fishes found pattern with positive correlation between length and weight.

INTRODUCTION

Fish is a cheap and important source of protein; it also contains lipids, minerals and vitamins (Usip and Etim, 2014, Anene, 2005). Fish occupies several different levels of the aquatic food chain and makes up more than 40% of the world vertebrate species. Fish interacts with the various levels of food chain and influence the structures of lakes, streams and estuaries since they are usually restricted to a particular mode of life related to their food source and reproductive requirements (Ashade *et al.,* 2013). The ever-increasing cost of beef, leaves fish as the most feasible option in resolving protein shortage. Fish oil contains omega-3-essential fatty acids necessary for the proper functioning of the brain, heart and immune system. It forms the main source of income for those communities, especially for the hinterland areas. Fishing and fish processing provide job opportunities for individuals and groups of people.

Pentanemus quinquarius is one of the species of the family Polynemidae found in warm tropical surface water of the Atlantic on the continental shelf of West Africa. It is usually distinguished by its lower portion of the pectoral fin detached to form nine or ten short free rays (Schneider, 1990). *Pentanemus quinquarius* is a moderately elongated fish, slightly compressed with the standard length about three times longer than the body depth. It has an inferior mouth with a fleshy translucent blunt snout. It occurs in shallow coastal waters, also in estuaries (Schneider, 1990). It is a carnivorous fish, feeding on variety of crustaceans such as shrimps and crab parts. It is of great importance as protein source for man and coastal tribes all over the world (Kusemiju and Osibona 1998; Osibona *et al*., 2010). The threadfins are important in the trawl fisheries of Nigeria in which two of the Genera *Galeoides* and *Pentanemus* form 10% and20% respectively of the total catch landings (Longhurst 1964).

The length – weight relationship is very important for proper exploitation and management of population of fish species (Anene, 2005). According to Pervin and Morthza (2008), the relationship between the total length and other body weight are also very essential for stabilizing the taxonomic characters of the species. Length-weight parameters are of great importance in fishery assessments (Haimovici and Velasco, 2000). Usip (2013) recorded that length-weight parameters are useful and are standard results in fish sampling. Besides this, the length-weight relationship can also be used in setting yield equations for estimating the number of fish landed and comparing the population in space and time. They are also useful for assessing the relative wellbeing of the fish population. The Length-weight relationships of some freshwater and coastal fish species have been reported in Nigeria (Fafioye and Oluajo, 2005; Anyanwu *et al.*, 2007; Agboola and Anetekhai, 2008; Imam *et al.*, 2010; Kumolu-Johnson and Ndimele, 2011; Nehemia *et al.*, 2012; Adebiyi, 2013 and Ahmad *et al*, 2015).

Sport fishing is a major source of recreation. Many fish species have been found to harbour protozoans and plenty of helminth parasites on their skin and/or under their scales and inside their tissues, blood and gut (Usip *et al.*, 2014). Fish parasites have logically received great attention in past researches. Parasites are organisms that inhabit at a time during their life-cycles the body of another larger animal thereby causing various diseases. Fish is also prone to attack by a variety of micro-organisms just like other animals especially those rich in protein. Parasites open ways for some of these microbial infections (Ravichadran and Ajithkumar, 2008). Fish parasites could be as a result of high density stocking, poor condition of farming, lack of proper husbandry and stress (Ekanem *et. al*. 2011, Ibiwoye *et. al.* 2006).

On fish parasites, Onyedineke *et al* (2010) reported that parasites often produce a weakening of the host immune system thereby increasing their susceptibility to secondary infection, resulting in the nutritive devaluation of the fish and subsequent economic loss. Parasites have been recorded by Khalil and Polling (1997) as being the main cause of economic losses in fish culture systems. Parasite infection of the body cavity and musculature of fishes have been reported as presenting marketing problems for commercially exploited species (Peterson *et al* 1993). Mehl (1970) recorded that infestation of *Gymnorlynchus thyrsitae* with Plerocercoids has seriously affected the exploitation of the highly valued *Thyrsite atun* in New Zealand. It has been recorded by Grabda (1970) that heavy infestation of the Alaska Pollock *Theragra chalcogramma* with Plerocercoid of *Nybelima surymenicola* has reduced the consumable part of the fish to the dorsal musculature. Ekanem *et al* (2011) recorded 40% incidence of parasite for *Ethmalosa fimbrata* form the Great Kwa River in Calabar, Nigeria. *Clinostomun sp* was recovered from the intestines of Tilapia fish in Owa stream (Olurin and Somorin, 2006). The survey of parasite 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). Akinsaya and Otubanjo (2008) reported that fishes from freshwater are infected by a variety of adult helminthes parasites ranging from monogenean, digenean, cestodes, nematodes, acanthocephalans and aspidogastrean. *Spirocamellanus spiralis* was recovered in the stomach of catfish as reported by Paperna (1980). The possibility of parasite transmission from fish to humans through fish consumption has been recorded as a public health concern (Ibiwoye *et al* 2006). Kabata (1985) reported that *Clinostomun* (an acanthocephalan) when ingested with poorly cooked fish is capable of producing laryngoharyngitis which is an unpleasant inflammatory condition in man.

Pentanemus quinquarius was found in a survey of the Liverpool Fish Market in Lagos State, Nigeria. The author of the survey noted that the majority of fishes were sub-adults (Ayo-Olalusi *et al.* 2010). Additionally, the targeting of juvenile fishes and by-catch of finfish from shrimp trawls are serious management problems in the artisanal fisheries of Sierra Leone, and this is likely the case in other parts of West Africa (Baio 2010). Throughout the region, both adults and juveniles of this species are taken in the fishery year-around. *Pentanemus quinquarius* is one of the most commercially important species off the western coast of Africa, being caught mainly by trawl, but sometimes by gillnet and beach seine, and juveniles appear to be targeted regularly. Given the previous statement regarding the relative importance of *P. quinquarius* off western Africa, there is relatively little information available for *P. quinquarius* and it does not appear to be managed beyond the collection of catch data.

The dearth of published information on the length – weight and parasite of *Pentanemus quinquarius* motivated the choice of this study. With the paucity of the information on the length – weight and parasite of *Pentanemus quinquarius* which is an important fish in Nigeria, there is need to establish the length – weight relationship of *Pentenemus quinquarius* and the danger of transmission of parasite from fish to man. The aim of the study was to examine the length- weight relationship and parasites of *Pentanemus quinquarius* from Qua Iboe River Estuary in Ibeno Local Government Area of Akwa Ibom State.

MATERIALS AND METHOD

The study was carried out in Qua Iboe River Estuary in Ibeno Local Government Area, Akwa Ibom State, from May to October 2016. The Qua Iboe River Estuary rises near Umuahia in Abia State, Nigeria and flows in a Southern direction between latitudes 4^0 35' and 4^0 38'North and longitude 7^0 48^I and 8^0 05^I East. Qua Iboe River is one of the largest fishing settlements on the Nigerian coast.

SAMPLE COLLECTION

A total of 720 pieces of *Pentanemus quinquarius* were bought from the artisanal fishermen at Ukpenekang, Ibeno for a period of six months (May – October 2016). The specimens were kept chilled under ice blocks in a cooler and taken to Animal and Environmental Biology laboratory, University of Uyo for examination.

LABORATORY ANALYSIS

In the laboratory, the fish specimens were pooled and identified using the identification keys and description of Schneider (1990). The specimens were then placed on an electronic weighing balance to know their weights (g) which were recorded to the nearest 0.1g and after which they were also placed on a meter rule and their total length (TL) and standard length (SL) recorded to the nearest 0.1cm. Each specimen was assigned a number to ensure proper documentation of records obtained.

EXAMINATION OF THE FISH FOR ECTOPARASITES

The mucous on the body of the fish were scrape with a scalpel into a petri dish and scooped on a slide and a drop of saline solution was added, it was then covered with a slide cover and observed under the microscope (x10) and later with a (x40) magnification. Similarly, the gill were removed into a petri dish and rinsed with few drops of saline solution. The mixture was observed under the microscope.

EXAMINATION OF GUT CONTENTS

The sexes were also noted by opening and examination of the papidari. The fish specimens were dissected with the aid of forceps and knife and the stomach contents were emptied into a petri dish by means of a spatula and dispersed with a small amount of saline water. The contents were then placed on a clean grease-free slide and examined microscopically (with variable magnifications) for parasites.

IDENTIFICATION OF PARASITES

The parasites were identified using the identification guide according to Paperna 1996.

The length-weight relationship was determined *using* linear regression on a scatter/dot plot where y = dependent (predicted) variable, x = predictor (predictive) variable. The linear regression intercept 'a' was calculated using the formula;

$$y = ax + b.$$

Correlation for R was calculated using $r = R^{2.}$
Parasite prevalence was calculated using simple percentage method. The significance level of parasite infection between months and sex were determined using χ^2 test with the formula: $\chi^2 = \sum (O - E)^2/E$. Where O = observed, E = Expected.

RESULTS

The result of the length weight relationship of *Pentanemus gunguaris* are shown in figures 2 to 7.

Plate 1: Specimens of *Pentanemus qinquarius* **PLATE 2:** Measurement of *Pentanemus quinquarius*

Table 1 shows the monthly distribution of the total length of *Pentanemus quinquarius*, their average(mean), standard deviation, minimum length as well as their maximum length. In the month of May, the total length ranged from 14.9 – 20.0cm with a mean of 17.44±1.08, in June, it ranged from 15.1 – 20.1cm with a mean of 17.47±1.09, in July, it ranged from 12.1 – 21.3cm with a mean of 17.46±1.50, in August it was from 14.4 – 20.0cm with a mean of 17.65±1.19, September varied from 12.0 **-** 21.2cm with a mean of 17.25±1.44 and October, it ranged from 15.2 – 22.0cm with a mean of 18.8± 1.25.

Table 2 shows the monthly distribution of the weight of *Pentanemus quinquarius*, their average (mean), standard deviation, minimum weight and maximum weight. In May, the range was from 30.08 – 57.40g with a mean of 42.69±5.80. In June, it varied from 23.82 – 57.96g with a mean of 39.74±6.61 and in July it was between 13.49 – 67.57g with a mean of 37.24±9.90. In August, it ranged from 17.28 – 57.15g with a mean of 38.78±8.39, In September, it varied from 13.49 – 67.57g with a mean of 36.92±9.72 and in October, it ranged from 23.57 – 69.65g with a mean of 40.76± 9.02.

Table 1: Monthly Distribution of the Fish Specimens by Total Length

Month	Mean	Std. Deviation	Minimum	Maximum
May	17.44	1.08	14.9	20.0
June	17.47	1.09	15.1	20.1
July	17.46	1.50	12.1	21.3
August	17.65	1.19	14.4	20.0
September	17.25	1.44	12.0	21.2
October	18.18	1.25	15.2	22.0

Table 2: Monthly Distribution of the Fish Specimen by Weight

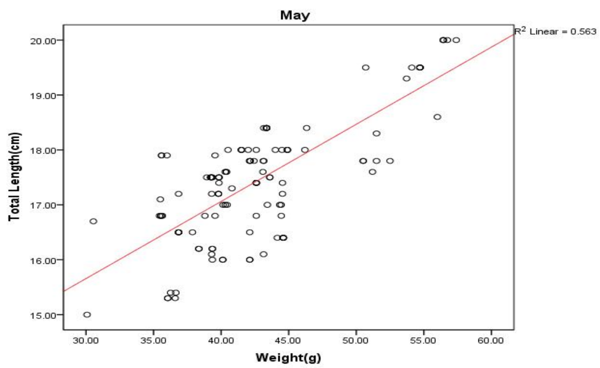
Month	Mean	Std. Deviation	Minimum	Maximum
May	42.69	5.80	30.08	57.40
June	39.74	6.61	23.82	57.96
July	37.24	9.90	13.49	67.57
August	38.78	8.39	17.28	57.15
September	36.92	9.72	13.49	67.57
October	40.76	9.02	23.57	69.65

From the plot in Figures 2, 3, 4, 5, 6 and 7, Total length (Predicted variable) is directly proportional to Weight (Predictive variable), as weight increases, total length increases. The regression line in Figures 2, 3, 4, 5, 6 and 7 has 0.563%, 0. 633%, 0.784%, 0.769%, 0.743%, and 0.852% accountability respectively, with their corresponding Correlation.

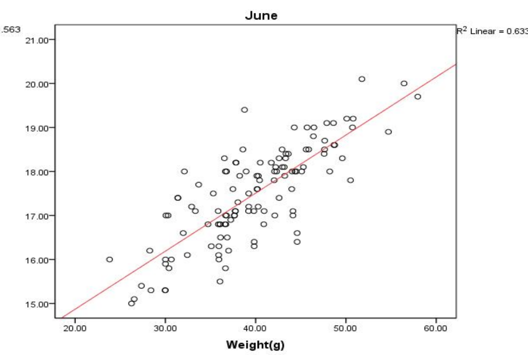
Table 3 shows that 720 specimens of *Pentanemus quinquarius* were examined for six months and a total of 276(38.33%) specimens were infected. October was observed to have the highest prevalence of infection with 58(48.33%) and August had the least prevalence of infection with 37(30.80%).

Table 4 indicates the prevalence of infection in relation to sex out 720 fish sample examined 326 were male out of which 124(38.03%) were infected and 394 were female out of which 152(38.57%) were infected. There was no significant different in infection between male and female ($p > 0.05$).

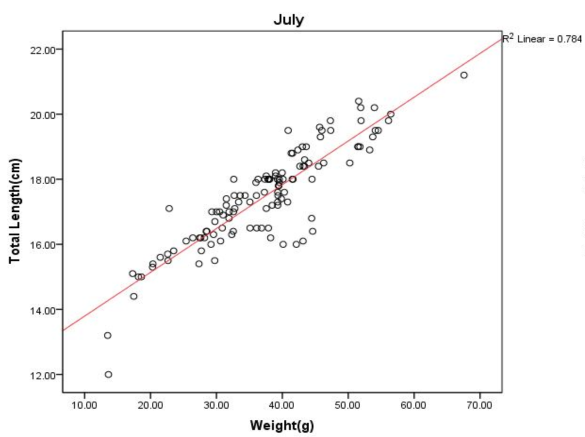
Table 5 shows the total number of parasites observed out of 720 fish specimens examined from May to October. *Camallanus sp.* had the highest level of infection 91(12.63%), this was followed by *Procamallanus sp.* 79(10.97%) and *Contracaecum sp.* 67(9.30%), *Capillaria* sp 35(4.86%), *Argulus* sp 2(9.077%) while *Trichodina sp* and *Chilodonella sp.* both recorded the least prevalence of infection of 1(0.13%) each.



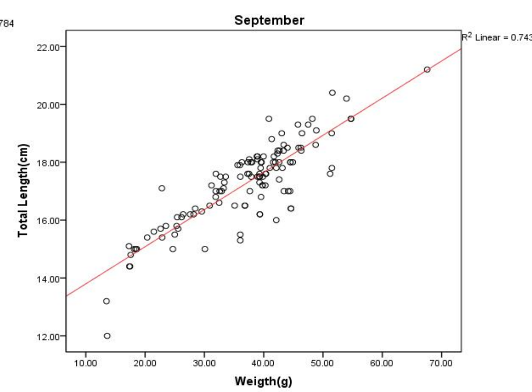
r = $(0.563)^2 = 0.316969$
Figure 2: Relationship between total length (cm) and total weight (g) for the month of May.



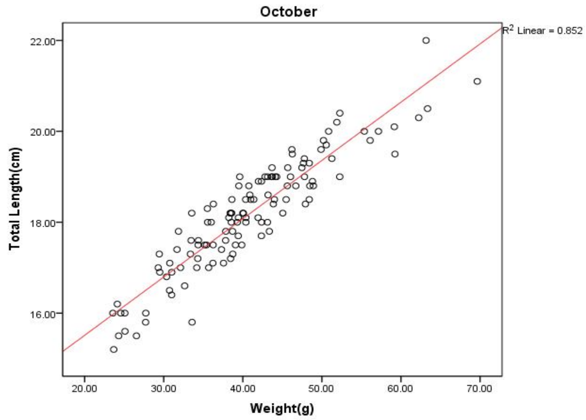
r = $(0.633)^2 = 0.407044$
Figure 3: Relationship between total length (cm) and total weight (g) for the month of June.



r = $(0.784)^2 = 0.614656$
Figure 4: Relationship between total length (cm) and total weight (g) for the month of July.



r = $(0.743)^2 = 0.552049$
Figure 6: Relationship between total length (cm) and total weight (g) for the month of September.



r = $(0.852)^2 = 0.725904$
Figure 7: Relationship between total length (cm) and total weight (g) for the month of October.

Table 3: Overall Prevalence/Monthly Prevalence of Infection

MONTHS	NO. EXAMINED	NO. INFECTED	% OF INFECTION
MAY	120	50	41.66
JUNE	120	47	39.16
JULY	120	40	33.33
AUGUST	120	37	30.8
SEPTEMBER	120	44	36.66
OCTOBER	120	58	48.33
TOTAL	720	276	38.33

TABLE 4: PREVALENCE OF INFECTION IN RELATION TO SEX

SEX	NO. EXAMINED	NO. INFECTED	% OF INFECTION
MALE	326	124	38.03
FEMALE	394	152	38.57
TOTAL	720	276	38.33

Calculated $\chi^2 = 0.0218$, Tabulated $\chi^2 = 3.841$, df = 1, $p>0.05$

Table 5: Prevalence of infection with respect to parasite spectrum and intensity of infection

PARASITES	NUMBER EXAMINED	NO. (%) OF INFECTION	TOTAL NO. OF PARASITES	PARASITE INTENSITY
Camallanus sp.	720	91[12.63]	108	1.18
Procamallanus sp.	720	79[10.97]	88	1.11
Contracaecum sp.	720	67[9.30]	74	1.10
Capillaria sp.	720	35[4.86]	45	1 .28
Argulus sp.	720	2[0.27]	3	1.50
Trichodina sp.	720	1[0.13]	2	2.00
Chilodonella sp.	720	1[0.13]	1	1.00

Figure 8 shows the prevalence of single, double and triple infection of parasites including nematodes, copepods, and protozoans in the percentage of 77, 19 and 4 respectively. Figure 9 shows the prevalence of parasite infection in relation to their weight from May sampling to October sampling. Class 10-15 had 4 specimens examined, 3 infected and 75% of infection. Class 16-20 had 18 specimens examined, 4 infected and 22.2% of infection. Class 21-25 had 31 specimens examined, 13 infected and 41.9% of infection. Class 26-30 had 55 specimens examined, 28 infected and 50.9% of infection. Class 31-35 had 93 specimens examined, 33 infected and 35.4% of infection. Class 36-40 had 219 specimens examined, 94 infected and 42.9% 0f infection. Class 41-45 had 178 specimens examined, 52 infected and 29.2% of infection. Class 46-50 had 64 specimens examined, 21 infected and 32.8% of infection. Class 51-55 had 38 specimens examined, 17 infected and 44.7% of infection. Class 56-60 had 14 specimens examined, 8 infected and 57.1% of infection. Class 61-65 had 3 specimens examined, 1 infected and 33.3% of infection. Class 66-70 had 3 specimens examined, 2 infected and 66.6% of infection.

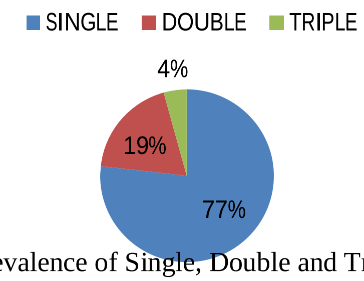


Figure 8: Prevalence of Single, Double and Triple Infection

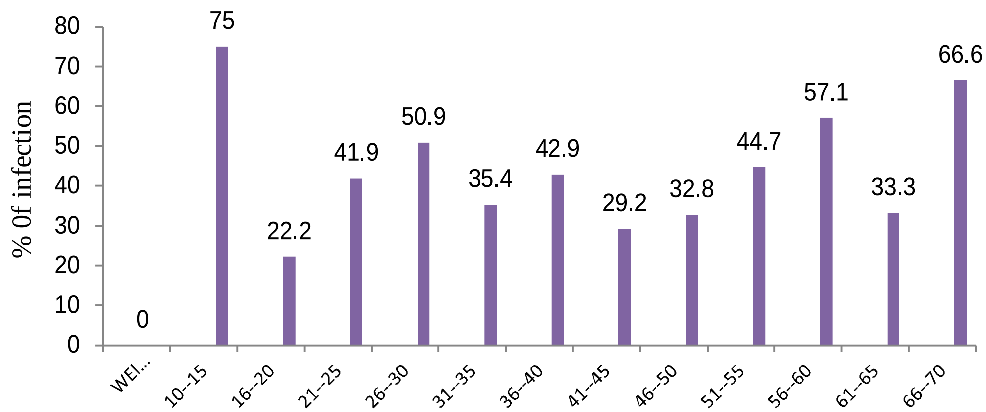


Figure 9: Prevalence in Relation to Weight (G) for Parasite Spectrum

DISCUSSION

In terms of their magnitude, the mean length of *Pentanemus quinquarius* obtained within the period of study did not reveal any significant different in the distribution of total length of *Pentanemus quinquarius* from May to October. This may be attributable to the fact that *P. quinquarius* breeds throughout the year with peak in the dry season as previously reported by (Edema and Osagiede 2011). This suggests that the fish of larger length could be harvested in any of the month. Similarly, the fish samples with over 40.0g mean weight were obtained only in the month of May and October and they were very few. This may be attributed to wet distribution of fish in the wild and the probability of obtaining heavy fish of over 40.0g is also low except in May and October.

To determine the length-weight relationship of *Pentanemus quinquarius*, the values of total length and total weight were plotted and a scattered plot was gotten. The plot indicated a linear relationship depicting that the increase in weight leads to a corresponding increase in length which is similar to the report of Osibona *et al* (2010) that the length-weight relationship of *Galeoides decadactylus* which is in the same family with *Pentanemus quinquarius*, reflected the general increase in weight with increasing length. Also, Usip (2013) reported similar relationship in the length – weight of *Chrysicthys nigrodigitatus* in Cross River Estuary. Length-weight relationship differs with species. These conditions sometimes reflect food availability and growth within the period prior to sampling, however, these conditions are variable and dynamic.

The scattered plots show a relationship between length and weight of the fish captured for the months under study and the correlation (r) values were generally less <0.80 in the entire month implying that the length has a significant relationship with weight, thus there was a positive correlation between length and weight of the captured fish from May to October. Length – weight relationship is very important in fishery research, it aids in estimating weight where only length data are available and as an index of condition of the fish (Usip, 2013, Ndome, 2010). The fact that the highest length and weight occurred in the month of October while the least length and weight occurred in the month of September could be explained in terms of the spawning season of the fish in that spawning commence in the wet season and peak during the dry season.

The parasites recovered included *Camallanus sp., Procamallanus sp., Contracaecum sp., Capillaria sp., Argulus sp., Trichodina sp.* and *Chilodonella sp.* But *Camallanus sp.* and *Procamallanus sp.* dominated the infection and appeared more frequent than other parasite which is in line with the record of Okaka (1998) that *Camallanus sp.* and *Procamallanus sp.* dominate infection and appear more frequent in fishes than other parasites in Nigerian rivers. The presence of intestinal parasitic nematode *Procamallanus cyathopharynx* (10.97%), *Camallanus sp.* (12.63%), *Contracaecum sp.* (9.30%) and *Capillaria sp.* (4.86%) could be attributed to availability of nutrient where helminthes parasites depend on absorbable food materials in the lumen of the gut. The outcome of this proves are in line with previous reports of (Usip, 2013, Ekanem *et. al.* 2011, Okaka, 1998) in fishes from similar habitat. The protozoan parasites; *Trichodina sp.* and *Chilodonella sp.* lives on the skin and gills of the fish causing skin ulcers and gill hyperplasia and can lead to massive mortality of the fishes at nursery phases (Usip *et. al.,* 2014, Iyayi and Eyo, 2008).

There were cases of not just single but double and triple infection from the parasites recovered. The presence of copepod parasites maybe as a result of feeding; the copepods may have been taken in as food. Parasitic crustaceans are increasingly becoming serious problem in both cultured and wild fish populations (Usip and Etim, 2014) *Argulus sp.* or fish louse are fish parasite that feed on blood meal, their attachment to the skin or gill of fishes causes serious skin necrosis, haemorrhages and other disabilities (Iyayi and Eyo, 2008). The highest prevalence of parasites infection was observed in the month of October. This can be attributed to the conducive nutritive advantage by the host's intestine to the parasites and high flux of waste dumped into the river either through human activities, heavy storm rain and run off. The percentage of infection between the male and female had no significant difference indicating that both male and female feed the same. Comparison of the results of this study is limited due to the paucity of the literature on this species of fish.

CONCLUSION

The length-weight relationship of *Pentanemus quinquarius* shows a positive correlation between length and weight of fishes captured between May to October, 2016 from Qua Iboe River Estuary. Just as the length increases, the weight also increases. The parasitic infection recorded in the present study is important to the fishery in the area and requires to be checked, since brackish water serves as a good source of fish food for coastal communities in Nigeria, particularly in Akwa Ibom and the Niger Delta.

RECOMMENDATION

There is need for further studies on the biology of this species of fish to continue to observe and discover new parasites and determine if there could be transfer to humans and to bring about a suitable method to control the rate of this parasitic infections. Further investigation of parasites in other organs of the fish specimen is recommended in order to close the whole gap existing for the brackish water eco-system and the length – weight and parasite of *Pentanemus quinquarius.*

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