

Prevalence of *Cysticercus bovis* in Cattle at Municipal Abattoir of Shire

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Abstract

Cross sectional study using random sampling to determine the prevalence of *Cysticercus bovis* from May to June 2014 on a total of 439 cattle slaughtered at Shire municipal abattoir was conducted. The overall prevalence of the parasite was 5.2%. The distribution of the parasite in adult cattle was (3.8%) where as in old cattle it was 1.8%. The rate of the parasite in old and adult cattle didn't vary significantly ($p>0.05$). The rate of the parasite in male and female was 4.6% and 0.79% respectively where there is no sex wise significant variation ($p>0.05$). At the same time, there is significance variation of the parasites in different organs with highest rate of the parasite in liver (4.3%) ($p<0.05$). This indicates the presence of the parasites in the study area so that great attention toward meat inspection, good animal health management and deworming of animals to reduce the burden of the parasite in the study area should be in place.

Keywords: Abattoir; Cattle; *Cysticercus bovis*; Prevalence; Shire

Introduction

Animal disease is one of the most important in sub-saharan Africa. Among the many prevalence livestock disease, parasitism represents a major drawback to development in the tropics for that matter it is high in Ethiopia. nevertheless, proper evaluation of public health importance due to various individual parasitic disease and adequate knowledge of epidemiology of parasites is lacking which otherwise is of great relevance, where the distribution of the disease determines the type and scope of control measurement to be applied [1].

T. saginata is a worldwide zoonotic cestode whose epidemiology is ethnically and culturally determined with estimates of approximately 50 million case of infestation worldwide with 50,000 people dying from this annually. In the tropics the consumption of uncooked or raw meat is common; as a result the tape worm problem is more serious. The occurrence of the larvae (*Cysticercus bovis*) in cattle musculature cause bovine cysticercosis while the adult worm in human small intestine causes taeniasis [2].

Bovine cysticercosis (Taeniasis) refers to the infection of cattle with metacestodes of human tape worm. Globally, there were 77 million human carriers of which 40% live in Africa. In developed countries even if the disease has very low prevalence, the problem with the removal and treatment facilities in their sewage system plays a great role in the distribution of eggs can survive longer in sewages [3,4].

The main intermediate hosts for *Taeniasaginata* are domestic cattle while man is the only definitive host. Man acquires infection by eating infested beef containing viable cysticercoids then s/he, in turn, excretes eggs which are picked up by cattle. However, in cattle heavy infestation by the larvae may cause myocarditis or heart failure [5]. Its significance impact in meat trade is increasingly becoming important in view of drastic measures and very strict regulation of importing countries [6]. Losses of meat due to bovine cysticercosis are occasioned by the total condemnation of carcasses with generalized infestation and partial condemnation of carcasses with localized infestation [3].

The epidemiological distribution of bovine cysticercosis is worldwide. The incidence of the disease in developing countries is higher than that of developed countries. This is because cattle reared on the extensive scale as well as human sanitation is poorly developed and cooking fuel is expensive. In this case based on routine carcass inspection [3]. Diagnosis of bovine cysticercosis is usually made only

at post mortem examination by direct observation of the cyst so meat inspection is the main public health measure for the prevention of *Taenia saginata* transmission [3].

Health problem caused by adult worms in humans gives rise to high medical cost, the economic losses occurring from the condemned and downgraded carcasses due to treatment of carcass before human consumption is substantial. In the study area there were report of the disease from different sectors but there were limited information with regard to the rate of the infection. Hence this research paper was designed with the objective of determining the prevalence of the parasite in Shire municipal abattoir

Methods and Materials

Study area

The study was conducted from May 2014 to June, 2014 in Shire, North West Zone, at shire municipal abattoir in Tigray regional state located in the northern Ethiopia. Shire is 1087 km far away from Addis Ababa with an altitude of 1600-2200 above sea levels, the rain fall gets in summer season 700-1135 mm (877.6 mm), the temperature ranges 18-34.6°C. Livestock population of the woreda has a total head of 116092 of cattle, 42567 sheep, 10577 of goats, 8799 of donkeys and horse, 95 of mules, 428 of camel, 14832 of chickens and 9714 honey bee colonies. The area was covered by different trees, shrubs, herbs, and grasses.

Study animal

The study animal comprised indigenous cattle originated from different sites of the surrounding areas and slaughtered at Shire municipal abattoir.

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Methods of examination

The animal were examined before slaughter/anti-mortem inspection) and after slaughter (Post-mortem inspection) was carried out on the different predilection sites of the parasite.

Ante-mortem inspection

Anti-mortem inspection of the animal was done day before slaughter to assess body condition, disease condition and place of origin of the animals. The main categorization were divided in to two categories based on their age (2-5 years as adult and >5 years as old).

Post-mortem inspection

During post mortem inspection, examination was made by making an incision on different muscles and organs to assess the presence of *Cysticercus bovis*. The various sites examined were liver, heart, tongue, masseter muscle, triceps muscle and diaphragmatic muscle

Sample size

Since there is no study conducted previously about the prevalence and economic importance in shire abattoir the expected prevalence of 50% was used to calculate the sample size of absolute precision of 5% and level of confidence of 95% was used according to the formula given by Thrusfield [7].

$$N = \frac{1.96^2 \text{ Pexp} (1-\text{Pexp})}{d^2}$$

Where N = required sample size

Pexp =expected prevalence

d = desired absolute precision

based on the formula 384 cattle were selected for this study but to increase the precision of the result a total of 439 cattle's were examined during the study period

Data management and analysis

Micro soft excel was used for data entry and SPSS statistical software version 16 for data analysis using descriptive statistics was used. The effects of different epidemiological risk factors such as age and origin on the prevalence of cysticercosis were tested using chi-square (χ^2) and value less than 0.05 was considered as significant.

Results

Out of the totally examined animal (439) during the study period, an overall prevalence of 5.2 % was obtained. The overall prevalence of the parasite was (3.4 %) in adult animals and (1.8%) in old animals but there was no statistical variation among age groups and the prevalence ($P>0.05$) as indicated in Table 1. The overall prevalence in male animals was (4.6%) whereas the prevalence in female cattle was 0.79%. but there is no significant difference between male and female ($p>0.05$) (Table 2).

The rate of the parasites in different organs indicated that it was 4.3%, 0.5% in liver, heart and tongue but in the rest of the organs it was 0% . There is significance difference in the distribution of the parasite in the different organs ($p<0.05$) as indicated in Table 3.

Age	Number of animal examined	No of positive	X ²	p-value
Adult	314	15(3.4%)	0.474	0.497
Old	125	8(1.8%)		
Total	439	23(5.2%)		

Table 1: Prevalence of *Cysticercus bovis* by age.

Sex	Number of animal examined	No of positive	X ²	p-value
Male	389	20(4.6%)	0.066	0.798
Female	50	3(0.79%)		
Total	439	23(5.2%)		

Table 2: Prevalence of *Cysticercus bovis* in male and female.

Organs affected	Number positive	X ²	p-value
Liver	19(4.3%)	4.390	0.000
Heart	2(0.5%)		
Tonque	2(0.5%)		
Masseter muscle	0(0%)		
Triceps muscle	0(0%)		
Diaphragmatic muscle	0(0%)		

Table 3: Distribution of *Cysticercosis* in different organs.

Discussion

In the current study it was found that the overall prevalence of the parasite was 5.2% .The distribution of the parasite in adult animals were higher (3.8%) compared to that of old animals having the rate of 1.8%. But there is no statistical significance difference between these two age groups ($p>0.05$). The current overall prevalence of the parasite was high compared to the finding of Onyango et al. [8] who stated that the prevalence rate of cysticercosis is generally low in developed countries, being less than 1% of the carcasses inspected. However it is lower compared to the finding of Maxwell et al. [9] who reported prevalence of 30%. On the other hand the current finding is higher compared to the result of Tembo [10] who reported prevalence of 3.11% in central high land of Akaki, Bishoftu and Adama. Moreover the present finding is lowe compared to the prevalence of 9.7% in gondar reported by Demissie [11]. But it is higher compared to the report of Shimelis [12] who indicated prevalence of 4.9%. Similarly, the present result was also lower compared to the study conducted by Degefu [13] in Mojo, ELFORA, Dukem and Luna with the rates of 17.9%, 13.6%,19.2% and 27 .6% respectively. The higher differences in the total prevalence recorded with the current study might be due to the differences on agro-climatic conditions, number of animal sampled and their origins of animals

Similarly, the rate of the parasite in male was higher compared to that of female having the rate of 4.6% and 0.79% respectively. The rate of the parasites in male and female didn't vary significantly ($p>0.05$)

At the same time there is significance variation of the parasites in different organs with highest rate of the parasite in liver (4.3%) compared to the rest of the organs having very low distribution ($p<0.05$). Demissie [11] stated that the parasites are most commonly found in muscles of mastication, particularly masseter muscle,shoulder muscles, heart,tongue, diaphragm and occasionally in fat, liver,lung and lymph nodes. Different authors also indicated that there is no specific predilection site for the parasite. The reason of reporting high percentage of liver positively for *cysticercus bovis* in the study abattoir might be due to the limitation of meat inspection facilities. In shire abattoir the organs and muscles incised for searching cysts are the liver,tongue and heart and masseter muscle.the other organs and muscles such as ,triceps muscle and diaphragmatic muscle are rarely incised or inspected due to customers complain in the area.

Conclusion and Recommendations

In the current finding indicate the presence of the parasite in the study area which needs high attention by the veterinarians of the study

area. At the same time there was variation of the prevalence of the disease in male and female cattle as well as in the adult and old animals which were slaughtered in the municipal abattoir. Similarly, the rate of the disease in different organs also vary from one organ in another organs with high rate of the parasite in liver

Based on the above findings the following points are recommended:

- Back yard slaughtering of cattle should be avoided.
- Construction of slaughter house which fulfills the necessary facilities and hiring of well qualified meat inspectors is highly paramount.
- Awareness creation to the community regarding the risk of consuming raw meat should be conducted.
- The existing meat inspection activity should be improved.
- Proper deworming of cattle is essential.
- Further research on the economic importance of the parasite should be conducted.

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