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**Original Article**

**PREVALENCE OF HUMAN TAENIASIS AMONG SCHOOL CHILDREN IN SOME SELECTED PRIMARY SCHOOLS IN BOSSO LOCAL GOVERNMENT AREA, MINNA, NIGER STATE, NIGERIA**

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**ABSTRACT**

A survey of the prevalence of human Taeniasis was conducted between the months of March to July, 2013 among school children in Bosso Local Government Area, Minna, Niger State, Nigeria. Samples were randomly selected from the school pupils and analysed by Formol-ether sedimentation techniques. A total of 21(8.40%) of the samples were positive for *Taenia saginata* out of 250 samples collected. Infection was higher in males 13(10.40%) than females 8(6.40%). There was no significant difference ( $P > 0.05$ ) in the infection rate of Taeniasis based on sex. Children in age group, 10-14 years i.e. 13(10.40%) of the samples had a higher infection rate than those of 5-9 years old 8(6.40%). It was observed that poor sanitation, poverty, eating of raw or undercooked beef and presence of scavenging pigs or cattle were obvious predisposing factors to high prevalence of human Taeniasis in the area.

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**Keywords:** Taeniasis, Bosso, Formol-ether, Poor, Cattle.

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## INTRODUCTION

Taeniasis is a zoonotic infection with medical and veterinary importance; caused principally by the cestodes *Taenia saginata* and *Taenia solium*. The primary risk factor that sustains the transmission of the disease being unsanitary disposal of human faeces, and eating raw or insufficiently cooked beef or pork (Biu and Hena, 2008). Taeniasis and cysticercosis affect approximately 100 million people worldwide (WHO, 1993; FAO, 2005) and are now regarded as potential emerging or re-emerging zoonoses in several underdeveloped or developed communities.

*Taenia* spp. are long, segmented, parasitic tapeworms (Phylum: Platyhelminthes, Family: Taeniidae, Subclass: Cestoda). These parasites have an indirect life cycle, cycling between a definitive and an intermediate host. *Taenia solium* and *Taenia saginata* are zoonotic, with humans serving as the definitive host, intermediate host, or both. Adult *T. solium* are 2-7 m long and may live up to 25 years. As many as 25 tapeworms have been recovered from a single person. The eggs are generally shed within the proglottid, which remains in the fecal bolus and disintegrates in the environment. The eggs may be disseminated by rain or wind and can contaminate both vegetation and water. *T. solium* eggs can survive in the environment for a few weeks or months (Office of International Education, 2005; Waikagul *et al.*, 2006).

The contaminated beef contains cysticercoids in the striated muscle of cows and when ingested by human will develop into adult tapeworms. In the cow, the ingested embryo penetrates the

intestinal wall and is carried to striated muscle (Sarti *et al.*, 2000; Musa *et al.*, 2011).

Adult *T. saginata* may be 4-25 meters long, although most are 5 meters or less. They can live for 5 to 20 years or more. The gravid proglottids of *T. saginata* are usually more mobile than those of *T. solium*. They move away from the feces and adhere to grass. *T. saginata* eggs can survive for several weeks or months in water and on grass. In the highlands of Kenya, *T. saginata* eggs have been reported to survive for up to a year (OIE, 2005). The adult tapeworms live in the intestines of the definitive hosts. Humans are the definitive hosts for *Taenia solium* (the pork tapeworm) and *T. saginata* (the beef tapeworm) (Pawlowski, 2005; Pius *et al.*, 2009).

Cooking food habits and cultural aspects are responsible for the spread of *T. saginata*, *T. asiatica* and *T. solium* infections. Cultural traditions of consuming raw or inadequately cooked beef and pork dishes containing viable cysticerci perpetuate human infections. Humans may also be infected by ingestion of short stem vegetables or water contaminated with eggs (Schantz *et al.*, 1993; Schantz, 1998; Naquira, 1999). Carriers of *T. solium* tapeworm can spread the infection to others through handling and preparation of food (if their personal hygiene standards are poor), self-contamination by poor hygiene occurs commonly and the possibility of internal (reverse peristalsis) autoinfection has been reported (Biu and Hena, 2008; Biu *et al.*, 2011; Bashir *et al.*, 2012).

Indiscriminate defaecation by man has contributed greatly to the dissemination of bovine and porcine cysticercosis in

communities lacking basic sanitary or latrine conveniences or facilities. Cattle and pigs are infected by ingestion of pasture, feed and/or water contaminated with *Taenia* eggs. Husbandry practices that allow free access of animals to the contaminated environments (communal grazing in cattle and free ranging in pigs) perpetuate transmission of cysticercosis. Presence of human tapeworm carriers on the farm or in households keeping cattle or pigs is a risk factor for animal cysticercosis (Flisser *et al.*, 1994; Craig and Ito, 2007).

The metacestodes of *T. saginata* and *T. solium* frequently present economic problems to the beef and pork industry and are a public health hazard. Cysticercosis in domestic animals leads to the downgrading and condemnation of infected carcasses (WHO, 1993; Anantaphruti *et al.*, 2007). Taeniasis in humans gives rise to medical costs, wage losses and food production losses (Robert *et al.*, 1994; Azhar *et al.*, 2007).

The aim of this study was to determine the prevalence of human Taeniasis among primary school pupils in some selected primary schools in Bosso Local Government Area, Niger State, Nigeria.

## MATERIALS AND METHODS

### Study Area

This study was conducted among primary school children, namely Bosso Model and Zarumai Nursery and Primary schools in Bosso Local Government Area, Minna Niger state.

Minna lies between latitude 9° 30' and 9° 45' North and longitude 6° 25' to 6° 40' East, dispersed to both sides of the main road from Chanchaga in the South to

Maikunkele in the North a distance of about 20 kilometers.

Minna is the capital city of Niger State in North central in Nigeria. The area enjoys moist, dry equatorial and tropical climate with seven (7) months of rainfall (April to October) and five (5) months of dry season (October to March). The natural fresh water bodies include streams, ponds and dams.

Bosso is a local Government Area in Niger State, Nigeria. Its headquarters is in Maikunkele. It has an area of 1,592km<sup>2</sup> and a population of 147,359 as at the 2006 census (National Population Commission, 2006).

### Sample Collection

A total of two hundred and fifty (250) samples of stool were randomly collected from pupils of both sex whose age range from 5 to 15 years old. The samples were collected in well- labeled sterile universal bottles. The pupils were instructed to provide possibly "early morning stool" for retrieval the next day. It should be uncontaminated with urine. Each participant produced about 10-15gm of stool samples. The specimens were taken directly to the laboratory for examination. The specimens that could not be examined immediately were fixed in 10% formalin solution.

### Parasitological Examination

The parasitological examination of stool samples of the pupils was carried out using formol-ether concentration technique (Cheesbrough, 2009; CDC, 2011).

One gram of stool was emulsified in 7 millilitres of 10% formol saline and allowed to stand for 10 minutes for fixation. It was then strained through a

wire gauze. Three (3) millilitres of ether was added to the filtrate, mixed thoroughly and centrifuged at 2000 rpm for 2minutes. The supernatant was discarded and a drop of the well mixed sediment was examined under the microscope using x10 and x40 objective lenses (Oyerinde, 1999; Cheesbrough, 2005).

**Statistical Analysis**

The data generated were analysed for significant difference in rates of Taeniasis infection recorded between male and female subjects and also between the age groups using Chi-square test ( $\chi^2$ ).

**RESULTS**

The prevalence of human taeniasis in relation to sex of the primary school pupils in Bosso and Zarumai Schools as shown in Table 1, indicating that 21(8.40%) of the 250 stool samples examined in this study were positive for the parasite. Sex-wise infection rates were 13(10.40%) male and 8(6.40%) female. The infection was more prevalent in male than female. Analysis of the actual data, however, showed that there is no significant difference in the infection rate of human Taeniasis based on sex ( $p>0.05$ ).

Table 1: Prevalence of *T. saginata* in Bosso and Zarumai Primary Schools, Minna, in relation to sex of pupils

SCHOOLS	Male (n = 125) No. Infected (%)	Female (n = 125) No. Infected (%)	Aggregate (n = 250) No. Infected (%)
Bosso Primary School	5 (4.00)	4 (3.20)	9 (7.20)
Zarumai Model School	8 (6.40)	4 (3.20)	12 (9.60)
TOTAL	13 (10.40)	8 (6.40)	21 (8.40)

$\chi^2$  cal = 1.26,  $\chi^2$  tab = 3.841, df =2-1=1 ( $p>0.05$ )

Table 2 shows the prevalence of Human Taeniasis in the two selected Primary Schools in relation to pupils' age. The results showed that highest infection occurred in age group 10-14 years

13(10.15%), and is less among age group 5-9 years 8(6.55%). Statistical analysis indicate that there was no significant difference in the infection rate of human Taeniasis based on age as well ( $p>0.05$ ).

Table 2: Prevalence of *T. saginata* in Bosso and Zarumai primary Schools, Minna, in relation to age (years) of pupils.

SCHOOLS	5-9 (n = 125) No. Infected (%)	10 -14 (n = 125) No. Infected (%)	Aggregate (n = 250) No. Infected (%)
Bosso Primary School	3 (2.40)	6 (4.80)	9 (7.20)
Zarumai Model School	5 (4.00)	7 (5.60)	12 (9.60)
Total	8 (6.40)	13 (10.40)	21 (8.40)

$\chi^2$   
cal = 1.26,  $\chi^2$  tab = 3.841, df =2-1=1 ( $p>0.05$ )

## DISCUSSION

The results of this study indicate that pupils in the selected schools in Bosso Local Government Area of Niger state are infected with human taeniasis with prevalence rate of 21(8.40%). Prevalence in relation to sex shown that more males (8.84%) are infected than females (7.77%). This is similar to the result obtained by (Biu *et al.*, 2011) in Yobe state, Nigeria. In contrast, the result obtained by Usip *et al.* (2011), showed that taeniasis infection rate was higher among females than males. Generally, the high infection rates of taeniasis can be attributed to eating raw or insufficiently cooked beef or pork, especially as 'suya'(roasted meat delicacy), improper disposal of waste (including human faeces and other organic waste) and poor sanitary conditions (Onah and Chiejina, 1995; Pawlowski, 2002; Moses *et al.*, 2010). It may also be infected by ingestion of short stem vegetables or water contaminated with eggs of the parasite. Prevalence of human Taeniasis in relation to age show that children between the age group of 10-14 years had the higher infection (10.15%) than age group 5-9 years (6.55%) . this finding contradicts that of Biu and Hena (2008), who reported that more adults were infected with taeniasis compared to younger people or children. Human may acquire infection at any age from 2 years onward but it is more common in people less than 40 years of age compared to older people (Enekwechi and Azubike, 1994; Garcia *et al.*, 2003).

## CONCLUSION

The outcome of this study indicates that the prevalence of human Taeniasis among pupils of selected primary schools in Bosso Local Government Area of Niger state is relatively high but could be more threatening in the future if not tackled or checked on time.

Consequently, the laying emphasis on personal and community hygiene can be achieved through promoting health education in the selected Primary Schools. However, human Taeniasis is a serious public health problem worldwide. Therefore, the Bosso Local Government Area should improve on its socio-cultural and sanitary practices for the residents.

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