Case Study

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A Case Report of Taeniasis in a 29yrs old Woman from Owerri, Imo State Nigeria.

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ABSTRACT

A 29yrs old woman from Obowo in Imo State Nigeria presented with a mild abdominal cramp and intermittent diarrhoea in one of the health facilities in Owerri. She had been discharging tapeworm segments since 2020 from her anus and sometimes these were found around her vagina without any major discomfort. Her husband had been away during this period and was due to return home. This made her decide to visit the health facility to present this situation so as not to possibly infect her husband. Sample containers were given to her to collect her stool samples, urine and any worm segments daily for 5days. A total of ten samples (both stool and urine) were analyzed using parasitological procedures. The recovered segments were examined using histological procedures for proper identification. Praziquantel and Metronidazole was administered to the patient and a follow-up stool analysis was carried out on 14th and 28th day after treatment. Eighteen worm segments were recovered from stool, anal region and around her vagina respectively. Out of the eighteen worm segments recovered, 4(22.0%) were from stool sample, 11(61.1%) from anus, 3(16.7%) around the vagina and none were recovered from urine samples. They were all identified as proglottids of *Taenia saginata* specie. Cyst of Entamoeba coli was also isolated in all the stool samples while few eggs of Taenia specie was detected in two out of five stool samples examined. Segments were not recovered in the urine samples and the Scolex of the tapeworm was not recovered in this study. The results of the post treatment analysis of both stool and urine samples were negative for *Taenia saginata* and *Entamoeba coli* respectively. The discharge of the segments from the anus stopped completely. There is need to enlighten the public on the importance of consuming properly cooked meat (Beef) and to maintain a good environmental sanitation to prevent Taeniasis and other parasitic infection.

Keywords : *Parasitic infection, Proglottids, Taenia saginata, Entamoeba coli, infestations.*

INTRODUCTION

Taeniasis is a parasitic zoonotic infection caused by the tapeworm *Taenia saginata* (beef tapeworm), *Taenia solium* (pork tapeworm), and *Taenia asiatica* (Asian tapeworm). Out of the 32 recognized species of Taenia, only *Taenia solium* and *Taenia saginata* are of medical importance in Africa (Akira, et al.,2006]. Eating raw or undercooked infected beef or pork causes taeniasis by *T. saginata* and *T. solium* / *T. asiatica* respectively in man. Humans are the only definitive hosts for *T. saginata* and *T. solium*. Infections with *T. saginata* are common, specifically in Eastern Europe, Russia, eastern Africa and Latin America (Dorny & Praet, 2007). They are also common in places with poor environmental sanitation and high population of people, where cattle can be exposed to human feces. Cattle become infected through grazing contaminated pastures, or ingesting contaminated grasses or water when eggs are shed into the environment (Murrell,2005). Thereafter, oncospheres reach the general circulation after hatching and penetrating the intestinal wall of the cattle. They are distributed throughout the body where they develop into cysticerci (Murrell,2005). The heart

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and masseter muscles are the common predilection sites for *T. saginata* cysticerci (Scandrett et al, 2009). The infection is generally asymptomatic in cattle; however, it may cause great economic losses for the meat sector due to treatment cost upon detection of cysticerci during meat inspection or other related insurance costs (Loranjo, et al 2017., Jansen, et al 2018). *Taenia asiatica* is limited to Asia and is seen mostly in the Republic of China, Korea, Taiwan, Thailand and Indonesia (CDC,2013). It was discovered in 1993 and was known to be a special form of *T. saginata* (Bowles & Mcmanus,1994., Akira et al, 2006).

Infection with *T. solium* is also more dominant in under-developed communities with poor sanitation and where people eat raw or undercooked pork. Higher rates of infection have been reported in Latin America immigrants, Eastern Europe, sub-Saharan Africa, India, and Asia (CDC, 2013). *Taenia solium* causes cysticercosis in human. Cysticercosis can cause seizures and muscle or eye damage (CDC,2020., Rish & Mcmanua,1988). Furthermore, Cysticercosis has been classified as a Neglected Tropical Disease (Hotez & Peter, 2014) which commonly presents in the form of Neurocysticercosis, and mostly affects the poor and homeless. Neurocysticercosis (NCC) occurs when *Taenia solium* infection involves the Central Nervous system (CNS) which is one of the leading cause of deaths from food-borne illnesses (Murrell, 20053). Central Nervous system is usually affected in 60-90% cases of neurocysticercosis (Murrell, 2005). Neurocysticercosis has been estimated to cause 30% of all epilepsy cases in countries where the parasite is endemic (CDC,2013). Symptoms include severe headache, blindness, convulsions as well as epileptic seizures and can be fatal. In contrast to human cysticercosis caused by *T. solium*, taeniasis due to *T. saginata* or *T. asiatica* has no major impact on human health. *Taenia saginata* causes few symptoms in both intermediate and definitive hosts. Infection with *T. saginata* is usually characterized by anal pruritus due to the active migration of its proglottids in humans and some mild abdominal pain (Tembo & & Craig, 2015). *T. saginata* tapeworms are usually 4-12 m in length, but can grow up to 25m with the adult tapeworms producing 1,000 to 2,000 proglottids per worm and may produce up to 100,000 eggs per worm. Whereas *T. solium* tapeworms are smaller measuring between 2 - 8 m in length and producing an average of 1,000 proglottids per worm, and may produce up to 50,000 eggs per worm. Taenia asiatica tapeworms however, range in size from 4 - 8m, producing up to 700 proglottids per worm and may produce 80,000 eggs per proglottid (CDC,2020).

Although tapeworm infections have been reported since ancient times, however, differentiation of *Taenia saginata* from *T. solium* was established in 1782 (Abuladze,1970). Furthermore, in 1871 the role of cattle as intermediate hosts for the parasite was established (Abuladze,1970). Differentiating between *T. solium* and *T. saginata* infections is very important because the consequences of human infection by these two parasites are different. *Taenia saginata* rarely causes human Cysticercosis and has lower impact on human health than *T. solium*. It is important to note that the eggs of *Taenia saginata* and *T. solium* are indistinguishable hence it's difficult to differentiate them by parasitological examination only (Mayta et al,2000). The presence or absence of hooks in the scolex of the tapeworm and the number of uterine branches present in well-preserved gravid proglottids are the major factors for differentiating the two human *Taenia species*. *Taenia saginata* has 15-20 lateral uterine branches on each side of the uterine trunk, while *T. solium* has only 7-13 lateral uterine branches (Ridley,2012). Moreover, In contrast to *T. solium*, the gravid proglottids of *T. saginata*, which contain thousands of embryonated eggs, are mobile and can independently migrate from the anus during defecation (Dorny & Praet, 2007). Deoxyribonucleic acid (DNA) hybridization techniques have been used to differentiate between *T. solium* and *T. saginata* [Harrison et al, 1990., CDC,2013). This technique uses radioactive probes which are expensive and difficult to handle in developing countries. However, a simpler and easily performed diagnostic techniques can be used for the diagnosis of Taeniasis especially in developing countries. These techniques include using hematoxylin-eosin (HE) staining technique for histological sections of whole gravid proglottids and PCR in combination with restriction enzyme analysis (REA)(Mayta et al, 2000). This case report emphasizes the importance of creating awareness within communities on the transmissibility of this parasite through improperly cooked meat.

CASE PRESENTATION

A 29yrs old woman resident in Owerri, the capital city of Imo State Nigeria presented a history of migration of tapeworm segments from her anus and within the vaginal region for over 2yrs without proper diagnosis. She has been experiencing constant migration of a motile, opaque, segmented and whitish worm from her anus and vagina region without pressure. This infection started after the birth of her first child. She confessed to have taken many antibiotics but to no avail until she visited a health facility where she was directed by the physician to see a Parasitologist. Physical examination showed healthy and nourished woman with no weight loss, weighing 90kg. Moreover, there were no symptoms such as anaemia, nausea, chronic diarrhea, flatulence, constipation or hunger pain as a result of the infection. She however reported periodic irritation in the perianal region whenever the tapeworm segments were migrating from her anus, intermittent diarrhea and mild intermittent abdominal cramp mostly during her menstrual cycle.

Clinical Imaging and Case Reports (ISSN 2770-9205)

METHODOLOGY

Study area

This study was carried out at the Federal University Teaching Hospital Owerri, a tertiary medical facility in Imo state.

Sample collection

Four clean wide-mouth sample containers and a pair of forceps were given to the patient to collect stool samples, urine and the tape worm segments daily for five consecutive days. She was instructed on how to use the forceps to pick up the visible segments into two containers that contained 10% formalin and 10ml physiological saline respectively. The third and fourth containers were used for the collection of fresh voided stool and urine samples. A total of ten samples (stool and urine) were collected for five consecutive days from the patient. Parasitological and Histological procedures was carried out on the stool/urine samples and the tape worm segments respectively.

LABORATORY INVESTIGATIONS

Parasitological Procedures

The physical appearance of the stool samples was documented which includes: consistency (whether formed, semi-formed, watery or loose stool), presence or absence of blood, mucus, adult worm or tapeworm segments. The color and turbidity of the urine sample was noted including the presence or absence of the tape worm segments. Chemical analysis was carried out on the urine samples with Combi 9 test strip and the deposit was examined with x10 and x40 objective lens of microscope. The following parasitological procedures was carried out on the stool samples.

Direct Wet Mount

This method was used to detect the motile trophozoite stages of protozoa. A suspension of the faecal specimen (about 2mg) was made on a grease-free slide with a drop of physiological saline on one end of the slide and Lugol's iodine solution at the other end using an applicator stick. The suspension was covered with cover slip and examined with x10 and x40 objective lens of microscope to check for trophozoites and cystic stages of protozoa as well as ova and larva of helminthes.

Concentration Method

To ensure the recovery of all the parasites present in the faecal samples collected, concentration techniques using formol-ether sedimentation and zinc sulphate flotation methods was used in this study. These methods separate protozoan cysts and helminthes eggs from excess faecal debris through differences in their specific gravity (Cheesbrough,2009).

Formol-ether concentration Technique

About 1g of faeces was emulsified in 4ml of 10% formol water in a screw cap container. The emulsified faeces was sieved into a beaker to remove large faecal particles and later transferred to a centrifuge tube. About 3-4ml of ether was added to the sieved suspension and centrifuge for 5minutes. After centrifugation, ova, larva, cyst and oocyst were sedimented to the bottom of the tube and the faecal debris were separated in a layer between the ether and the formol water while the faecal fats were dissolved in the ether. A drop of the sediment was placed on a grease free slide, covered with a cover slip and examined with x10 and x40 objective lens of microscope.

Zinc Sulphate Floatation Technique

This technique allows the separation of protozoan cyst and certain helminthes eggs from excess debris through the use of high specific gravity of 1.180-1.200. About 1g of faeces (or 2ml of watery stool) was emulsified in zinc sulphate solution, strained to remove large faecal particles. The suspension was transferred to a test tube, filled to the brim with more solution of zinc sulphate. A grease-free cover glass was placed on top of the tube and left undisturbed in a vertical position in a rack for 30-45minutes for the cyst and eggs to float. Thereafter, the cover glass was placed on a grease free slide and examined with x10 and x40 objective lens of microscope.

Histological Procedures

The Taenia proglottids recovered from stool samples and anal region were repeatedly washed with distilled water, thereafter they were finally washed in 0.01 M Tris-HCl (pH 8.0) to remove all fecal material and debris (Garcia et al 1993). Part of the tape worm segments were stored at 4°C in 0.85% physiological saline while the remaining parts were fixed in 10% formalin for histological procedures. The portion of segments stored in physiological saline was centrifuged at 3,000 × g for 5 min. Eggs of the Taenia specie were isolated after a drop of the sediment was examined with x10 and x40 objective lens of microscope. The portion of whole gravid proglottids fixed in 10% formalin were washed thoroughly to remove excess formalin, embedded in paraffin, cut into longitudinal sections of 6µm and stained with hematoxylin & eosin stain, thereafter mounted. The uterine branches were examined and counted with x100 objective lens of a light microscope.

Data Analysis

The data obtained from this study was analyzed using Chi Square test of significant, simple percentage value to determine relationship between different variables.

Clinical Imaging and Case Reports (ISSN 2770-9205)

RESULTS

A total of ten samples (both stool and urine) were collected from the patient and examined using parasitological procedures. There were 5 samples each for urine and stool respectively. Cyst of *Entamoeba coli* was isolated in all the stool samples examined, whereas ova of Taenia specie was recovered only in 40% (2/3) of the stool samples (Table 1). Urinalysis showed a normal urine result with acidic reaction for all the urine samples analyzed. Taenia segments were not found in the urine samples.

From the histological procedures, the Proglottids were identified as *T. saginata* when there were 15-20 lateral uterine branches on each side of uterine trunk and as *T. solium* when there were only 7-13 lateral uterine branches [CDC,2020., Ridley,2012). In this study all the proglottids were identified as *Taenia saginata* specie (Table1& 2). The proglottids of *Taenia saginata* (eighteen in total) was recovered in 80% (4/5) of the stool samples analyzed (Table 1). Out of this number, 4(22.0%) were from stool sample, 11(61.1%) from anal region and 3(16.7%) from the vaginal region (Table 2). Thus, the highest number of proglottids (61.1%) was recovered from anal region followed by stool samples (22.0%) and vaginal region (16.7%).

Subsequently, a total of 14(77.8%,14/18) *Taenia saginata* proglottids were recovered from both anal and vaginal regions. Out of this number, 78.6% (11/14) were from anal region while 21.4% (3/14) were from vaginal region (Table 3). The scolex of the tape worm was not isolated in this study.

Table 1. Species and stages of Intestinal parasites isolated in the study pretreatment.

Days	Stool sample	Urine sample
1st	Cyst of Entamoeba coli/Ova of Taenia spp/Proglottids of Taenia saginata	Nil
2nd	Entamoeba coli/ Proglottids of Taenia saginata	Nil
3rd	Ova of Taenia spp/Proglottids of Taenia saginata	Nil
4th	Entamoeba coli cyst	Nil
5th	Proglottids of Taenia saginata	Nil

Table 2. Overall distribution of proglottids of Taenia saginata in relation to samples examined and collection sites.

samples	proglottids recovered(n=18)	% Prevalence
stool	04	22.2
Urine	00	0.0
Anal Region	11	61.1
Vaginal Region	03	16.7
TOTAL	18	100.0

n= Total no of proglottids recovered in the study.

Table 3. Proglottids of Taenia saginata recovered through the anal and vaginal region in relation to days Examined.

Days	Anal Region(n=11)	Vaginal Region(n=3)	Total(n=14)
Day 1	04(36.4%)	01(33.3%)	05(35.7%)
Day 2	01(9.1%)	00(0.0)	01(7.1%)
Day 3	03(27.3%)	00(0.0)	03(21.4%)
Day 4	01(9.1%)	02(66.7%)	03(21.4%)
Day 5	02(18.2)	00(0.0)	02(14.3%)
Total	11	03	14

N= no of proglottids collected for 5days.

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Figure 1

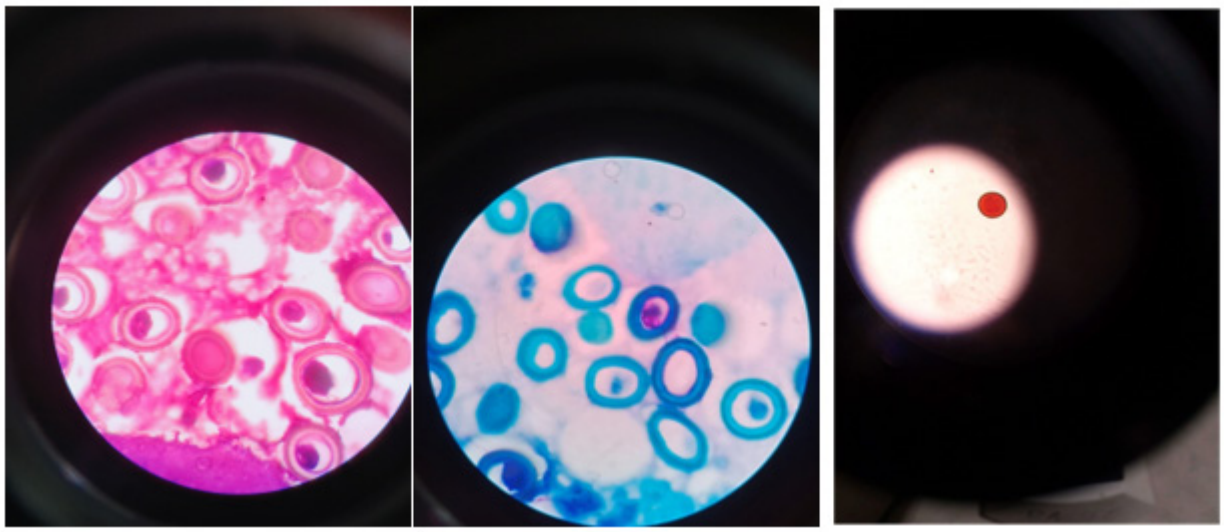

Plate 1 **Plate 2** **Plate 3**

Plate 1: Haematoxyline -Eosin stained Histological sections of gravid proglottid showing maturation of eggs.
Plate 2: Giemsa stained Histological sections of gravid proglottid showing developmental stages of the eggs.
Plate 3: Direct wet mount of centrifuged Taenia proglottids in physiological saline.

DISCUSSION

Taeniasis and cysticercosis in humans is grossly underreported in Nigeria. *Taenia solium* (pork tapeworm), *T. saginata* (beef tapeworm), Diphyllobothrium latum (fish or broad tapeworm), *Hymenolepis nana* (dwarf tapeworm), and *Echinococcus granulosus* and *E. multilocularis* (hydatid) are the most important cestodes of clinical interest that are pathogenic to man (Fan, 1997.,Ridley,2012). These parasites are mostly contracted through the diet by eating contaminated raw or undercooked meat, fish, or grains and from contact with animals and their excrement (CDC,2013). *Taenia solium*, *Taenia saginata* and *Taenia asiatica* are the three parasite species which causes taeniasis in humans.

Our patient presented with a significant history of passage of tapeworm segments in her stool, anal and vaginal region but was asymptomatic to *Taenia* infection, hence there was no report of anaemia, nausea, chronic diarrhea, flatulence, constipation or hunger pain as a result of the infection (CDC,2020). Physical examination showed healthy and nourished woman with no weight loss, weighing 90kg. Laboratory examination of stool samples showed eggs of Taenia specie and cyst of Entamoeba coli. Tapeworm segments recovered from stool, anal and vaginal region showed Proglottids of *Taenia saginata*.

This study is in conformity with the established fact that people with *Taenia saginata* infection typically have mild gastrointestinal symptoms unlike *T. solium* which has a major health effect on central nervous system causing neurocysticercosis, which can cause epilepsy and may likely lead to seizure (Flisse 1994., Garcia et al. 1993.)

In this study, the highest number of Taenia proglottids were recovered from anal region (61.1%) while the least were from vaginal region(16.7%). The Taenia proglottids recovered around the vaginal region might be as a result of few proglottids that might have descended down to the vaginal region after its discharged from the anus while the patient was asleep. This conforms with the established facts on biology of Taeniasis by CDC (2020) which revealed that gravid proglottids of *Taenia saginanta* contains thousands of embryonated eggs and can independently migrate from the anus and during defecation.

CONCLUSION

This case study has shown the existence and presence of Taeniasis in Imo state. Though infection with *T. saginata* is generally asymptomatic in man, it may not be same in cattle, where it may cause great economic losses for the meat sector as a result of treatment cost during meat inspection and other related insurance costs. Taeniasis and cysticercosis are common in places with poor environmental sanitation and high population. Our finding however is worrisome as this was not the environment of our case study. The findings from this study calls for concerted One Health action from public health, veterinary health

and food surveillance sectors to create awareness on this infection and possibly nib this in the bud before it becomes a menace.

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