International Journal of Advanced Research in Biological Sciences
ISSN: 2348-8069
www.ijarbs.com
DOI: 10.22192/ijarbs Coden: IJARQG (USA) Volume 8, Issue 12 -2021

Research Article

DOI: http://dx.doi.org/10.22192/ijarbs.2021.08.12.007

Study on prevalence and public health importance of Bovine Cysticercosis

Tsegaye Mitiku Haile*
*Faculty of veterinary medicine, University of Gondar, P.O.Box:196, Gondar, Ethiopia
E-mail: *tsegayemitiku52@gmail.com*

Abstract

A cross-sectional study was conducted on bovine from October 2014 to April 2015 on bovine cysticercosis at Debretabor municipal abattoir with the main objectives of determining the prevalence of bovine cysticercosis in animals, cyst viability, cyst distribution in different body tissues and organs, and prevalence of taeniasis in human. Active abattoir survey and questionnaire survey were conducted to know the prevalence of cysticercosis and public health significance of taeniasis, respectively. Of the total of 408 inspected animals in Debretabor municipal abattoir, 46 animals had varying number of *C. bovis* giving an overall prevalence of 11.3% (46/408). Anatomical distribution of *cysticercus bovis* cysts showed the highest proportions of cyst were observed in the cardiac muscle 35 (30.7%), followed by tongue 27(23.7%), masseter muscle 20(17.5%), triceps muscle 18(15.8%), shoulder muscle 14(12.3%), liver 3(2.6%), and spleen 2(1.7%), respectively. A total of 114 cysts were collected during the inspection period among these, 37.7% of them were live cysts whereas 62.3% of them are degenerative cysts. There is no statistical significance difference (P>0.05) in the prevalence of bovine cysticercosis with sex, breed, and body condition of the animals in the study area. Of the total of 60 respondents, 30% (18/60) had contracted *T. saginata* infection. The majority of the respondent (13) contracting the disease had experience of raw meat consumption as a result of traditional and cultural practice. Analysis of the risk factors showed no significance difference (P>0.05) in the prevalence of taeniasis with different educational level and occupation. But, the analysis showed there is significant variation between the type of feed consumed (raw meat), sex, age and religion (P<0.05) and the prevalence of taeniasis. Therefore attention should be given for meat inspection, awareness creation for the people not to consume raw meat (‘kourt’, ‘kitifo’) and to use toilet to reduce dispersion of taenia eggs on grazing areas.

Keywords: Bovine, Cysticercosis, Debretabor municipal Abattoir, Prevalence.

Introduction

Ethiopia has the highest livestock population in Africa with estimated number of 70.79 million head of cattle, 28.48 million sheep, 25.91 million goats, 24.56 million donkeys, 11.39 million horses, 8.08 million mules, 8.39 million camels, 42.51 million poultry and 71.62 million beehives (CSA, 2010).

Animal diseases are one of the most important constraints to increase productivity of food animals in all parts of the world. Parasitism is one of the major problems that affect the productivity of livestock worldwide. Losses from parasitic infections include losses through death, reducing working power, milk yield, hide and skin quality and condemnation carcasses or organs after slaughter. Among many parasitic problems of domestic animals, tapeworms are an economically important intestinal parasites found all over the world (Radostits *et al.*, 2007).

Bovine cysticercosis is a disease that affects the muscle of cattle and is caused by the metacestode stage of the human intestinal cestode, *Taenia saginata*. It iscosmopolitan in its distribution and it occurs in developing as well as in developed countries. The adult Taenia infection in man is referred to as taeniasis and that due to the larval stage cysticercosis (Roberts and Janovy, 2009). The distribution is associated with economic conditions, religious beliefs and close proximity of humans to cattle in utility function. *Taenia saginata* is wider in developing countries where hygienic conditions are poor and where the inhabitants traditionally eat raw or insufficiently cooked meat (Symth, 1994).

It is important to note that eggs have been demonstrated to survive almost all stages of sewage treatment. Thus, it is significant to that even the high standard of meat inspection in abattoirs of highly developed countries that are expected to identify measly beef carcasses has not succeeded in eliminating this parasite (Minozzo *et al*., 2002).

Taenia saginata/*Cysticercus bovis* is important from the standpoint of the health of cattle because of consequences for the meat supply and, more importantly, from the direct effects on the well-being of humans who, almost universally, consume beef as a source of protein and other minerals (Wanzala *et al.*, 2003).
Its life cycle is entirely dependent on the link between man and cattle; so that any break in this link can result in the total elimination of the parasite. Cysts of *Cysticercusbovis* can be found anywhere in the carcass and viscera, but there seems to be special affinity towards some parts which are described as sites of predilection (masseter, tongue, heart, triceps, intercostal muscles and the diaphragm). Most of these organs except the heart are consumed raw or under cooked and could be a potential public health hazard in contracting taeniasis (FAO, 2011).

Bovine cysticercosis is very common in Africa and is endemic in areas of Central and East African countries like Ethiopia, Kenya and Zaire (Harrison *et al*., 2001). The variations in the epidemiological patterns of taeniasis/cysticercosis throughout Africa are a reflection of the numbers and distribution of human and cattle populations (Harrison *et. al*., 2001). The custom of eating raw or undercooked beef dishes such as kourt,leble*b*,kitffo and the habit of defecating in open fields coupled with the tradition of allowing cattle to graze in such fields made taeniasis of human and c*ysticercosis* of cattle are common in Ethiopia (Teka, 2006).

The prevalence of *C. bovis* in cattle reported by different individuals was different in different agro-climatic zones of the country; 2.2-3.2% in Addis Ababa Abattoir Teka (2006), 19.4% in Bahir Dar Alemu (2005), 21.17% in Nekemte Ahmed (1990), 13.85% in Debre Zeit Belayneh (2004) and 9.67% in Gondar Demissie (2001). This is mainly due to the presence of a number of unimproved animal healths, among which, *Taenia saginata*/*Cysticercus bovis* is one that remains a major public and animal health problem (Mekbib *et al*., 2013).

The epidemiology of bovine cysticercosis/human taeniasis various from one area to another so control measures appropriate in one area is not necessarily of value in another. Hence, it is essential to have adequate knowledge of the epidemiology of the disease before contemplating control programmes. The disease occurs most commonly in areas where poor hygiene, poor sanitation, poor husbandry practice, inadequate meat inspection and inhabit of traditionally eating raw or under cooked meat. Due to insufficient information about the way of transmission, it results problem in the study area. Therefore the objectives of this study were:

- ✓ To determine the prevalence of *Cysticercus bovis* in cattle
- ✓ To assess the public health implication of *T.saginata*
- ✓ To assess risk factors associated with taeniasis/cysticercosis

Materials and Methods

Study area

The study was conducted in Debretabor town at Debretabor Municipal abattoir from October 2014 to April 2015. Debretabor is found in Northwest part of Ethiopia at about 666 km from Addis Ababa, 100 kilometers Southeast of Gondar and 50 kilometers east of Lake Tana at longitude and latitude of 11°51′N 38°1′E11.850°N 38.017°E respectively. Based on 2007 national census conducted by the central statistical agency of Ethiopia, this town has a total population of 5, 5596 of whom 27,644 are men and 27,952 women. The climate is warm and temperate. In winter there is much less rain fall than in summer. The average annual temperature is $15^{0}_{C.}$ The average

annual rain fall is 1497 mm at an altitude of 2,706 meters (8,878 ft) above sea level. The area is characterized by two seasons, the wet season from June to September and the dry season from October to May. Generally the administrative zone is divided into three main agro-climatic zone, high land, midland and low land region (CSA, 2010).

The role of livestock in food security and food self sufficiency in the highland production system is important in these areas. More than 85% people live in South Gondar depend on animal power for cultivation, planting, weeding, threshing, and transporting. They are important as producers of meat, milk and hides which are part of the food in virtually all part of the world both directly in the form of animal product and indirectly from the contribution of manure and draught power to food(CSA, 2010).

Study design

A cross sectional study was carried to determine the prevalence of bovine cysticercosis. The study was based on routine meat inspection on randomly selected cattle slaughtered at the abattoir. The randomly selected animals for routine meat inspection were given an identification numbers; this is to avoid the unnecessary mixing with organs during inspection. Visual inspection of all exposed surface was made in all active organs. They are shoulder muscles, hearts, masseters (cheek muscle), diaphragms, tongues, livers and spleen. This was followed by incision of all those organs examined for *Cysticercosis bovis*.

Study animals

Study population was cattle presented to the abattoir for slaughtering and routine meat inspection. From those animals that daily came to the municipal abattoir, study animals were randomly selected and routinely inspected for bovine cysticercosis. Mostly the animals were brought from Farta, Ebinat, Debretabor, Giynt, Fogera, Estie and Simada. In fact it is very difficult to trace back the exact origin of the animals.Accordingly, those animals brought to the abattoir were subjected as a study population for active abattoir survey.

Sampling method and Sample size determination

The total numbers of cattle required for the study was calculated based on the formula given by Thrusfield (1995) using random sampling method. In this study, 50% prevalence was considered to calculate the sample size using the following formula.

$$n = \frac{1.962 \times pexp\ (1-pexp)}{d2}$$

Where n=required sample size
Pexp= expected prevalence
d2 =desired absolute precision

$$n = \frac{1.962 \times 0.5(1-0.5)}{(0.05)^2} = 384.$$

Actually 408 animals were sampled and inspected to maximize the positive value during the study period for the presence of *Cysticercus bovis* in inspected organs. Animals selected during this study were both male and female animals of local and cross breed.

Study methodology

3.5.1. Active Abattoir survey

The cross-sectional study, which was based on the active abattoir survey that was conducted during detail meat inspection on randomly selected 408 cattle slaughtered at Debretabor municipal abattoir. Before inspecting the animals, ante-mortem inspection was carried out and the tag number of each animal was recorded.

Antemortem examination on individual animals was done by considering of their body condition, age, sex, breed and place of origin. Epidemiological data were also determined including, the main categorization of the animals in the study (Frta, Fogera, Ebinat, Gaint, Estie and Simada); sex (male and female) and age was categorized into adult (<5 yrs) and old (≥5 yrs) based on owners' information.

During post mortem inspection, visualization, palpation followed by incision of organs was made to examine for the presence of *C. bovis*, according to the guideline by Ministry of Agriculture (1972). The cysts were incubated in ox bile at 37 ºC for 1-2 hr using 40% ox bile solution diluted in normal saline(8ml bovine bile and 12ml saline solution were used) . After this, the scolex was examined under microscope by pressing between two glass slides. The cysts were regarded as viable if the scolex evaginates during the incubation Period.

Questionnaire survey

Moreover, a cross-sectional study was conducted by a structured questionnaire survey to assess the prevalence of *T. saginata*/taeniosis, associated potential risk factors and its public health importance on 60 volunteer respondents from who randomly selected individuals within the town.

Efforts were made to include respondents with different risk factors for taeniasis such as age, sex, religion, occupation, habit of raw consumption, awareness of the raw meat consumption and the way of prevention and control in the questioner to estimate the risk factors associated with the occurrence of the disease in human and public impact of the disease.

Data management and analysis

Data both from the direct physical examination and questionnaire were properly coded and entered into Microsoft Excel-2007 spread sheet. The data was filtered for any invalid entry and then transferred to SPSS 16.0 version for windows package (2007) for statistical analysis. Descriptive statistics was made and differences (associations) in the prevalence of *C.bovis* within each risk factor (independent variable) have been tested for significance through Pearson's Chi-square analysis. Results of the analysis are presented through illustrative tables.

Results

Prevalence of bovine cysticercosis

Of the total of 408 inspected animals in Debretabor municipal abattoir, 46(11.3%) animals were found positive for *C. bovis* at postmortem inspection. Prevalence of bovine cysticercosis in the study area was associated with different risk factors which facilitate the occurrence of this parasitic disease. Breed, body condition, sex and age of animals were factors observed. There was no significant difference ($p>0.05$) between sex, body condition, and breed with prevalence of the disease (table 4). But, there was significant difference ($p< 0.05$) between age group and the occurrence of *cysticercosis*. Animals that came to the abattoir were young and old age with both sexes.

Of inspected animals, 10.3% of good body conditioned animals, 11.7% of medium and 15.6% of poor body conditioned animals were positive for *cyticercus bovis.* Thus, out of examined animals; higher infection rate was observed in old animals (13%) than young animals (4.7%) as indicated in table 1.

Table 1: The prevalence of *C.bovis* on the base of potential risk factors

Risk factors	Number of examined	Number of positive	Prevalence	X^2	P-value
Breed					
Local	395	45	11.4%		
Cross	13	1	7.7%	0.175	0.678
Total	408	46	11.3%		
Sex					
Male	371	39	10.5%		
Female	37	7	18.9%	2.377	0.123
Total	408	46	11.3%		
Age					
Young	86	4	4.7%		
Old	322	42	13%	4.779	0.029
Total	408	46	11.3%		
Body condition					
Good	243	25	10.3%		
Medium	120	14	11.7%	1.079	0.583
Poor	45	7	15.6%		
Total	408	46	11.3%		

Anatomical distribution and viability of cysts

Analysis of active abattoir survey data showed that there was a variation with regard to the anatomical distribution of cysticercus in the organs inspected. As indicated in table 5, the highest proportions of *C. bovis* were observed in the cardiac muscle 35(30.7%), followed by tongue 26(22.8%), masseter muscle 18(16.7%), triceps muscle 16(14%), shoulder muscle 13(11.4%), liver 3(2.6%), and spleen 2(1.7%), respectively. There is no any cyst found in the kidney. Of the total of 114 cysts that were collected during the study period 43(37.7%) were found to be alive while other 71(62.3%) were degenerative cysts.

Regarding cyst locations, out of the total of 46 cattle positive for *C. bovis*, carcasses of 35 cattle were having the cysts at one site only and 11 of them had more than one site. Thus, of 46 positive animals 26% of them had cysts on cardiac muscle(26%), 21.7% of them had cysts on tongue (21.7%), 8 of them had cysts on masseter muscle (17.4%), 8 of animal on shoulder muscle (17.4%), 2 of them had on liver (4.3%) and one animal had cyst on spleen as shown in table 2.

Table 2: Distributions of *C.bovis* and its relative proportion of live and dead cysts in the inspected organs

Organ	No of inspected	Positive animal	Live cysts	Dead cysts
Tongue	408	10	9(21%)	17(24%)
Masseter	408	8	7(16.3%)	12(17%)
Triceps	408	8	6(13.9%)	10(14.1%)
Heart	408	12	12(27.9%)	23(32.4%)
Shoulder	408	7	6(13.9%)	7(9.8%)
Liver	408	2	2(4.6%)	1(1.4%)
Spleen	408	1	1(2.3%)	1(1.4%)
Kidney	408	0	0	0
Total	408	46	43(100%)	71(100%)

Questionnaire survey

Of the total of 60 interviewed respondents who participated in this study, 30% (18/60) had contracted *T.saginata* infection, of which 89% and 11% reported using modern and traditional drugs, respectively. The majority of the respondent had experience of raw meat consumption with knowgly or unknowgly the risk of eating raw meat as a result of traditional and cultural practice. Analysis of the risk factors showed significance difference ($P<0.05$) in the prevalence of taeniasis with different age groups, Sex, religion and raw meat consumption. In this study, there was no significance difference ($p>0.05$) between educational status and occupation with prevalence of the disease.

Of the total interviewed age groups higher infection were observed in adult age group, among 38 respondents 42% of them were positive. The exposure rate in muslims 16.7%, in orthodox 43.8% and in protestants 10% (table 6).

Among 60 of interviewed respondents, 27 are males and 13(48.1%) of them contracted taeniasis. But, among 33 females only 5(15.2%) of them had taeniasis as indicated in table 6. Out of 60 volunteer interviewed respondents 27 (45%) of them consume raw meat, out of these 48.1% them were infected with taeniasis and 33 of the respondents don't consume raw meat as indicated in table 3.

Table 3: Prevalence of *T.saginata* in human population at Debretabor town

Risk factors	Number of respondents	Number of positive	Prevalence	X^2	p-value
Sex					
male	27	13	48.1%		
Female	33	5	15.2%	7.699	0.006
Total	60	18	30%		
Age					
<18yrs	6	1	16.7%		
18-40yrs	38	16	42%		0.024
>40yrs	16	1	6.2%	7.457	
Total	60	18	30%		
Religion					
Orthodox	32	14	43.8%		
				6.310	0.043
Muslim	18	3	16.7%		
Protestant	10	1	10%		
Total	60	18	30%		
Educational status					
Elementary	10	2	10%		
High school	11	4	36.4%	1.055	0.901
College	11	4	36.4%		
University	12	3	25%		
Other	16	5	31.2%		
Total	60	18	30%		
Occupation					
Employed	14	3	21.4%		
Marchant	14	4	28.6%		
Farmer	13	4	30.8%	0.931	0.818
Other	19	7	36.8%		
Total	60	18	30%		
Raw meat					
User	27	13	48.1%		
				7.699	0.006
None user	33	5	15.2%		
Total	60	18	30%		

Discussion

The prevalence of *C. bovis* among the carcasses inspected at Debretabor municipal abattoir was 11.3%, which was slightly in agreement with the finding of Getachew (2007) from Debre Zeit (13.8%) and Regassa *et al*., (2009) from Wolaita Sodo abattoir (13.3%). However, it is higher than findings by Dawit (2004)from Gondar (4.9%), Tembo (2001) from Central Ethiopia (3.1%), and Megersa*et al*., (2010)from Jimma (4.4%), whereas the present study was lower than the findings by Abunna et al., (2007) in Hawassa (26.3%), and Hailu (2005) in East Shoa (17.5%), Ahmed (1990) in Nekemte(21%). The difference among these studies could be attributed to differences in the agro-climatic conditions of the study areas, management system, backyard slaughtering of animals, culture of raw meat consumption, and probability of incision made at inspection site from abattoir to abattoir, dose and viability of eggs and or larvae consumed can contribute for the variation in prevalence.

Conversely, lower prevalence than this study was reported from developed countries, such as 0.26% in Croatia (Zivkovic *et al.*, 2002), 0.48-1.08% in Germany (Abuseir *et al*., 2006) and 0.9% in Cuba (Suares and Santizo, 2005). The majority of the findings in Ethiopia were based on surveys carried out on carcasses subjected to routine meat inspection. Accordingly, the lower prevalence of bovine cysticercosis in this study might be attributed to variations in personal and environmental hygiene, religion, culture, and feeding habits, including beef breeds and their production systems.

Regarding the anatomical distribution of the cyst in the intermediate host, many researchers come up with different results. Fufa (2006) reported triceps as frequently affected by the cyst, shoulder by Alula (2010) and Ragasa (2008), tongue by Megersa (2008) and Abunna *et al*., (2007). However, the present study showed that the most frequently affected organ with the highest number of cysts was heart (table 5) which is in agreement with reports of Wanzala (2003), Kebede (2009), Demissie(2001) and Ahmed (1990) on their respective working sites.

The viability test of the cysts also revealed that the heart harbored the highest number of viable cysts (27.9%), followed by the tongue (12%), masseter (16.3%), triceps (13.9%), shoulder (13.9%), liver (4.6%), and spleen (2.3%), but there was no cyst found in the kidney. The proportion of heart affected with metacestodes of *T. saginata* was higher than that found in Hawassa (10.4%), but lowers than that found in Jimma (40.43%). The variation in anatomical distribution of the *T.saginata* metacestode in the different predilection site depends on a number of factors, such as animals' daily activities and blood kinetics. Any geographical and environmental factors affecting blood kinetics in the animal affect the distribution of onchospheres as well and hence, affect predilection sites during meat inspection (Hailu, 2005).

Generally, the method of meat inspection, the ability of meat inspectors to identify cases, differences in management, the sample size and sampling method, the number of cuts, and other factors can contribute to prevalence variations in bovine cysticercosis. This reduction of prevalence in cysticercus bovis in Debretabor municipal abattoir is may be due to the farmers knowledge about parasitic disease is increased and practicing deworming activities in order to facilitate weight gain relative to areas that have higher prevalence. More importantly, the extension health workers are teaching the rural communities about the use of toilets and disadvantages of open defecation for control of taeniasis and other GIT parasites. This may contribute less contamination of grazing land by human excreta containing *T. saginata* eggs. There may be subsequent reduction of chance of infecting the intermediate host, cattle.

The majority of the findings in Ethiopia were based on surveys carried out on carcasses subjected to the routine meat inspection procedures. Hence, the same limitations with which meat inspection were reflected in this study. Furthermore, low prevalence of the infestations could be partly due to practical limitations to the number of incisions allowed as gross mutilation lowers the marketability of carcasses and introduce contamination; owners do not allow multi incisions for the detail investigation (Smyth, 1994).

There was no significant change observed between body condition, sex, breed, and origin of the animals ($p>0.05$). Prevalence of *C. bovis* in this study was not affected by sex of the animals. This is in agreement with previous reports of Kebede *et al*., (2009), Endris and Negussie (2011), and Bedu *et al*., (2011). This could be associated with similar management given to both male and female cattle. In communal system both sexes were grazing on the same pastures and thus exposed to similar challenge with *T. saginata* eggs. In

the study, female cattle examined for cysticercosis were small in number which makes difficulty to correlate prevalence with the sex of animals. However, according to Qaeer (2008), and Ibrahim and Zerihun (2012) report, males were highly infected than females. This may be related to management system of longer exposure of male outdoor, while females are kept in door at the beginning of lactation and breeding.

There is also significant difference ($p < 0.05$) among age groups in which old age group had higher prevalence when compared with young age group. In this study, animal greater than five years of age were highly infected. This finding is in agreement with the report of Usip *et al*., (2011). But, it was inconsistent with other works who found no significance variation in different age group of cattle Abunna et al., (2011), and Ibrahim and Zerihun (2012)**.** The increase in prevalence of cysticercosis with age may be explained due to the long cumulative exposure time of the animal to the different sources of infection with eggs of *T.saginata.*

The prevalence of *T. saginata* recorded in this study based on the questionnaire survey was 30%, illustrated that the significance of taeniasis in the population of Debretabor town, which was slightly lower than the reports from Southern Ethiopia by Regassa *et al*., (2009)50.6% at Wolaita Soddo and Abunna *et al*., (2007) 64.2% in Hawassa town. Higher prevalence of 69.2% was also reported by Dawit (2004) in Gondar, Northern Ethiopia and lower prevalence of 9.72% was reported by Abunna *et al*., (2007) at Nekemte, Western Ethiopia. The reason of this variation may be related to infestation of *T.saginata* is mainly due to the habit of eating raw or under cooked infested (measly beef) due to low awareness creation about the disease and deep rooted tradition, inherited from parents.

The respondents who were questioned in this study disclosed findings of proglottids in their feces, under wears, and a laboratory diagnosis at a health institution indicated the presence of *T. saginata*.In the present study, the prevalence of human teniasis showed significant differences ($p < 0.05$) according to sex, religion, age, and raw meat consumption. Men, orthodox christian, adult, and persons who consumed raw meat were at higher rate of contracting teniasis than women, muslims, young, and cooked-meat consumers, respectively. This study was in agreement with the finding of Megersa *et al*., (2009), Abunna *et al*., (2007) and Tembo, (2001).However; it was in agreement with the finding of Qadeer [30], Kumar [33] and Getachew [15].

The occurrence of disease had significant association ($p<0.05$) with ages of respondents, indicating that higher prevalence of infection occurred in adult people The possible suggestion for this could be adult people had the habit of raw meat consumption and high income than the younger, as younger are not allowed to consume raw meat and economically they do not afford consuming raw meat, “kurt” which may be expensive for them. Significance association was also observed between taeniasis prevalence and sex of the respondents. The higher prevalence was observed in male individuals due to economic reasons and cultural practices in that males do not prepare their dish at home, rather consume at restaurants and butcheries, and traditionally there is strong discrimination of females on consumption of raw meat. The study also showed significantly higher prevalence of taeniasis among individuals who often consume raw meat than those none consumers, this is similar to the finding of Abunna *et al*., (2007). The prevalence of teniasis was also higher among Christians than Muslims, because raw meat consumption is not common among Muslims, whereas Christians in Ethiopia consume raw meat during several religious celebrations; this is also true in the study area. High-risk groups are of course more prone to infection than low-risk groups because they come into contact with meat and meat products (symth, 1994).

There was no variation observed ($p > 0.05$) between people with different educational background and occupation with Taeniasis prevalence, perhaps because of the deeply rooted tradition of raw and undercooked meat consumption regardless of the occupation and educational level. In the study area even professionals aware of the situation (veterinarians and medical professionals) often consume Kurt or Kitifobecause of deeply rooted traditions.

Conclusions and Recommendations

Tania saginata is medically and economically important cestode parasite, while infection of cattle with cysticercus bovis (larval stage) causes economic losses in the meat industry. In this study, the prevalence of bovine cysticercosis determined by the active abattoir survey was relatively lower than reports by different researches in different parts of the country.The wide distribution of *Taenia saginata*/ *Cysticercus bovis* is associated with the habit of eating raw beef such as *kitfo* and *kourt*, lack of adequate meat inspection, defecation in bushes and backyard

slaughter might have contributed for the high prevalence in cattle and human. Thus taeniasis /cysticercosis, remains a widespread zoonoses that affects human health and economy through condemnation, quality degradation of frozen beef, cost of refrigeration, cost of human therapy, lowering productivity of infected workers who may be absent from work or reduce their working efficiency by creating uneasiness. This is particularly true in developing nations since the knowledge on the dynamic of the disease is poorly recognized.

Based on the above conclusion the following recommendations are forwarded:

- ✓ Public health extension program should be encouraged to increase the awareness especially the rural part of the society regarding the mode of infection and risk factors in T.saginata epidemiology.
- ✓ The rural community and some of marginal urban community should construct toilets in order to improve sanitation and hygiene in order to reduce egg dispersal to intermediate hosts, cattle.
- ✓ Avoid eating of raw ('kurt', 'kitifo') beef/ meat that is not inspected by well experienced meat inspectors.
- ✓ Infected meat and meat products must be undergo the process of freezing, boiling or destruction of the cysticercus based on the intensity of infection.
- ✓ Eradication of bovine cysticercosis requires cooperation between the public health and official veterinary authorities.
- ✓ Detailed meat inspection is recommended than routine meat inspection.

References

Abdussalam, M., 2003. The Problem of Taensiasis /Cystcercosis In, Seminar Meeting on FMD and Zoonosis Control. Washington, D.C. Pan African Health Organization (Scientific Publication 295).

Abunna, F., Dasta, A., Alemayehu, D., Bekele, M. and Debela, E., 2011. Major Metacestodes in cattle slaughtered at Nekemte Municipal Abattoir, Western Ethiopia: Prevalence, Cyst Viability, Organ Distribution and Socio Economic Implications," *Biomirror*, vol. **2**, (10), Pp. 1-7.

Abunna, F., Tilahun, G., Bersisa, K., Megersa, B. and Regasa, A., 2007. Bovine cysticercosis in Hawassa in southern Ethiopia; prevalence, risk factor and cyst viability,zooneses and public health,55(2)82-8.

Abusier, S., Epe, C., Schnieder, T., Kedein, G. and Kühne, M., 2006. Visual Diagnosis of Taenia saginata /Cysticercosis during meat inspection.

Acha, N. P. and Szyfres, B., 2003. *Zoonoses and communicable Disease common to human and Animals.*3rd ed. Volume 3. Parasitizes. Washington, D.C; Pan American health organization. Pp.166-214.

Adugna Tadesse, Yacob Hailu Tolossa, Dinka Ayana and Getachew Terefe., 2013.Bovine cysticercosis and human taeniosis in South-west Shoa zone of Oromia Region, Ethiopia Oromia Livestock Agency, *Ethiop.Vet.J.*, Addis Ababa University, College of Veterinary Medicine and Agriculture, ***17****(2),121-13*

Alemu, M., 2005. Bovine Cysticercosis Prevalence Economic and Public Health Importance at Bahir Dar Municipality Abattoir. DVM Thesis. Faculty of Veterinary Medicine, Addis Ababa University.

Alula, A., 2010. Major Metacestodes in Cattle Slaughtered At KombolchaELFORA Abattoir, North East Ethiopia: prevalence, cyst viability, organ distribution and socio economic implication. Faculty of Veterinary Medicine, Hawassa University, Hawassa, Ethiopia, DVM Thesis.

Ashwani, K. and Gebretsadik, B., 2008. Occurrence of cysticercosis in cattle of parts of Tigray region of Ethiopia. *Haryana Vet*, p.88-90.

Bedu, H., Tafess, K., Shelima, B., Woldeyohannes, D. and Amare, B., 2012. Bovine Cysticercosis in Cattle Slaughtered at Zeway Municipal Abattoir: Prevalence and its Public Health Importance," *Journal of Veterinary Science and Technology*, vol. 2(108), pp. 2157- 7579.

Belayneh, G., 2004. Prevalence and Significance of Cysticercus bovis Among Slaughtered Cattle at Debre Zeit Abattoir. DVM Thesis. Faculty of Veterinary Medicine, Addis AbabaUniversity.

Boone, I., Thys, E., Marcotty,T., Borchgrave, J., Ducheyne, E. and Dorny, P., 2007.Distribution and risk factors of bovine cysticercosis in Belgian dairy and mixed herds. *Prev. Vet. Med*, **82**, 1-11.

CDC (Center for Disease Control and Prevention)., 2010. Life cycle of cysticercus bovis and cystic echinococcosis .Available at: http://pathmicro.med.sc.edu/parasitology/cestodes.htm

CSA (Central stastical authority)., 2010. Livestock population of Ethiopia,central stastical authourity Addis Ababa.

CSA (Central Statistics Agency)., 2014. Federal Republic of Ethiopia; Statistical abstract, 2006, Addis Ababa, Ethiopia.

Dawit, S., 2004. Epidemiology of *Taenia Saginata;* Taeniasis and Cysticercosis in North Gondar Zone, North West Ethiopia. DVM Thesis. Faculty of Veterinary Medicine, Addis Ababa University, Debrezeit, Ethiopioa.

Debas, E. and Ibrahim, N., 2013**.** Prevalence and Economic Importance of Hydatidosis in Cattle Slaughtered at North Gonder Elfora Abattoir.*European Journal of Applied Sciences*, **5** (1): 29-35.

De-Luata, A. and Habel, R.E., 1986. *Teeth.Applied Veterinary* .USA.W.B.Sounders company, Pp.5-15.

Demissie, A., 2001. Prevalence and Significance of Cysticercus bovis Among Slaughtered Cattle at Gondar Meat Factory. DVM Thesis. Faculty of Veterinary Medicine, Addis Ababa University.

Deplazes, P., Craig, P.S., Gemmell, M.A., Gottstein, B., Heath, D., Jenkins, D.J., Kamiya, M. and Lightowlers, M., 2001. Echinococcosis in animals: *Clini-cal aspects,diagnosis and treatment*. Paris, Pp. 72-99.

Dorny, P. and Preat, N., 2007. Taenia saginata in Europe.Veterinary Parasitology,149:22-24

Endiras, Z., Yechale, T. and Assefa, M., 2010. Bovine Hydatidosis in Ambo Municipality Abattior,West Shoa, Ethiopia. *Ethiopian Veterinary Journal***, 14**(1), p.1-14.

Endris, J.and Negussie, H., 2011. Bovine Cysticercosis: Prevalence, Cyst Viability and Distribution in Cattle Slaughtered at Kombolcha Elfora Meat Factory, Ethiopia," *American- Eurasian Journal of Agriculture & Environmental Science*, vol. 11(2), pp. 173-176.

FAO., 2011. Sustainable animal health and contained animal-related human health risk –in support of the emerging 'One Health' agenda. Applying Lessons Learned from Highly Pathogenic Avian Influenza in the Prevention and Containment of Major Animal Diseases and Related Human Health Risks. Working document, March 21-25, 2011, Rome, Italy.

Fromsa, A. and Jobre, Y., 2011. Infection prevalence of hydatidosis in domestic animals in Ethiopia .*A synthesis report of previous surveys*, *Ethiop. Vet. J.*,**15** (2), Pp.11-33.

Garcia, L.S. (Ed.)., (2003). *Manual of Clinical Microbiology* (8th ed., pp. 1895). Parasitology Washington, D.C. ASM Press. Available@http://www.phac-aspc.gc.ca/lab-bio/res/psds-ftss/taenia-saginata-eng.php

Getachew, B., 2007. Prevalence and significance of Cysticercus bovis among cattle slaughtered at Debrezeit abattoir. Addis Ababa University, Faculty of Veterinary Medicine, DebreZeit

Getaw, A., Beyene, D., Ayana, D., Megersa, B. and Abunna, F., 2010. Hydatidosis prevalence and economic importance in ruminants slaughtered at Adama municipal abattoir central Oromia,Etiopia

Giordano, T.P. and White, A.C., 2003. Nuerocysticercosis(NCC), Taenia solium . Medicine: Instant Access to the Minds of Medicine. Boston Medical Publ.corp.

Hailu, D., 2005. Prevalence and risk factors for *T. saginata*/cysticercosis in three selected areas of eastern Shoa. MSc Thesis, Addis Ababa University, Faculty of Veterinary Medicine. DebreZeit, Ethiopia.

Harrison, L.J.S., Onyango-Abuje, J.A., A-Schuitto, E., E.Parkhouse, R.M., 2001. Cystcercosis Diagnostic aspects in animals. In International workshops on Cystcercosis Preforia SouthAfrica, Pp. 92-99.

Ibrahim, N. and Zerihun, F., 2012. Prevalence of *Tania Saginata* Cysticercosis in Cattle Slaughtered in Addis Ababa Municipal Abattoir, Ethiopia," *Global Veterinarian*, vol. 8(5), Pp. 467-471.

Kebede, N., Fikire, Z., Tolosa, T. and Nigussie, Z., 2011. Prevalence and characterization of hydatidosis in cattle and sheep slaughtered in Addis Ababa Abattoir, Ethiopia.

Kebede, N., Gebre-Egziabher, Z., Tilahun, G. and Wossene, A., 2009. Prevalence and Financial Effects of Hydatidosis in cattle slaughtered in Birre-Sheleko and Dangila Abattoirs,Northwestern Ethiopia.

Kebede, N., Tilahun, G. and Hailu, A., 2009. Current status of bovine cysticercosis of slaughtered Cattle in Addis Ababa Abattoir, Ethiopia," *Tropical Animal Health Production*, vol. 41, pp. 291–294.

Kumar, A. and Tadesse, G., 2011. Bovine cysticercosis in Ethiopia: a review. *Ethiop. Vet. J.*,**15** (1): 15-35.

Kumba, F.F., Shicongo, L.T. and Mate, I., 2004. Prevalence of Bovine Cystcercosis in the North of Nambia Reterospective study based on Abattoir Records. *Zimbabwe Vetirinary Journal*, **32** (3/4), 69-74.

Maeda, G.E., Kyvsgaard, N. P., Nansen, C. and Bogh, H.O., 1996. Distribution of Taenia saginata Cysts by Muscle group in Naturally Infected Cattle in Tanzania. *Prev.Vet.Med*. **28** (2), 81-89.

Mekbib, B., Abesha, H. and Tesfaye, D., 2013. Study on Zoonotic Metacestodes of Cattle Slaughtered at Bahir Dar Municipal Abattoir, Northwest Ethiopia.*Global Veterinaria*n, 10 (5): 592-598.

Minozzo,J.C., Gusso, R.L.F., De Castro, E.A., Lago, O. and Soccoi, V.T., 2002. Experimental Bovine Infection with Taenia saginata Eggs: Recovery Rates and Cysticerci Location. Braz.arch.biol.technol, Pp. 45-49.

MoA., 1972. Meat Inspection Regulations. Legal Notice No-428. Negarit Gazeta. Addis Ababa,Ethiopia.

OIE., 2000. Manual of Standards for Diagnostic Tests and Vaccines. Cysticercosis. pp,423-428.

OIE., 2008. Echinococcosis /Hydatidosis.Terresterial animal manual, p.176-189.

Qadeer, M. 2008. *Prevalence* of bovine cysticercosis in Jos Abattoir, Nigeria," *Animal Research International*, vol. 5(1), pp.777 – 779.

Radostits, M.O., Gay, C.C., Hinchcliff, K.W. and Constable, P.D., 2007. Veterinary Medicine. Text book of the disease of cattle, sheep, goats pigs and horses. 10th ed. Saunders. Philadeliphia. Pp. 1581-1583.

Regassa, A., F.Abunna., A.Mulugeta and B. Megersa., 2009. Major metacestodes in cattle slaughtered at Wolaita Soddo Municipal abattoir, Southern Ethiopia: Prevalence, cyst viability, organ distribution and socioeconomic implications.Tropical Animal Health and Production, 41: 1495-1502.

Roberts, J.L.S. and Janovy, J., 2009). Gerald D. Schmidt & Larry S. Roberts' Foundations of parasitology (8th ed.). Boston: McGraw-Hill. ISBN, Pp.128-458.

Sau'rez, H.M. and Santizo, R.M., 2005. Epidemiology of the *Taenia saginata* complex and C. bovis in Ciego De Avila province of Cuba. Rev Pathology Tropic, 34: 43-52.

Soulsby, E, J.L., 2006. Helminths,Arthropods and Protozoa of domesticated animals.7th ed. Bailliere Tindal.London,U.K.

Symth, J. D., 1994. Introduction to Animal Parasitology. 3rd ed.

Teka, G., 2006. *Food Hygiene Principles and Food Borne Disease Control with Special Reference to Ethiopia*. 1st ed. Faculty of Medicine Department of Community Health, Addis Ababa University.

Tembo, A., 2001. Epidemiology of Taenia saginata, Taeniasis/ Cysticercosis in Three Selected Agro-Climatic Zones. Faculty of Veterinary Medicine. Free University of Berlin, Berlin, MSc Thesis.

Thrusfield, M., 1995. Veterinary Epidemiology. 2nd ed. Exford:Black Well Science tropics.

Tolosa, T., Tigre, W., Teka, G. and Dorny,P., 2009. Prevalence of bovine cysticercosis and hydatidosis in Jimma municipal abattoir, South West Ethiopia. *Onderstepoort Journal of vet.*

Urquhart, G.M., Armour, J., Dunlan, J.L., Dunn, A.M. and Jennings, F.W., 1996. Veterinary parasitology.2nd ed. London.Blackwell science, Pp.120-137.

Usip, P., Isaac, I., Amadi, E., Utah, E. and Akpaudo, U., 2011. The occurrence of cysticercosis in cattle and taeniasis in man in Uyo, capital city of Akwa Ibom State, Nigeria, " *Nigerian journal of agriculture, food and environment*, vol. 7(2), Pp. 47-51.

Wanzala, W., J.Onyango-Abuje, E.Kang`Ethe, K.Zessin, N.Kyule, M.Bauman, H.Ochanda and L.Harrison., 2003. Analysis of Post-Mortem Diagnosis of Bovine Cysticercosis in Kenyan Cattle,Onderstepoort J. Veterinary Research, 1: 28-31.

WHO., 2005. Guidelines for Surveillence, Prevention and Control of Taeniasis/ Cysticercosis. In Gemmel M, Matyas Z, Pawlowiski Z, Suolsby EJL, VPH/83.49: 207-238.5.

Yoder, D.R., Eblell, E.D., Hancock, D.D. and Combs, B.A., 2002. Public Veterinary Medicine: Food Safety and Handling, Epidemiological Findings from an Out Break of Cysticecosis in Feed lot Cattle. *J. A.V.M.A.* 205, Pp.75-86.

Zarlenga, D.S and Rhoads, M.L., 1999. Taenia Antigens for use as Immuno Diagnostic Reagents for Bovine or Swine Cystcercosis. U.S.Departement of Agricultural Research Services.USA.

Zivkovic, J., Velimirovic, D., Dzaja, P. and Grabarevic, Z., 1996. Prevalence of Cystcercus bovis.hermis. Measles with Particular References to Histopathological changes in Meat.ArchivFurlebensmittel Hygine, 47 (3), 66-6.

Access this Article in Online

Website: www.ijarbs.com

Subject: Medicinal Plants

Quick Response Code

DOI:10.22192/ijarbs.2021.08.12.007

How to cite this article:
Tsegaye Mitiku Haile. (2021). Study on prevalence and public health importance of Bovine Cysticercosis . Int. J. Adv. Res. Biol. Sci. 8(12): 60-71.
DOI: http://dx.doi.org/10.22192/ijarbs.2021.08.12.007