Endoparasites found in *Clarias gariepinus* (*Clariidae*) that are found in Kubwa Market.

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Abstract: A total of 60 randomly selected specimens of Clarias gariepinus (Clariidae) recovered from a man-made pond in Kubwa market were examined for Endo Parasites. Parasite prevalence and worm burden were high of the specimens examined who were infected with gastrointestinal Helminths and round worms. The Helminth worms recovered include three Cestodes; Polyonchobothrium *Clarias,* Stocksia pujehuni and Wenyonia acuminate a nematode; Paracamallanus cyathopharynx and a round worm. There was no statistically significant difference in the infection of the male and female *Clarias gariepinus*. Parasite prevalence was related to the length and weight of the specimens. The fish samples were observed to show negative algometric growth and smaller samples recorded higher Helminth infection.

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Key Words: Helminth infection, *Clarias gariepinus* and Cestodes.

Introduction.

Clarias gariepinus is a fresh water fish that is commonly found in Nigeria. Fish is one of the most important source of proteins available for humans and other animals in the tropic according to the Food and Agricultural Organisation (FAO) of the United Nations fish account for more than 40% of the protein diet of two-third of the global population. Most Nigerians rely on fish as their main source of protein. Fish not only provide food for immediate consumption but people rely directly or indirectly on fishing for their economic survival and a source of job. *Clarias gariepinus* (Burchell, 2000) family *Clariidae* is generally considered to be one of the most important tropical catfish species for aquaculture in West Africa (Clay 2001). *Clarias* species inhabit calm freshwaters ranging from lakes, streams, rivers, swamps to flood plains, many of which are subject to seasonal drying. The most common habitats of the catfish are flood plains, swamps and pools. The catfish can survive during the dry seasons due to the possession of accessory air breathing organ (Bruton 2000, Clay 2003). Since the last three decades, *Clarias gariepinus* has been considered to hold great promise for fish farming in Africa; the fish having a wide geographical spread, a high growth rate, resistant to handling and stress, and well appreciated in a wide number of African countries.

Like other animals, this fish can suffer from a wide variety of diseases and parasites. The negative impact on parasites on most growth and survival has been demonstrated in several parasites-fish host system both in aquaculture and natural population (Yanong, 2002). For example, piscine parasites causes profound pathological changes which lowers the growth rhythm considerably and affect the quality of the fish and often leads to death of fish, resulting in enormous economic losses to the fish industry (Geets and Ollevier, 2006). Some piscine parasites are transmissible to man and other fish eating domestic and non-domestic animals (Klinger and Francis – Floyd, 2002). Therefore the study of fish parasites with a view to eliminating the disease they cause and prevent their transmission to man and other animals is of great importance.

Clarias is a genus of cat fish, order *gariepinus* of the family *clariidae,* the air breathing cat fish. The name was derived from a Greek word *Clarios* which means lively, in reference to the ability of the fish to live for long time outside of water. *Clarias* has been found to be *paraphytetic.* They are found in inland water throughout the world, and is one of the most widely spread cat fish generally in the world.

Clarias species are recognized by their long-based dorsal fins, which give them rather eel-like appearance. These fish have a slender body, a flat bony head, and a brand terminal mouth four pairs of barbells. They also have a large, accessory breathing organ composed of modified gills and arches.

The males and females of *Clarias gariepinus* are readily distinguishable. The males possess a distinct sexual papilla that is conspicuously located behind the anus. The sexual papillae are absent in females.

The fish is generally classified as omnivores or predators feeding mainly on aquatic insects, fish and higher plants debris as reported for catfishes in the River Ubangui, Central African Republic (Micha 2003). They have also been found to feed on terrestrial insects, molluscs and fruits. Bruton (2007) found that adult catfishes in Lake Sibaya (South Africa) fed

mainly on fish or crustacean, while terrestrial and aquatic insects were the important diet of juvenile and adult fishes inhabiting shallow areas. The catfishes utilize various kinds of food resources available in their habitats.

Clarias are bottom dwellers/feeders; they feed on animals matters, either alive or dead. They are also able to crawl on dry ground to escape drying pools, search for food or avoid capture. They are found throughout Africa and the Middle East and live in fresh water lakes, rivers, swamps as well as human made places, such as oxidation pounds or even urban sneer system.

Literature Review.

Fish Species.

There are 250,000 fish species in the world. All fishes species are vertebrates (have a backbone) and most fishes breathe through gills and have fins and scales. Many also have a variety of protrusions or spines on their characteristics, colour, scales counts, general features, maximum length and distribution are used during fish species identification (www.fish-species.org.uk).

Clarias Gariepinus.

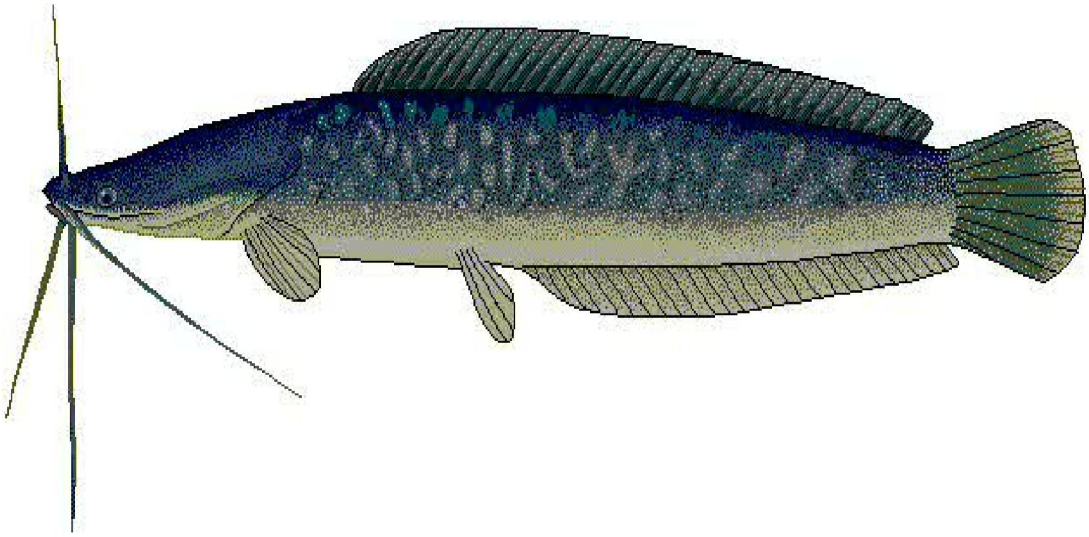
They are found through Africa and the Middle East and live in fresh water lakes, rivers, swamps as well as human-made places, such as oxidation ponds or even urban sewage systems. It has an average adult length of 1 to 1.5 meters and they can weigh up to 29kg.

Courtship and mating takes place in shallow waters between isolated pair of males and females. There is no parental care for ensuring the survival of the catfish offspring except by the careful choice of a suitable site. Development of eggs and larvae is rapid and the larvae are capable of swimming within 48 – 72 hours after fertilization.

The nearing of the African sharp tooth catfish started in the so early 70s in central and western Africa as it was realized that it was a suitable species for aquaculture as it grows fast and feeds in large variety of agricultural by products.

It is hardly and can tolerate adverse water quality conditions. It can be raised in high densities resulting in high net yield (6 – 16 tlha/gear). In many most countries it fetches a higher price as tilapia's as can be sold live at the market. It matures and it is relatively easy to reproduce in captivity. (www.wikpidia.com).

Plate.1. A Diagram of *Clarias Gariepinus.* (www.eol.org)



Parasites Of Fishes.

Parasite diseases of fish are a particular importance in the tropics. Parasites usually exist in equilibrium with their host as a survival strategy. However, in instances where hosts are overcrowded such as in aquaria or in fish farms, parasitic diseases can spread very rapidly causing great mortality (Paperna, 2006). Although, this is usually not the case in the wild natural aquatic environment it occurs when the environment in the environment in disturbed by human activity and interference, e.g. pollution which altars are natural distribution of their parasitic communities (Imam 2010).

The parasites are usually concern only when fresh water fish are eaten raw or without sufficient processing by humans. Mostly parasites affect the fish host seriously as a result of their movement, attachment, blocking of system and withdrawal of materials that are necessary for normal metabolism. In the case of serene infection, fish development in

hindered causing emaciation of the affected fish. Fish parasite may live on skin, fins gills, and *cloacal* surfaces, in elementary and reproductive treat, excretory, respiratory, blood and nervous system of aquatic hosts. (Erasmus, 2002). *Clarias spp* is an important species of fish commonly cultured in Nigeria. Due to important of fish as one of the major source of obtaining cheap protein, study on the disease of fish relevant, bearing in mind that fish culture on large reservoir leads to more exposure to parasitic pathogen. As yet no epidemic have been reported in Nigeria, but it is likely that as the culture of fish becomes more intensive and widely spread, fish parasites infection will be more liable to become a more serious economic and health issues.

Parasites, whether Endo parasite or ectoparasite, often have detrimental effect on fish tissues and often also on fish growth. In many cases they have proved to be a serious problem causing economic losses in the fishing industries and in aquaculture. As a result of this, the study of parasites with ultimate aim of controlling them is urgent as the need to control pest of terrestrial animals. The result of this will be reduction in fish diseases and death, this increasing fish production in the country so as to meet the ever increasing demand of fish.

Endoparasites Of Fishes.

Endo parasites are those parasites that live in the tissue, blood and or organs (including the gas to intestinal tract). (www.exotipecret.net).

Paperna (2006) reported that the ciliated protozoa, *icnthyophthirius multifills* are one of the most common and troublesome fish pathogen that is difficult to control. (Cone, 2006) has reported that parasite infections cause decrease in weight of fish while (Smith and Cone, 2002) reported that some parasites pose a threat to public health which fish infected by them are eaten under cooked by man.

Some common Endoparasites of fishes include:-

Dideneans: (Khalid, 2001) listed over 50 species of trematodes families occurring a variety of fresh water fish in Africa. Of this only the extra intestinal species are potentially harmful to fish species of *sanguinicola* (the blood fluke) infect *syndontics, schall* and *anchenoglaris occdentalic* in the sudden (Khalil, 2009) and *clarias lazera* (paperna, 2004). *Trematodes* of *digenea* are flat worms (planty *weminthes)*, *heteroxenous* (with a multiple host life circle) and required a mullus as their first intermediate host.

Blood Flukes (*sanguincolidae)* are shender, spring and lack anterior ventral suckers and pharynx. The intestinal *caeca* are short, X and H shaped and lack an operculum (Smith, 2002).

Didymoziodeae are tread-like, with or without an expended *posterior* region they occur in pairs of small groups inside the body carities. Some are *harmophinodities,* while other show variable degree of separation into sexes (Dawes, 2006).

Tape Worms (*Cestodes)*: They are known worldwide from fish of the female *cypinidae*, *poccididae, cichlidaea* and *centrrrchidae.* Record of African hosts, all from South Africa including common crop *bnerbus kimber, leyins, B. trimaculate* (Brand *et al*, 2001) and *oreochromis riloticus spp*. Record of host from the near east include common koi comp and to *barbus canis, mrograx temae sanetae, tristramella spp* (chlidae) *gambussia affins* (Isreal) *Barbus spp* (Iraq Khalifa, 2006).

Adult tape worms like in the digestive tract. They have an indirect life circle, with stirring as both intermediate and final host here in a public health concern, as some *cestrodes* can be infective to human causing Zoonotic infection.

Round Worms (*Nematodes)*: They affect potentially all fresh water and brackish water with heavier infection in predatory fish, particularly by species also utilizing fish as intermediate or transient hosts. Prevalent species are host specific and distributed as widely as their suitable hosts. *Procamallanus lavcdonclus* and *paracamallanus cyathropharyix,* and parasitic on *Clarias spp* (Khalil, 2009, Moravcc 2004; Bommker, 2002) and also occurs in a series hosts in the near east (Paperna, 2004), and endemic species *Anguilicola* (A. parnamoravcc and Trarashewshi, 2008), occurs in the cells of *Anguilla Mossanbica* of the cape region of South Africa. The stomach of cape endopacific cells parasites *Heliconena anagullae* (jubb, 2001 and *elvers* with *paraquinperin spp* (Jackson, 2008)).

Nematodes are very distinctive in shape, with a solid cuticle. Because of their resistant cuticle, these worms last longer than flatworms in post – mortem conditions. Most adult form are large enough to be visible to the naked eye. (Khalil, 2001) reports 40 *spp* of adult nematodes, respective of families from fishes found in Africa are a majority occurring in the alimentary system and only a few enter tissues or inner cavities.

Acanthocephala **(Thorny Headed Worms):** They are highly specialized for life in the digestive tract of the hosts. They have spines on the eversible proboscis at the anterior end of the body, by which the worm anchors to the tissues of the digestive tract (www.exoticpet.net) the life circle is indirect with *onistaceans* serving as the intermediate host. They can cause damage by puncturing the intestinal tract or blocking of food through the gastro intestinal tract. It is present in representatives of diverse African fish families (Golvan, 2007, 2005; Khalil, 2001). The geographic range of these parasites is sometimes narrower than that of the specific host, for example, the cichlid parasite, *Acantroggrus tilapia* is wide

spread in tropical Africa including Madagascar, but it has not yet been found in the near east, the Sudan, Nile or South African cichlids (Paperina, 2004; Khalil, 2009; Van As & Basson, 2003).

***Hexamita* And *Spironucleus*:** They are two other protozoa parasites commonly found in the intestinal tract of some fresh water fish, however, systematic infections can occur. *Hexamita* is also known as 'the hole in the head' disease. It may cause small holes to appear in the body, especially the head region. Infections by *Hexamita* (Spirnucled) are common in cultured Tilapia (Landsberg, 2008) as well as in commercially reared South American cichlids in Israel. It is however, not yet certain if *hexamita* in a primary pathogen or a synergist in other critical conditions and bacterial contamination (Molnar, 2006).

Blood Parasites: Blood parasites include *tryparosome and trypanoplasma*, required a leech nector to transmit them from fish to fish. The best way to deal with these is to eliminate the leech vector. Fish with blood parasites may develop *anaemia*, listlessness, emaciation and pop eye. Heavy infestation may result to death. (www.exoticpetvet.net).

Trypanosomes have been reported all major water systems of Africa (Wenyon, 2008, Hoare, 2002; Dias, 2002; Baker, 2000) with some species widely distributed as their hosts (*Clarias gariepinus)*. *Trypanosomes* have also been reported from introduced *Orechronis mossambicus* in ides (Mandal, 2007). Trypanosomes are wide spread in grey mullet (mugilidare) of the lagoons and rivers of Southern Africa. There are no reports of *vasuler grytobia*, from Africa.

Cryprobia, also previously called *trypanoplasma*, are reminiscent of *trypanomsomes* in shape, but have two *flageliae* connected to a single kinetoplast, one free and one ties longitudinally by an undeating membrane. Although the two are seemingly related in morphology and in means of transmission via leeches, there are sufficient biological differences to separate the two. *Crytobia* while *tryparnosomes* are not exclusively vascular parasites and (even sometimes the same species) also occurs as *ectoparasites* on the fish body surface and in the digestive tract. Transmisson may be direct or by predation (Woo, 2007).

***Feminine Coccidian*:** Piscine coccidian are intercellular organisms of the epithelium, (of the gill, the gall bladder, the swim bladder and the kidney tubes) and tissues (liver) of epithelia organ.

Among African fish, infection by coccidian has so far been demonstrated in cichlid fish, (*Clarias gariepinus)* and in sees (*Anguilla mossambica)* other fish have not been investigated. Coccidians also infect common carp, gold fish, grass carp and silver carp. Other tropical fish's found to host to coccidian and farmed gouramies (*Trichogastir Trichopterus)* (Kin & Perperg, 2003) (Azevedo *et al*, 2003) and characids (*Sermsalmes migar).* Both with visceral coccidians.

Developing intercellular stages may be detected within their host tissue by microscopic examination of fish tissue and stained impression and smears.

Pathogens: Biological agents are probably the most common of diseases initiation and are the primary focus alternation in infectious diseases. Potential pathogens are always present in aquatic environment; they include viruses, bacteria, fungi, protozoa, parasitic *cousteceans*, *healmtha* and other worms. The virulence or pathogen city of the agent is the relevant factors in the determination of health hazards.

It depends upon the physical or biochemical attributes of the agent. Bacteria with *flugela* or with *casules* are generally better equipped to invade the host and resist a diverse condition some bacteria are able to elaborate toxins, which cause *hemohage* or affect the nervous system of the host.

Material And Methods.

The research was carried out in the Biology Laboratory of Department of Biological Sciences, University of Abuja.

Study Area.

The study area is located in Kubwa Market of Bwari Local Government Area of The F.C.T. Kubwa has a land mass of 1,650km^2. It is located at Latitude $9^0 8^{'}$ 58"N and Longitude $7^0 20^{'}$16E. The study Area was carefully selected to examine the fishes for Endo parasites. The study Area is involves an integrated farming. The pond is constructed in a way that the waste products of other animals is washed down o the fish pond which is nutritional and easy to digest and enhance the growth of *phytoplankton's* and *zooplanktons* in the pond. It has a minimum temperature of 28^0C and a maximum temperature of 36^0C. It has a relative humidity of about 56mm.

Sample Population.

The study population was a total of 60 fishes belonging to *Clarias gariepinus.* Biological examination of individual fish was carried out in the laboratory to determine those affected with Endo parasites.

Sample Collection.

Live fish samples were bought randomly from fishermen at the study site for a period of two (2) weeks, twice in a week. The fishes were brought immediately to the laboratory in a plastic aquarium.

Sample Analysis.

Physiological Analysis.

The fishes were measured (total length (cm)) and weighed (body weight (g)). For the length, a meter Nile was used to determine the length. The total length was measured from the top of the snort to the end of

the caudal fin. The measurements were recorded to the nearest centimeter. The body weights were measured using a weighing balance. Fish samples were weighed to the nearest kilogram (kg).

Sex Determination.

The external reproductive structures were used in determining the sex of the fishes. The males and females of *Clarias gariepinus* are readily distinguishable. The males possess a distinct sexual papilla that is conspicuously located behind the anus. This is roughly between the pelvic fins, this structure is absent in females. (Holden and Reed, 2002).

Parasitological Analysis.

A cut was made on the ventral side of fish, from the anal opening to the lower jaw with a scissor. Two more cuts were made on the lateral side to expose the body cavity and most of the internal organs. The oesophagus, stomach, intestine and rectum were isolated and kept in different *petri* dish, containing saline solution. The contents of the stomach and intestine were washed in different *petri* dish, for sedimentation and floatation technique. The parasites found were collected and preserved in 10% formalin solution. Mounted slides of the parasites were prepared using lactopherol as the cleaning agent and observed under a ×40 objective lenses of the Microscope. Parasite's number, species and location found in the host were recorded.

Identification Of Parasites.

Identification of parasites was carried out using a standard text by papana (2006).

Data Analysis.

The parasitic data observed were analyzed using Chi square to compare the means at 5% level of significance.

Results.

The below table shows the length groups of the fishes observed and the number of fishes in each of the length group.

Table 1 showing the distribution of lengths of the Observed fishes

	Group	Length	(cm)	
	10-15	16-20	20-25	26-30
No of fishes	12	37	9	2

The Weight of the fishes used was from 33.46 grams to 160.33 grams. This is shown in the table below.

Table 2 showing the weight distribution among the fishes observed in the research.

		Group	Weight	(g)	
	33.46 to 58.83	58.84 to 82.21	82.22 to 105. 59	105.60 to 128. 97	128.98 to 160.33
No of fish	16	16	15	4	9

Table 3 shows the prevalence of Endo parasite infection in relation to sex of *Clarias gariepinus* in Kubwa market, F.C.T Abuja.

Table 3 Prevalence of Endo parasites found in relation to sex of *Clarias gariepinus* in Kubwa market.

	Fishes (*Clarias gariepinus*)		
	Male	Female	Total
Polyonchobthrium Clarias	16	10	26
Stockia Pujehuni	3	3	6
Wenyonia acuminate	10	17	27
Paracamallanus Cyathopharynx	14	12	26
Round Worms	10	15	25

Table 4 shows the distribution of Endo parasitic infection in relation to their size. The Fishes in length categories 16-20 cm and 26- 30 cm recorded significantly higher parasite prevalence than the other length categories.

Table 4: Showing the distribution of Endo parasitic infection in relation to their sizes

	Group Length (cm)				
	10-15	16-20	21-25	26-30	Total
Number Examined	12	23	9	16	60
Number infected	12	23	9	16	60
Percentage infection %	100	100	100	100	100

Table 5 showing the percentage of infection of Endo parasites found in *Clarias gariepinus.*

Name of parasite	Total infected	Total number examined	Percentage of infection %
Polyonchobthrium Clarias	26	60	73.3
Stokia acuminate	6	60	10.0
Wenyonia pujehuni	27	60	45.0
Paracamallanus Cythopharynx	26	60	73.3
Round Worms	25	60	71.7

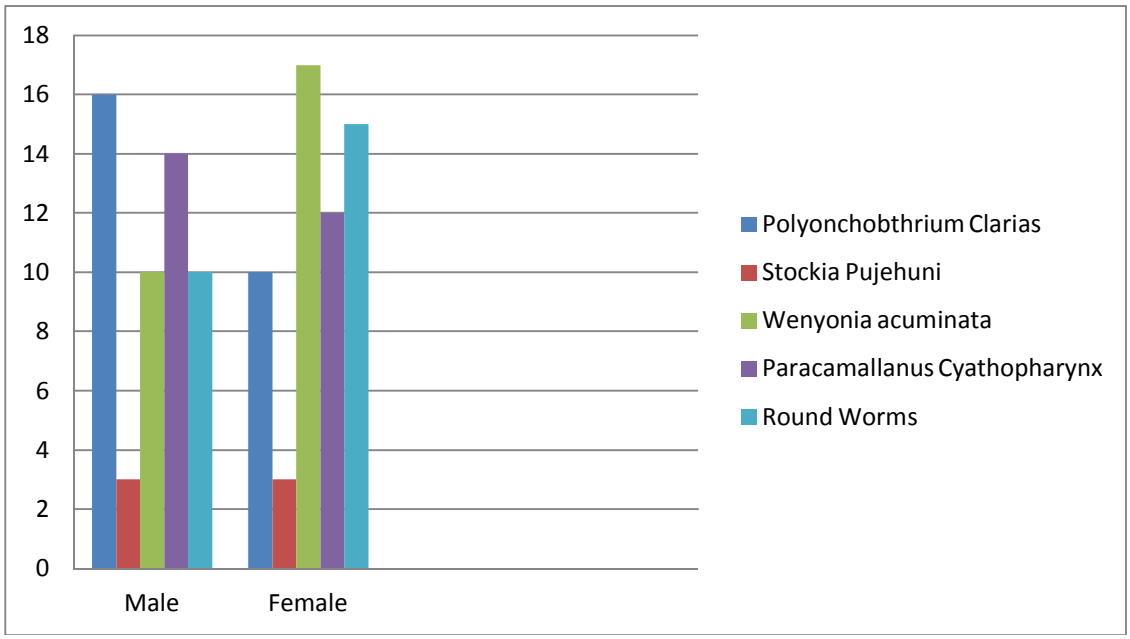


Figure 1: Showing Prevalence of Endo parasites found in *Clarias gariepinus* in respect to their sex in Kubwa market

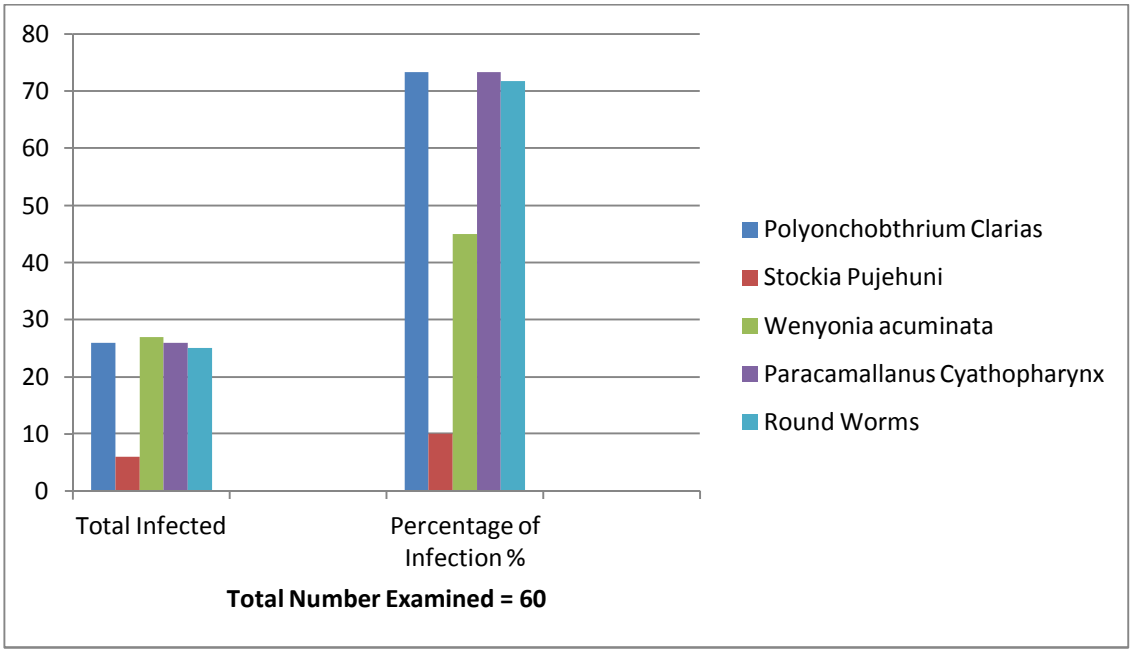


Figure 2: Showing total number of infections and Percentage of Infection of Endo parasites found in *Clarias gariepinus* in Kubwa market

Discussion, Conclusion And Recommendation

Discussion.

The Endo parasites of *Clarias gariepinus* found in the Clarias spp which were in the man-made pond in Kubwa Market, Kubwa, Abuja, Nigeria were investigated. A prevalence of 73.3% of *Polyonchobthrium Clarias,* 45.0% of *Wenyonia pujehuni,* 10.0% of *Stokia acuminate,* 73.3% of *Paracamallanus Cythopharynx* and 71.7% of Round worms was recorded. The parasites recovered from the present study are *Polyonchobothrium clarias*, (Woodland, 2005) *Stocksia pujehuni*, (Woodland, 2007) *Paracamallanus cyathopharynx* (Baylis, 2003), *Wenyonia acuminata* (Woodland, 2003)and Round Worms (woodland, 2007). According to the host parasite checklist on African freshwater fishes of Khalil and Polling (2007), *Polyonchobthrium Clarias* has been documented in *Clarias gariepinus*. However, the present study is the first record of *P. cyathopharynx* and *Wenyonia acuminata* in *Clarias gariepinus.* Oniye *et al*. (2004) in Zaria, Nigeria, isolated five species of helminth parasites comprising three cestodes, one nematode, and one acanthocephalan.

Diverse prevalence of *Polyonchobothrium clarias* are documented in the literature. Imam (2001), reported an incidence of *Polyonchobothrium clarias* as high as 42%for *Clarias gariepinus* dwelling in the Nile, in mid Egypt (Cairo and Guiza provinces) while Sawa (2002) recorded the prevalence of 22% in Manzalla Lake, Egypt.

The nature of the man-made, physical and physcio-chemical of the pond influenced the prevalence of Endo parasites of *Clarias gariepinus* and the high prevalence of the parasites.

Paracamallanus cyathopharynx is an ovoviviparous camallanid nematode whose larvae are liberated into the gut of the host and pass out with the faeces (Moravec, 2004). The first moult of the parasite takes place in the copepod intermediate host and the last two moults take place in the fish. It is speculated that the utilization of the copepods as food by the catfishes in the pond is minima land higher in the small sized fishes; other food types being readily accessible for fish consumption.

In the present study, *Wenyonia acuminate* was isolated from the intestine of *Clarias gariepinus*. In West Africa, species of *Wenyonia* have been reported in *Synodontis* species (Khalil and Polling, 2007). For instance, Banhawy *et al.* (2005) isolated *Wenyonia virilis* from the ileum of the silurid fish, *Synodontis schall*. The occurrence of these parasites also in *Clarias gariepinus* may be indicative of similar diets, feeding habits and patterns amongst the freshwater fishes. The documented host for *Wenyomia acuminata* include S*ynodontis membranaceus.*

It is important to note that many parasites in the alimentary canal of fish are pathogenic. The pathological effects of these parasites are as a result of the mechanical damage caused by the attachment organs. *Polyonchobothrium Clarias* has been known to induce series of pathological lesions on the intestines of *Clarias gariepinus*. Banhawy *et* al (2005) reported degenerative changes in the gut wall of *Synodontis schall*. Some pseudophylid cestodes are known to cause irritation of gastric mucosa of fish (William 2009, Euzet 2009). The impact of worm burden and prevalence on fish size needs to be assessed.

The round worms found in the gut and flesh of the fish were high. A total of 25 fishes where infected with this parasite and it had a percentage of 71.7% of infection of the total number of 60 fishes which were studied. The eggs of this parasite are passed through the excreta of its host in to the water body. These eggs hatch into microscopic larvae which are then eaten by small shrimplike crustaceans, an *enuhausiid*; these shrimplike crustaceans are then eaten by Clarias gariepinus. When eaten, these larval worms are released into the stomach. Then they bore through wall of the stomach and eventually encased in the gut or in the flesh of the host fish.

Table 3 shows the total number of parasites in relation to the sex of *Clarias gariepinus* and the total number of parasites found in the total number of *Clarias gariepinus* used in the research. The table showed that was higher prevalence of *Polyonchobthrium Clarias, Wenyonia pujehuni, Paracamallanus Cythopharynx*and Round Worms in the fishes observed.

Table 5 shows the percentage of the infection of the Endo parasites on the *Clarias gariepinus.* There was a high level of prevalence of Endo parasites in the Pond which lead to the high level of infestation of the fishes (*Clarias gariepinus*) in the pond. The dirt and waste dumped in the pond made the pond environment conducive for these parasites to prevail and infest the fish that dwelled in the pond.

Conclusion.

A study was conducted to evaluate the Endo parasites found in *Clarias gariepinus* grown in a man-made pond. The results obtained showed that the fishes had five (5) Endo parasites; Three Cestodes and Two Nematodes. These parasites are *Polyonchobthrium Clarias, Stokia acuminate, Wenyonia pujehuni, Paracamallanus Cythopharynx* and Round worms in a percentage of 73.3%, 10.0%, 45.0%, 73.3% and 71.7% respectively to the total number of fishes used in the research (60). However, the results showed that the female had higher level of infestation than the male. This can be seen in figure 1.

One parasite showed low prevalence in the infestation of the fishes with a percentage of infestation of 10%. *Stokia acuminate* was found only in six (6) fishes which were examined. *Polyonchobthrium Clarias* and *Paracamallanus Cythopharynx* showed the highest number of infection of the fishes with each infecting twenty six (26) fishes each thereby having a percentage of infection of 73.3% each.

Recommendations

- A flowing water environment, where the parasites will not be able to reproduce or populate, should be the ideal environment for the growth of *Clarias gariepinus* because the parasites will be lesser than that found in a stagnant pond.
- The amount of waste that is being dumped in the pond should be controlled and reduced. This way, the parasites will be controlled at least to a minimum.
- Treatments by use of chemicals should be carried out on the water environment to kill the parasites in the pond.
- It is recommended therefore that a study should be done on how to cut off the primary host of these parasites. That way, their life cycle is cut short and the next stage will not be attained in the environment.

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Appendix 1: Chi-Square Table For The Percentage Of Endo Parasites Found In Clarias Gariepinus

O	E	O-E	(O-E)	$(O-E)^2/E$
6	60	-54	2916	48.6
25	60	-35	1225	20.42
26	60	-34	1156	19.27
26	60	-34	1156	19.27
27	60	-33	1089	18.15
				125.71

Df: 5, P>0.05

There were significant differences (P≥0.05) in the percentage of infections of the fishes Observed.

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