Research Article

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Prevalence of *Cysticercus bovis* in cattle in case of Wolaita Sodo municipal Abattoir, Southern Ethiopia

Dr. Gizaw Mekonenn Meku
Department of Veterinary Gyneacology and Obstetrics, Wolaita Sodo University, Ethiopia
Email: *doctorgizaw@gmail.com*
Dr. Timotiwos Wogaso Tonga
Department of Veterinary Medicine, Wolaita Sodo University, Ethiopia
Email: *lewikeb@gmail.com*

Abstract

Bovine cysticercosis is infection of cattle by cestode called as *Taenia saginata*. A cross-sectional study was conducted at Wolaita Sodo municipal abbatoir, Southern Ethiopiato determine the prevalence of cysticercus bovis in cattle from May, 2021 to August, 2021.The kidney, diaphragm, tongue, masseter muscle, intercostal muscle, thigh muscle and heart of each animal were examined for the presence of *Cysticercus bovis* after slaughtering of presented cattle. Among total examined cattle (384), overall prevalence of *C. bovis* was 3.13%.Among 166 adult slaughtered cattle and 218 old age cattle,3.61%and2.57%respectively were positive for *C. bovis*. Among considered risk factors, sex,age and origin of animals were statistically insignificant with the prevalence of *C. bovis* infection. However, body condition and organs at which the cyst was statistically significant difference in prevalence of *C. bovis* in study area. Tongue, masseter, liver andtriceps muscle of cattle are the most frequently found organ with 41.67**%**, 25**%**, 25**%** and 8.33**%** respectively. The infection is a problem common in area where beefsteak is consumed in developed countries and wider in developing countries where poor sanitation system and where the inhabitants traditionally eat raw or insufficiently cooked meat. It is most common cause economic loss in the beef meat industry due to the condemnation of infected meat. So I recommended that Good animal husbandry practices such as good sanitation as well as proper meat inspection and consumption of well cook cattle meat should be implemented so as to curtail the menace *Cysticercusis bovis*.

Keywords: *Bovine cysticercosis, Prevalence, Taenia saginata, Wolaita Sodo municipal abbatoir,*

1. Introduction

According to central statistical Agency in 2015, Ethiopia has largest in livestock population in Africa with an estimated 56,706,389 cattle, about 29,332,382 sheep and 29,112,963 goats (CSA, 2015). However, national income and livestock population were not comparable due to different factors in Ethiopia. Therefore, livestock productivity is coming down due to major constraints such as diseases, low genetic potential of indigenous cattle and poor reproductive performance, scarcity of nutrition, and lack of good husbandry practices (Negassa *et al*., 2011).

From several constraints, diseases are major concern. Among highly prevalent diseases, bovine cysticercosis is most common that economic losses, and public health problems (Tariku and Beredo, 2019). It is a muscular infection of cattle caused by the larvae of the human intestinal cestode (Soulsby, 2009).

T. saginata has two stages of development, intermediate host and final host in cattle and human respectively. Larval stage of this parasite occurs in heart and skeletal muscles of intermediate host and adult worm locates in intestine of final host. Visual inspection of carcass and other organs is the primary detection method of bovine cysticercosis because commonly found area of carcass that is, the external and internal masseter pterygoid muscles, heart, tongue, diaphragm, and esophagus (Ogunremi *et al.,* 2004).

Taenia saginata known as beef tapeworm. It is characterized by clinical manifestation such as anorexia, loss of weight, abdominal pain and digestive upset(Basem *et al.,* 2009).Although it has no clinical features in bovine, severe case may cause myocarditis (Hashemnia *et al.,* 2015). Regarding to public health concern, this parasite is manifested by clinical features such as nausea, headache, increased appetite, weight loss, abdominal pain, intestinal obstruction, nervous syndromes and epilepsy in human(Cabaret *et al*., 2002).

Bovine cysticercosis can be occurs after intaking of contaminated feed and water containing the eggs expelled by the human faeces. Infected raw undercooked beef meat can be source of infection in humans (Hashemnia *et al.,* 2015). This infection is common in developing countries due to poor hygienic practices and consume raw meat. However, it is rare occurs in developed countries where eating of undercooked meat is common (Minozzo *et al.,* 2002).

Taenia saginata is global distributed in both developed and developing countries. However, it is high reported incidence cases inAfrica when compared with other parts of the world (Abunna *et al*., 2007).This parasite epidemiology is ethnically and culturally determined with estimation annually cases and mortality rate around 50-77 million and 50, 000 people respectively (Birhanu *et al*., 2018).

As reported in Ethiopia from several authors, prevalence was 2.5 % to 89.41 % and 3.11 % to 27.6 %, in humans and cattle, respectively (Abunna *et al*., 2008). According to reported from Fufa (2006), The favored condition to spreading is the cultural habit of eating raw meat in the form of "Kourt"-meat cubes and "Kitfo"-minced meat in Ethiopia.

It causes dramatically economic loss beef meat industry due to the organ condemnation (Kebede, 2008). Generally, insufficient health education and low availability information of taenicides are the major hindrances for the control infections in study area. It is also a major public and animal health problem. Therefore, the objective of this study was to determine the prevalence of *Cysticercus bovis* in cattle slaughtered at Wolaita Sodo municipal abattoir.

2. Materials and Methods

2.1 Study area

The study was conducted in Wolaita Sodo municipial abbatoir. Wolaita Sodo town is located 329 km southwest of Addis Ababa at latitude of 8°50" N and longitude of 37°45" E. The average total annual rainfall is 1014mm, and the mean daily temperature is 19.5^{0}C(WZLFR Bureau, 2016).

2.2. Study Design

A cross-sectional study was conducted in Wolaita Sodo municipal abbatoir, Southern Ethiopia from May 2021 to July 2021 to determine the prevalence of *Cysticercus bovis*. Age, sex, origin, and body condition of the animals were recorded during pre slaughter.

2.3.   Study population

Cattle were presented to the abattoir in order to slaughtering and routine meat inspection conditions. Cattle were randomly selected and routinely inspected for cysticercosis. The study animals were came from different town and district of Wolaita Zone. They were transported to the abattoir using vehicles or on foot depending on the origin animals. After animals were archived to abattoir, ante mortem and post mortem examinations were carried out for every animal.

2.4. Abattoir survey

Active abattoir survey was carried out when routine meat inspection on randomly selected 384cattle. During pre sluaghtering, identification number, sex, age and origin of animals were recorded. The assessment of body condition, age, sex, breed and their place of origin was determined in antemortem examination .Then, post-mortem examination was conducted using standard procedures after animals became sluaghter. During Post mortem inspection, visceral organs and carcass was inspected by visualization; palpation and making systematic incisions where necessary for the presence of cysts and the result was recorded.

2.5. Sampling method and Sample size determination

Systematic random sampling was used in sampling methods and 95% interval with required 5% precision, the sample size was calculated by the formula (Thrusfield, 2007).

$$n = \frac{(1.96)^2 \times Pexp(1-Pexp)}{d^2}$$

$$n = \frac{(1.96)^2 \times 0.0259\,(1-0.0259)}{(0.05)^2} = 39$$

Where, n- Required sample size, Pexp - Expected prevalence, d- Desired absolute precision, usually d is 0.05 at 95% confidence level and 5% expected error.

Hence, the sample size was calculated to be 39. However, sample size was increased to 384 in order to increase the precision of study.

2.6. Data Management and Analysis

The collected data was entered in to micro soft excel and were analyzed using STAT. Descriptive statics was used. Assessment of association between considered risk factors and prevalence of *Cysticercus* *bovis* was determined by Pearson Chi-square (X2) and p-value < 0.05 was considered as significant.

3. Results

Among 384 animals examined, 12 animals had *Cysticercus bovis*. This is indicated that prevalence of *Cysticercus bovis* was 3.13%. Out of 384 cattle inspected, 3.13% of male and 0% of female were positive for *C. bovis*. Among 166 adult and 218 old aged cattle were slaughtered atabattoir, 6(3.61%) and 6(2.75%) were positive for *C. bovis* respectively. In current study, There was statistically insignificant (p>0.05) between sex and age of animals with the prevalence of *C. bovis* infection. The present study result showed from animal inspected with body condition good, medium and obese were prevalence of 2.68%,0% and 50%respectively. There was statistical significant difference (p<0.05) between body condition of animals and *C. bovis*. The tongue with 5(41.67%) cyst take first rank the highest number of cysts followed by masseter muscle 3 (25%), liver 3 (25%) and triceps muscle 1(8.33%).The abattoir survey analysis clearly indicated that there was a significant variation with regard to the anatomical distribution of *C. bovis* in the inspected organs of slaughtered animals. Regarding to the origin of animals, statistical association exists between origin of animals and prevalence of *C. bovis*.

Table 1. Association between suspected *Cysticercus bovis* infection and sex, age and body condition of cattle in inspected animals.

Variable	Groups	No of animals Examined	Negative	Positive	Prevalence (%)	Chi square	P-value
Sex	Male	380	368	12	3.16		
	female	4	4	0	0.00	0.1304	0.718
Age	Adult	166	160	6	3.61		
	Old	218	212	6	2.75	0.2314	0.630
Body condition	Good	373	363	10	2.68	29.5010	0.000
	Medium	7	7	0	0.00		
	Obese	4	2	2	50.0		

Table 2. Prevalence of *C.bovis* based on origin of animals

Origin	Number of animal inspected	Negative	Positive	Prevalence (%)	X^2	P- value
Adama	23	22	1	4.35	7.3338	0.602
Arbaminch	33	33	0	0.00		
Areka	37	36	1	2.70		
Badesa	39	36	3	7.69		
Boditi	47	46	1	2.13		
Gununo	33	31	2	6.06		
Humbo	52	52	0	0.00		
Oofa	53	52	1	1.89		
Selamber	23	22	1	4.35		
Sodo zuriya	44	42	2	4.55		
Total	384	372	12	3.13		

Table 3.Prevalence of *Cysticercus bovis* among inspected organs.

Variable	Group	Positive	Prevalence (%)	Chi square	p-value
Organs	Liver	3	25	93.7323	
	Masseter muscle	3	25	93.7323	0.000
	Triceps muscle	1	8.33	31.0809	
	Tongue	5	41.67	157.0449	
Total		12	3.13		

4. Discussion

Cysticercosis occurs in poor sanitation, primitive livestock husbandry practice and inadequate meat inspection and control environment. Bovine cysticercosis usually does not cause much morbidity and mortality among cattle. However, it causes serious economic problems in the endemic areas due to the condemnation of meat (Wanzala *et al*., 2003). The current study showed that prevalence of *C. bovis* was 3.13%. The current study is coincided with the finding of Dawit *et al*., (2012) and Tembo (2001) who reported 2.59%in Wolaita Soddo and who reported 3.11% in central Ethiopia respectively. In addition to that present finding is agreed with finding of Nuraddis and Firew (2012), Dessie (1992), Tolosa *et al*.and Gomol *et al*., (2011)who reported 3.6% in Addis Ababa Municipal Abattoir, in Assela (2.7%), in Jimma municipal abattoir with prevalence of 2.93 % and 3.6%, respectively. However, the current finding disagreed with the finding of Regese *et al* (2009), Ahmed (1990), Abunna *et al*., (2008), Kebede (2009),

Hailu (2005) who reported in wolaita sodo manucipal abattoir (11%), in Nekemte (21%), in Hawassa abattoir (26.25%), in North West Ethiopia(18.49%), in East Shoa (17.5%) respectively. In addition to that, it is disagreed with Mesfin and Nuradddis (2012)in Hawassa municipalabattoir(22.9%)and Hailemaria*et al*., (2014) in Ethiopia (92.7%). This differs between present study prevalence and prevalence at past study due to differs on agro-climatic conditions of different area, sample size determination, differs in management and origin of animals.

Although, this finding indicated that prevalence of prevalence of *C. bovis*is higher in malethan female, there was statistically insignificant among sex of animals. The current study is lined with finding of Samuel and Berihun (2014) who reported that higher prevalent in male than in female due to females are kept in the herd for breeding, milk production and thus rarely being sent to slaughter.

The present study finding was comparable with reports of Kebede *et al.,* (2008), Gomol *et al*., (2011), Mesfin and Nuraddis (2012), Nuraddis and Firew (2012) showed that there was statistical insignificant among sex of animals with prevalence of *C. bovis*(p>0.05)and who reported that higher prevalent in male than in female. This finding was incomparable with (Wanzala, 2003) who reported that the prevalence of *C. bovis* was slightly higher in female than male cattle. The present study revealed there was statistical insignificant among sex of animals with prevalence of *C. bovis* might be due to the fact that similarity in management and the socio-economic status (Abunna *et al*.,2008).

The current study revealed that there was no statistically significant between *C. bovis* infection and age of animals (p>0.05). This result is lined with reported from Ibrahim and Zerihun (2012) in Ethiopia due to all age group of animals has susceptibility to *Taenia saginata* eggs. However, present study finding is disagreed with the finding of Basem *et al*., (2009) in Ethiopia, and the report of Wondimagegnei and Belete (2015) showed that there was statistically significant among age of animals due to their different in rank of immunity among age of animals to combat infection.

The present study suggested that there was statistically significant among anatomical distribution of *C. bovis* in the inspected organs of slaughtered animals.Thecurrent finding suggested that the tongue5(41.6%) had found highest number of cysts than that found in masseter muscle 3 (25%), liver 3 (25%) and triceps muscle 1(8.33%).This result is agreed with Ahmed (1990),Hailu (2005), Amsalu (1989), Abunna *et al*., (2007) and Mesfin and Nuradddis(2012) who reported thattongue was the most frequently affected organ. The present study is disagreed with the study of Demissie (1989) who reported as *Cysticercus bovis* was most frequently found in muscles of mastication. The finding of the current study is incomparable with the reported from Bekele *et al*., (2017), Opara *et al*., (2012), Alemayehu *et al*., (2009) and Hailu (2010) who reported that examination of the shoulder muscles was most frequently site of detection. The present finding was in disagreementwith reported from Fufa (2006), the report of Gracey (1999), Getachew (2013), Tolosa *et al.,*(2009), Gomol *et al*., (2011), Jemal and Haileleul (2011) and Nuraddis and Frew (2011) indicated that the tricepsbeing the most frequently affected muscle. In addition to that, this finding is disagreed with reported from Haylegebriel and Alembrhan (2011)that

heart as being frequently affected. The statistically significant among anatomical distribution of *C. bovis* in the inspected organs of slaughtered animals might be due to differ in rate of blood flow within organs and daily activity of animals (Wanzala., 2003).

The present study revealed that there was statistically significant among body condition of animals with prevalence of *C. bovis* infestation. The current result revealed that obse conditioned animals, good body conditioned and medium body condition were 50%, 2.5% and 0% respectively. Therefore, obse conditioned animals was highly affected than that of good body conditioned and medium conditioned animals. In current study, medium conditioned animals were not affected. This result was lined with the reported of Yalew (2017) showed there had statistically significant among body condition of the animals with prevalence of *cysticercus bovis*. However, reported of yalew showed that poor body conditioned animals had higher prevalent than obse and good body conditioned animals. The present finding is incomparable with the report of Melaku *et al*., (2012) showed that poor conditioned cattle were more infected than a medium and good onethis might be due to moderate to severe infection, the parasite may cause retarded performance and growth, reduced quality of meat and milk as well as live weight loss.
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5. Conclusion

Bovine Cysticercosis is an infestation of cattle muscle tissue which caused by larval stage of *Taenia saginata.* It has global concern. However, it is very common in developing country where hygienic conditions are poor and where the inhabitants traditionally eat raw or insufficiently cooked meat. The infection is a problem in developed countries where undercooked meat is consumed. Although, environmental experts and communities applies efforts to improve sanitation and hygiene in rural setting and farming communities, cases of *Cysticercosis bovis* are prevalent. From the present study, we concluded that bovine cysticercosis was slightly prevalent in Wolaita Sodo municipal abattoir and its percent prevalence was lined with study from other parts of Ethiopia. Among risk factors, body condition had statistically significant with prevalence of *Cysticercosis bovis.*

Thus, we were stated recommendations based on conclusion:

➢ The routine meat inspection procedure should be applied.
➢ Good management system should be provided for animals.
➢ The proper attention of inspection in case of obse body conditioned animals.
➢ The good aware of society regarding with avoid the consumption of raw or partially cook cattle meat.

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