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Prevalence of Zoonotic Gastrointestinal Parasites in Cattle Slaughtered at Gwadabawa Abattoir of Sokoto State, Nigeria

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ABSTRACT

The current study was hatched out of the desire to strengthen the bond between veterinary and medical workers, a relationship adjudged to be non-existent or at best very weak. This study investigated the prevalence of zoonotic helminthes in cattle slaughtered at Gwadabawa abattoir of Sokoto State, Nigeria. About 5g of fecal samples were collected from 108 cattle and examined for presence of the parasites. Helminthes eggs and oocysts were detected using formal-ether concentration techniques. The results revealed an overall prevalence of 10.2% (11/108) for zoonotic parasites, from two genera Fasciola 7.4% (8/108) and Taenia 2.8% (3/108). Males had the higher prevalence 12% (6/50) of helminths infection than females 8.6% (5/58). Older cattle appeared to be more infected with 12.5% (5/48) of the infection compared to younger ones 8.3% (5/60). There were no significant ($p<0.05$) differences between infection and sex or ages of the cattle. Significantly ($P<0.05$), the prevalence based on breed showed that mixed breed cattle had the highest prevalence 17.1% (6/35) followed by Red Fulani 8.3% (4/48) and Sokoto Gudali 5.3% (1/19). Therefore, it is imperative to advocate for the provision of sanitary facilities at the abattoir, and among vendors; and the public should subject meat to proper preparation methods to minimize helminthes infections.

Keywords: Abattoir, Cattle, Helminths, Parasites, Zoonotic

INTRODUCTION

Cattle meat remain an important food that provides both micro- and macro-elements. Some of the meat components of importance include, water, protein, fat (saturated and unsaturated fatty acids), iron, zinc, selenium, vitamin D, vitamin B1, vitamin B2, vitamin B3, vitamin V5, vitamin B6, and vitamin B12 (Cabrera and Saadoun, 2014; Li, 2017). All of which serve valuable roles in the biological system for healthy life, and supplementation of nutritional deficiencies. It has a distinctive property function of producing nutritional compositions that are bio-available for healthy diet to all people across different age groups. More specifically, in the developing regions like Nigeria, the beef serves as part of the consumed balanced diet that promote food security, and cattle production is essential in sustaining the livelihood of the rural dwellers as well (Cabrera and Saadoun, 2014; Shehzad et al., 2014). Ideally, the beef meat is an important thing in health, and on the other hand can affect health due some issues, such as the presence of microorganisms that can affect human health negatively (Pighin et al., 2016). Additionally, cattle are important in producing hides, skins, manure, transportation, farming, medicine, and other socioeconomic activities benefitting the country and the entire region (Sarkingobir, 2021).

Zoonoses are infections involves in the transmission of the etiologic agent to humans from an ongoing reservoir in animals or arthropods, without the permanent establishment of a new life cycle in humans (Jones et al., 2008; Kubkomawa, 2017). Zoonotic gastrointestinal (GI) parasites are mainly protozoan and helminths. Helminths refer to a group of complex multicellular eukaryotic parasites which are infective to animals and humans (Karshima, et al., 2018). People with greater exposure to cattle and cattle products have increased risk of contracting bovine zoonotic infections. These group of people include livestock handlers, veterinarians, abattoir workers, meat inspectors, laboratory staff handling biological samples from infected cattle, and persons consuming unpasteurized milk or other dairy products and improperly prepared meats (McMichael et al., 2002). About 75% of the new diseases affecting humans over the past 10 years were attributed to pathogens from animal or their products (Coleman, 2002; Eversole, et al., 2009; Magaji et al., 2011; Lorossu et al., 2016).

A systematic review done by McDaniel, et al. (2015) identified forty-five bovine zoonotic pathogens, evenly dispersed around the world though majority (69%) have a worldwide distribution. Bacteria represent the largest taxonomic group (42%) of the pathogens, followed by parasitic pathogens (29%), viruses (22%), fungi (5%), and prions (2%). One of the major concern was that, some bovine zoonoses are among pathogens listed as emerging or re-emerging diseases of interest (EIDs), by National

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Institute of Allergy Infectious Diseases. National Institute of Allergy Infectious Diseases recognizes 25 (56%) of them as emerging or re-emerging diseases of interest (Lorossu et al., 2016). Therewith, 13 (52%) of them are bacteria, six (24%) are viruses, four (16%) are parasites, one (4%) is fungal, and one (4%) is a prion. These pathogens pose ongoing health problems and have the potential to create a significant impact on the overall health of the community. As they have the potential to be used as biological weapons based on their ability to create human disease and public fear (Markos and Abdurrahman, 2018; Muhammad et al., 2019). This research is carved out of a desire to gather more information on the occurrence of zoonotic infections in Sokoto state and Nigeria, a framework needed to cement the link between veterinary and medical workers. It was also with a view to help in protecting public health. This study investigated the prevalence of zoonotic helminthes in cattle slaughtered at Gwadabawa abattoir of Sokoto State, Nigeria

MATERIALS AND METHODS

Study Area

The study was conducted in Gwadabawa local government of Sokoto state, Nigeria. Gwadabawa is located between Kware, Illela, Tangaza, Gada, and Wurno local government areas, with a total land area of Gwadabawa is about 991kmsqm and a total population of 231,358 based on 2006 census report. The major inhabitants of the area are Hausa/Fulani, Muslims. The major occupations are farming, trading, and livestock keeping, whereas some residents are civil servants (Sarkingobir et al., 2019).

Age determination

Age of the cattle was determined using their dentition, as described by Pace and Wakeman, (2003) as follows:

Calf are born with or without teeth, usually at the end of first month after birth all eight temporary incisors appeared also called baby teeth.

Cattle of 1 year appears to have all four pair of teeth are temporary and firmly in place, the tooth appears short, broad, usually bright ivory color.

Cattle of 2 years were characterized by the appearance of first permanent incisors, both temporary incisors may or may not be present when the permanent appears.

By 3 years second pair of permanent incisors are positioned and began to wear.

Fourth pair erupted as the animal approach four years (corner incisors) and are in full wear seven months later or a year a latter.

It is difficult to estimate the age beyond 5 years, accuracy of this method is however challenged by what animals graze often on, for instance animal feeding under rough feeding conditions such as desert range land have their teeth worn at much faster rate than the one feeding on soft feed for their entire life. For this study cattle from 0 to 35 months were consider as young, while 36 months above as old.

Collection of Fecal Sample

About five grams (5g) of the fecal samples were obtained directly from the rectum of cattle with the aid of a spatula and transferred into a clean sample bottle, in accordance with the technique described by Cringoli, et al., (2010). The samples were taken to medical laboratory, School of Health Technology Gwadabawa for investigation. Each fecal sample was tested using formal ether concentration technique as suggested by Ballweber (2001).

Sample Preparation

Fecal samples were processed using formal ether concentration technique that require "about 5g of feces thoroughly mixed in 10ml of water and strained through two layers of gauze in a funnel, the filtrates are centrifuged at 2000 r.p.m. for two minutes, the supernatant were then discarded and the sediment suspended in 10ml of physiological or normal saline. Again, it was subjected to centrifugation and supernatant was discarded; then sediment was re-suspended in 7ml of formalin saline and allowed to stand for 10 minutes or longer for fixation. Then, 3ml of ether were added and shaken vigorously to form a mixture, then the stopper was removed and the tube was centrifuged at 2000 r.p.m. for two minutes; the tube was allowed to rest in a stand. Four layers become visible, the top layer consists of ether, the second was a plug of debris, third was a clear layer of formalin saline, and the fourth was a sediment. The plug of debris was then detached from the side of the tube with the aid of a glass rod, then liquid was poured off leaving a small amount of formalin saline for suspension of the sediment; which was poured on a clean glass slide covered with cover slip and then examined under a microscope (Cheesbrough, 2006).

Storage of Fecal sample

10% Formalin was adopted for this study as was an all-purpose fixative appropriate for used for preservation of protozoan cysts; therewith, it was also recommended for helminth egg and larvae. Most commercial manufacturers recommended utilization of 10% formalin, which is more likely to kill all helminth eggs to help maintain organism morphology. This solution could preserve cysts and eggs for some months (Ali, 2019).

Determination of Prevalence

Prevalence was calculated for all data as a number of infected individuals divided by number of individuals examined, and expressed in percentage as follows (Thrusfield, 2005):

$P = n/d \times 100$

Where:

p = prevalence,

d = number of individuals having diseases at a particular point in time,

Table 1: Prevalence of helminths zoonotic parasites in cattle examined based on some demographic characteristics.

Characteristic of cattle		Cattle examined (n = 108)	Cattle infected No. (%)	χ^2
Sex of cattle	Male	50	6(12)	0.339
	Femal	58	5(8.6))	
Age of cattle	Young	60	5(8.3)	0.250
	Old	48	6(12.5)	
Breed of cattle	Red Fulani	48	4(8.3)	
	Sokoto Gudali	19	1(5.3)	
	Mixed breed	35	6(17.1)	
	Muturu	6		

n = number of individuals in the population at risk at that point in time

Statistical analysis

The data obtained were subjected to descriptive statistical analysis using percentages (prevalence rates) in the different breed, sex, age and BCS of cattle. Prevalence of the parasite in relation to sex and age was analyzed using Chi-square statistical test, the level of significance was set at $P<0.05$.

RESULTS AND DISCUSSION

The results for this work are shown in Table 1, and Figure 1 of this section.

Prevalence of zoonotic helminths in relation to gender revealed that 6(12%) of males and 5(8.6%) of the females were infected (Table 1). Prevalence of helminths in relation to age revealed that old cattle had slightly higher prevalence of 6(12.5%) than young with 5(8.3%) (Table 1). However, there exist no significant differences in the distribution of the infection by sex or age of the cattle ($P<0.05$). In respect to cattle breed, mixed breed type has the higher infection rate 6(17.1%) than Red Fulani and Sokoto Gudali with 4(8.3%) and 1(5.3%) respectively.

The present study reveals that, male cattle were more infected with zoonotic gastrointestinal parasites (helminths) (Table 1), which is contrary to the findings of Singh and Bello, (2017) whom reported a prevalence of 65.0% for males and 76.0% for the females. Higher infection in males could be attributed to the aggressive nature of male animals (cattle) when feeding, which may introduce them to helminth eggs on the pasture, making them more susceptible to helminths. Furthermore, the growth and spread of parasites in male guts is more rapid than in females; an observation believed to be enhanced by factors such as hormones, and debilitating immune functions. These factors tend to make them more susceptible to infections with gastrointestinal tract parasites (Magaji et al., 2011; Abdullahi, 2019).

In this study, higher prevalence of helminth infections in adult compared to young cattle reported appears to be in opposition to what was documented by Muhammad et al., (2019) in Ilorin metropolis; and still goes contrary to the findings of Aliyu, et al. (2014) in Zaria, who documented the different finding revealing that, young cattle are more infected than adult ones. It also contradicts the notion that development of acquired immunity in the older animals may results in resistance, as opined by earlier investigators (Edosomwan and Shoyem, 2012). Higher infection in the older cattle could be due to the fact that older livestock may have been exposed more frequently to infective stages as they are mostly brought up through an extensive grazing practice of the nomadic cattle herders before the animal is sold and bought for slaughter (Sarkingobir, 2021). However, low prevalence of helminth parasites recorded in young cattle could possibly be because they are usually homestead thus, reducing the possibility of infection in the field (Dogo et al., 2017).

Meanwhile, the Sokoto Gudali, Red Fulani, and Mixed breed examined in this work are infected with the zoonotic helminths at different level of prevalence (Table 1). Whereas, this work found that, the Muturu breed was not infected by the zoonotic helminths. However, the prevalence of the found parasites in this work was far below 70.0% and 72,0% obtained for Red Bororo and Sokoto Gudali at Sokoto abattoir (Singh and Bello, 2017). The higher prevalence obtained for the local breed could be due to the fact that, cattle of this breed is the most predominant in the study area and very often, the extensive system of management under which they are reared, coupled with the dwindling grazing lands owing to increased food crops farming, compels them to graze in areas that could be heavily infested with the intermediate hosts, just as speculated by (Aliyu et al., 2014). The prevalence of helminth infections in relation to different cattle breeds is multifactorial: the frequency of and type of anthelmintic used, and the physiological and nutritional status of the cattle (Dogo et al., 217).

Nevertheless, in total, 108 fecal specimens were collected. Two zoonotic helminths eggs, Fasciola and Taenia were identified at prevalence rate of 10.2%, 7.4% for Fasciola and 2.8% for Taenia.

This study identified two genera of zoonotic parasites (helminths) capable of infecting humans at prevalence rate of 10.2% (Figure 1). Which appears slightly higher than 4.30% obtained from Phiri, et al. (2005) in Port Harcourt and much lower than the findings of Biu, et al. (2009) who reported an overall prevalence estimate of gastrointestinal parasites in the University of Maiduguri

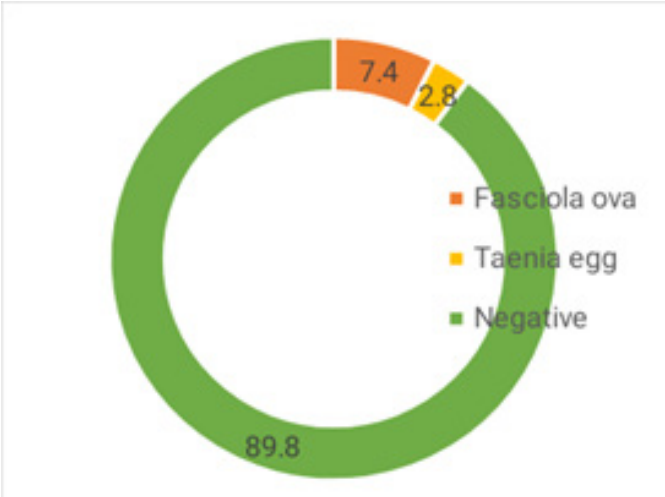

Figure 1: Occurrence of Zoonotics Parasites in cattle slaughtered at Gwadabawa Abattoir.

Research Farm at 51.3%. Our result was greatly lower than the 71.1% obtain from Singh and Bello, (2017) in cattle slaughtered at Sokoto abattoir, also dissimilar with reports from Ali, (2019) who reports 71% prevalence of F. hepatica and 18% T. saginata in cows in Mbale, Uganda. The abundant nature of these parasites could be irked by factors including grazing habits, nutritional status, husbandry, production systems, host immunological status and availability of intermediate hosts as well as the number of viable infective larvae and eggs in the environment (Karshima, et al. 2018). High immunity developed by cattle, good sanitation, and good grazing practice could yield low prevalence of zoonotic helminths (Yuguda et al., 2018).

From the health perspectives, the presence of Taenia and fasciola parasites in some samples analyzed is a public health concern, as these microbes can traverse to harm the humans by causing infection in consumers. Taenia causes a disease known as Taeniasis, an infection characterized with seizures (Gilman et al., 2012). It can traverse to reach the brain to instigate neurocysticercosis (the principal situation that can led to epilepsy), and people can feel economic burden due the disease. Thus, it is an issue to worry about (Mwangonde et al., 2014). Fasciola is among the microbes that are affecting humans, cattle, livestock and the likes. This parasite can be able to affect the liver and result in its damage entirely. Sometimes, the parasite can live in the lungs, wall of the intestine, kidney, subcutaneous tissue, and diaphragm, and lead to inflammation after tissue damages (Engdaw and Gebrie, 2015). Therefore, there is need for education and awareness among the public to elicit the public to take up healthy behaviors such as personal hygiene and environmental hygiene and chemotherapy (Engdaw and Gebrie, 2015).

CONCLUSION

Infectious diseases and malnutrition are some of the issues in Sokoto, Nigeria. Cattle is an important animal in the region that helps economically and provide food nutrients in Sokoto. However, zoonotic diseases are affecting both the cattle and human population in the state. Thus, this study objective was to determine the prevalence of zoonotic helminthes in cattle slaughtered at Gwadabawa abattoir of Sokoto State, Nigeria. Meanwhile, the prevalence of the two zoonotic helminths reported in this study are 7.4%, and 2.8% for Fasciola and Taenia respectively. This indicates a low prevalence, but considering the public health and economic importance of the parasites, measures shall be taken to bring the prevalence to a down level. Sanitary facilities are needed in the abattoir and at meat vendors' places to avoid fecal-meat contact. Other methods are needed to scuttle the chain of transmission of infections through the meat cattle.

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