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Prevalence of Bovine Cysticercosis in Cattle and Zoonotic Significance in Jimma Town, Ethiopia

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Abstract: A cross sectional study was conducted from November 2013 to April 2014 to estimate the prevalence of bovine cysticercosis in cattle slaughtered at Jimma municipal abattoir with the objectives of determining the prevalence of *Taeniasaginata*cysticercosis, cyst viability, cyst distribution in different body tissues, prevalence of Taeniasis in human and economic loss analysis through drug inventories. Active abattoir survey, Questionnaire survey and inventory of pharmaceutical shops were performed to accomplish the study. The abattoir survey was carried out by routine inspection of carcasses. Post mortem examination of 547 slaughtered cattle were examined from randomly selected animals of which 28 (5.1%) were infected with *Cysticercusbovis*. The prevalence of *Cysticercusbovis*was insignificantly different between risk factors such as origin, sex, breed, body condition and age. Of the total of 102 *Cysticercusbovis* collected during the inspection, 45 (44.1%) were found to be alive while others 57 (55.9%) were degenerated cysts. Regarding organ distribution, triceps muscle (43.1%) was frequently affected with *csyticercusbovis* followed by longsimus muscle (33.3%), thigh muscle (14.7%), diaphragm (2.9%), liver (2.9%) and heart (2.9%). To know prevalence of taeniasis 86 individuals were randomly selected. Out of these 58% had contradicted *T.saginata* infection and 74.4% of the respondents had an experience of raw meat consumption. Human Taeniasis prevalence showed significant difference ($p<0.05$) with meat consumption and occupational status. In this analysis there was no significance difference between religion, education status, marital status, age, sex, awareness of community ($p>0.05$). The economic impact of Taeniasis from the estimates of yearly adult Taenicidal drugs dose of 22, 936 worthing a total of 67,950 Ethiopian birr. This study revealed that Niclosamide were the most frequently sold drug followed by praziquntel. Results obtained in this study confirm that cysticercosis has economic and zoonotic importance, so that routine meat inspection and keeping environmental sanitation should be implemented.

Key words: Taenia Saginata · Bovine · Cysts · Viability · Prevalence · Drugs · Risk Factors · Taeniasis · Questionnaire · Raw Meat · CysticercusBovis

INTRODUCTION

Bovine cysticercosis is a food-borne parasitic zoonosis caused by the larval stage of the tapeworm *Taeniasaginata*commonly referred to as the beef tapeworm. This larva is meat-borne and human infection results from the ingestion of raw or undercooked beef. This condition is associated with tissue infection and the larval stage is referred to as *Cysticercusbovis*. The *Cysticercusbovis*is of great public health significance especially in developing countries [1].

Cattle become infected by grazing on materials contaminated with *T. saginata* eggs, which can derived from human faeces directly or via sewage plants after flooding or sewage sediment distributed on pasture [2]. After ingestion, eggs hatch in the intestine and the oncospheres, librated from the eggs penetrate the intestinal wall and circulate through the lymphatic and blood stream. Finally, the larvae settle down in muscle tissue, the predilection sites are the masseter muscle, tongue, heart and diaphragm. The mature cysticercus, firstly, are transparent, but with time, the irritated tissue

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reacts by forming cyst walls around the parasites and the immune system of the host might kill the cysticercus over time, forming caseous or calcified cyst [3].

Bovine cysticercosis can only be detected during post-mortem examination of carcasses and remains one of the major causes of meat condemnation at the abattoir. The cysts can be seen with the naked eye, 2-4 weeks after infection, as nodules in the striated muscles, particularly of the chest, massetter, tongue, diaphragm and pectoral regions of cattle [4].*Taeniasaginata*cysticercosis is one of the zoonotic parasites of great importance in public health. In abattoirs, infected meat with *Cysticercusbovis* is considered of down grade. It may be subjected to freezing in localized infection cases or total condemnation of carcasses and offal in generalized ones [5].

Economic losses due to bovine cysticercosis are associated with total condemnation of carcasses with generalized infestation and downgrading of carcasses which are subjected to refrigeration, in addition to the cost of refrigeration and extra handling and transport [6, 7]. The treatment cost for human taeniasis and costs of manufacturing of drugs have significant contribution in estimation of economic losses [8].

Lack of awareness about raw meat consumption existence of highest population density, poor hygiene and sanitary facilities are some of the factors that facilitate to the transmission. The prevalence and intensity of bovine cysticercosis in cattle depends mainly on infection pressure and degree of protective immunity before reaching the age of grazing [9]. The prevalence reports of bovine cysticercosis in Ethiopia showed variable results with localities. Relatively lower prevalence of 3.1% Central Ethiopia Tembo [10], 4.9% at Gondar Dawit [11] and 7.5% in Addis Ababa Nigatu[12] were reported, while higher are 17.5% in East Shoa [13].

Even though a large proportion of Ethiopian population frequently takes Taenicidal drugs, there are limited systematic studies undertaken so far to evaluate the economic importance of *Tania saginata* infection through the inventory of pharmaceutical shops. There is lack of adequate information on the prevalence of Taeniasis particularly in the southern part of the country where raw meat consumption is so popular [14]. This necessitated the current study to investigate the status of Taeniasis among human population, potential risk factors for occurrences and to estimate the economic impact of the disease. Therefore: This cross-Sectional study was conducted with main objective of the following: To know the current status of Bovine cysticercosis in cattle that are found in jimma and around it, to determine prevalence of Taeniasis in human in and around Jimma town and to assess the socio-economic impact of taeniasis in jimma town.

MATERIALS AND METHODS

Study Area: A cross-sectional study was conducted on randomly selected animals slaughtered at Jimma municipal abattoir. Jimma zone is located at the south western part of the county in Oromia regional state. The town is located at 352 km south west of Addis Ababa, geographically located at 70° 13' and 80° 56' N latitude and 35°52' and 37°0 E longitudes. The area has an altitude ranging between 880 and 3358 meter above sea level. The annual rainfall is ranging between 1,200 to 2, 000 mm with minimum and maximum and annual temperature of 7°C to 30°C respectively. Jimma district has livestock population of 18, 354 Bovine; 1, 846 Caprine; 3, 310 Ovine; and 1, 490 Equine [15]. Slaughter animals were brought from different district of Jimma zone and nearby zones to Jimma municipal abattoir. The livestock production is characterized by extensive production system in which indigenous cattle are kept under traditional management system.

Study Population: A total of 547cattle was randomly sampled and routinely inspected for detection of the *T. saginata*cysticercosis. The study populations' were indigenous breed of cattle which are kept under traditional management system. The study animals were male which are originated from the around Jimmaweredas and nearby zones.

Study Design: A cross-sectional study was conducted from November 2013 to April 2014 to gather information about prevalence of *cysticercusbovis* and viability test of cysts and identifies potential risk factors for bovine infection. Using routine meat inspection technique in municipality slaughter houses *C. bovis*was detected in cattle slaughtered at Jimma municipal abattoir. Meat inspection was conducted in accordance with the procedures of Ethiopian Ministry of Agriculture Meat inspection Regulation (1972) for the detection of *T.saginata*/*Cysticercusbovis*.

Sampling Size: Sample size was calculated based on the formula given by Thrusfield[16] using simple random sampling method. Expected prevalence of 50% was

considered since the study conducted in previous time was fluctuating from one researcher to other. Finding of Tolosa that was conducted in 2007/2008 showed that Overall Prevalence rate was 2.93%. The other finding of Megersa[17] in the same study area indicates that 4.4 %.The sample size was calculated to be 384 but for more accuracy the sample was doubled by 50 % based on 95% confidence interval and precision levels of 5 %. In this study, 50% prevalence was considered to calculate the sample size using the following formula.

$$N = \frac{1.96^2 x p^{ex} p\,(1-p^{exp})}{d^2}$$

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

$$n = \frac{1.96^2 x\ 0.5(1-0.5)}{(0.05)^2} = 384.$$

Therefore, the sample was doubled by 50%, 547 animals were sampled and inspected during the study period for the presence *Cysticercusbovis* cyst in inspected organs.

Study Methodology: Antemortem inspection: The study animals were cattle which were presented to Jimma municipal abattoir for routine meat inspection. Prior to sampling, each selected animals an identification number was given and data on each animal: sex, age, breed, body condition and origin were recorded. Antimortem inspection was conducted in different states in static form, in motion and examination of all system.

Postmortem Inspection: During meat inspection, identified animals and their respective organs were strictly examined separately to avoid mixing up of organs. Meat inspection was conducted in accordance with the procedures of Ethiopian Ministry of Agriculture Meat Inspection Regulation (1972) for the detection of *T. saginata*cysticercosis. Carcasses of cattle slaughtered on these days were thoroughly and systematically inspected by visual examination, palpation and incision into organs such as the tongue, masseter muscles, myocardium, triceps, thigh muscles, diaphragm, liver, spleen. Visual inspection followed by multi-incisions of 0.5 cm in each organ (heart, diaphragm, shoulder, tongue, liver, kidney, lung and masseter muscle) were made to examine the cysts of *T. saginata*. Lesions consisting of cysticerci are 5-8 mm by 3-5 mm, translucid and filled with brownish fluid.

Viability Test of Cysts: All positive samples were taken to Jimma University Veterinary parastology Laboratory for confirmation of cyst viability. The cysts were placed in bile solution for overnight then incubated at 37°C for 1 - 2 hrs using 40% ox bile solution diluted in normal saline. Then, the scolex was examined under microscope by pressing between two glass slides. The cysts were regarded as viable if the scolexevaginate during the incubation period. Additionally, the scolex was checked whether it is *T. saginata*metacestode or other species based on the size of cysticercus and absence of hook on the rostellum of the evaginated cyst [18].

Economic Loss Evaluation Using Pharmaceutical Inventories: One of the possible sources of information to evaluate the economic feature is to carry out inventories of pharmaceutical shops, which still cannot reflect the actual economic impact of the disease as it only shows the loss due to drug cost. The treatment cost for human taeniasis and costs of manufacturing of drugs have significant contribution in estimation of economic losses [19]. To estimate the economic loss drug purchasing was performed by gathering information from 10 volunteerpharmacies and drug stores that are found in Jimma town. The types of drug sold more frequently, doses of drug sold per year and worthing of birr was recorded.

Questionnaire Survey: A cross-sectional study was conducted by a structured questionnaire survey to assess the prevalence of *T. saginata*/taeniasis, associated potential risk factors and its public health importance.

Questionnaire survey on the disease occurrence and risk factor assessment was administered on 86 volunteer respondents from who randomly selected individuals. Efforts were made to include respondents of different. risk factors for Taeniasis such as age, sex, religion, occupation, habit of raw consumption, frequency of raw meat consumption, income per month, awareness of the raw meat consumption and the way of prevention and control In this study the less educated group includes those who attend the informal and elementary education; and more educated ones those who attended high school and college and university level educations.

Data Management and Analysis: Abattoir data were collected and recorded on Microsoft Excel spread sheet. The outcome variables for the abattoir study were cases *of T. saginata*cysticercosis detected during routine postmortem inspection. Sex, age, body condition, breed and origin of the animals were regarded as the explanatory variables. The prevalence of the disease was determined and various potential risk factors for cysticercosis in animals and *T. saginata* infection in humans were analyzed by SPSS Version16.00. Questionnaire survey data were recorded in Microsoft excels and analyzed by SPSS Version.

RESULTS

Prevalence of Cysticercusbovis: The study was conducted from November 2013 to April 2014 in Jimma Municipal Abattoir. A total of 547 cattle were inspected, 28 of them were positive for *cysticercusbovis*. Overall prevalence is 5.1%, had varying numbers of metacestodes of *T. saginata*. No significant difference ($p > 0.05$) was observed in the prevalence of cysticercosis in relation to the risk factors: sex, Origin, breed, body condition and ages as shown in Table 1.

The prevalence of bovine cyticercosis was 3.8% of good conditioned animals, 7.6% of medium and 7.1% of poor body conditioned animals were positive for *Cysticercusbovis* as indicated table1.out of examined animals higher infection rate was observed in adult animals which is 5.7% than older animals 2.2% as indicated in Table 1.

Cysticercusbovis were found in different organs; however its presence was maximum in triceps muscle. In this study most animals had cysts on triceps. Out of 28 positive animals 16 them had cysts on triceps muscles(2.9 %), 13 of them had cysts on longisimus muscle (2.3 %), 2 of them had cysts on thigh muscle (0.03 %), 1 animal on heart muscle 0.001 % as shown in Table 2.

Out of 102 cysts 44 (43.1%) were found in the triceps muscle, followed by 34 (33.3%) in longisimus, 15(14.7%)) in thigh muscle, 3 (2.9%) in each (liver, diaphragm and heart muscle).

Among the 86 interviewed volunteer respondents, 50 (58%) had contracted tapeworm infection in the course of their lives. The majority of the respondents consumed raw meat as a result of traditional or cultural practices. The chi-square analysis of the risk factors showed a statistically significant difference ($p < 0.05$) in the prevalence of Taeniasis with regard to occupational risks and raw meat consumption. In this analysis there was no statistically significant difference ($p>0.05$) between different age groups, economical status, religion, sex, educational level, awareness of risk raw meat consumption and knowledge of how to prevent and control.

As Table 4 indicated, Stastical analysis showed that the prevalence of *Taeniasaginata* was insignificant with different age groups, sex and religion of respondents ($P>0.05$). (42.9% of respondents were positive between ages of 15-25, 43.8% were between 25- 40 years and 69.7% were beyond 40 years old..As shown table 4 higher prevalence of Taeniasis was o bserved in respondents

Table 1: Prevalence of bovine cysticercosis in cattle based on body condition and age

Risk factor	No.of examined	No.of affected	Prevalence	X^2	p- value
Body condition					
Good	345	13	3.80%		
Medium	132	10	7.60%		
Poor	70	5	7.10%	3.527	0.171
Total	547	28	5.10%		
Age					
Adult	454	26	5.70%	0.154	2.033
Old	93	2	2.20%		
Total	547	28	5.10%		

Table 2: Frequency distribution of *cysticercusbovis*in different organs and tissue of affected animals.

Organs/carcasses	No.of infected animals	%	No. of cyst	%	Viable
Triceps muscle	16	2.9	44	43.1	10 (29.4%)
Longisimus	13	2.3	34	33.3	30 (68.1%)
Thigh muscle	2	0.03	15	14.7	5 (33.3%)
Diaphragm	1	0.001	3	2.9	0%
Liver	1	0.001	3	2.9	0%
Heart	1	0.001	3	2.9	0%
Total(44.1%)	34	5.1	102	100	45

Table 3: Prevalence of human Taeniasis inhuman based age, sex and religion

Risk factor	No. of Respondents	No. of infected	prevalence	x^2	p-value
Age					
15- 25	21	9	42.90%	0.366	0.601
25- 40	32	14	43.80%		
> 40	33	18	69.70%		
Total	86	41	47.60%		
Sex					
Male	78	38	48.70%	0.366	0.545
Female	8	3	37.50%		
Total	86	41	47.60%		
Religion					
Orthodox	34	16	47.10%	0.03	0.98
Protestant	13	6	46.20%		
Muslim	39	19	48.70%		
Total	86	41	47.60%		

Table 4: Prevalence of humanTaeniasis based on occupational status and habit of raw meat consumption.

Risk factor	No. ofrespondents	No. of infected	prevalence	X^2	P-value
Habit of raw meat consumption				0.035	0
Consume raw meat	64	41	62.50%		
Don't consume	22	0	0%		
Total	86	41	47.60%		
Occupational status				13.03	0.011
Abattoir worker	10	8	80%		
Butcher men	6	5	83.30%		
Farmer	12	4	33.30%		
Employee	27	17	63%		
Others	36	11	30.60%		
Total	91	45	49.50%		

Table 5: Prevalence of human Taeniasis based on marital status and educational level

Risk factor	No. of respondents	No. of infected	Prevalence	χ^2	P-value
Marital status					
Single	34	15	44.10%	0.366	0.545
Married	47	22	46.80%		
Divorced	1	1	100%		
Widow	4	3	75%		
Educational level					
Illiterate	14	4	30.30%	4.89	0.305
Primary school	25	13	52%		
Secondary school	19	9	47.40%		
College/graduates	28	15	53.60%		
Total	86	41	47.60%		

beyond the age of 40. Out of interviewed individual, 48.7 % of male and 37.7% of female were positive for Taeniasis. Exposure rate in Muslims 48.7%, in orthodox 47.1% and in Protestants 46.2%.

There was statically significant difference in prevalence of Taeniasis with different occupational status and habit of raw meat consumption. The prevalence was higher in occupationally exposed group than none exposed. Out of interviewed individual 80 % of abattoir workers were positive for Taeniasis and 83.3% in butcher, 33.3% in farmer, 63% in employee and 30.6% in other occupationals as shown in Table 5. Out of 86 volunteer interviewed respondents 64 (74.4%) of them consume raw meat, out these, 41(62.5%) them were infected with Taeniasis and 22 of them don't consume raw meat as indicated Table 5.

Table 6: Prevalence of human Taeniasis based on awareness risk of raw meat Consumption

Risk factor	No. of respondents	No. of infected	prevalence	X^2	P-value
Awareness of risk of raw meat Consumption				0.035	0.853
Aware	60	29	48.3%		
Don't aware	26	12	46.2%		
Total	86	41	47.6%		

Table 7: Pharmaceutical inventories of Taenicidal drugs doses with their respective costs

	Name of pharmacy									
	Lukas		Hayujimma Dembal							
Eman Anbesa	Dose	Birr	Doses	Birr	Doses	Birr	Doses	Birr	Doses	Birr
Niclsosomide	720	2160	360	720	720	1440	720	2160	360	1080
Praquantel	1080	1080	360	2160	720	1200	720	2520	360	2880
Albendazole	360	720	360	1080	-	-	-	-	360	360
Menbendazole	360	720	-	-		360	720			2160
Vermox								1440		
Total	2520	4680	1080	3960	1440	2640	1800	5400	1440	7560
	Red cross		Sina							
Betelium Tsinu Milkem	Doses	Birr	Doses	Birr	Doses	Birr	Doses	Birr	Doses	Birr
Niclosomide	1080	3240	360	5760	84	252	1800	4500	720	1440
Praziquantel	1400	8640	360	2880	84	504	1080	4536	720	2520
Albendazole	1800	3600	720	8640	84	504	1440	6480	-	-
Menbendazole	-	-	-	-	84	252	-	-	-	-
Total	5,360	18,720	1, 800	17,740	336	1, 512	5,400	17,676	1,800	5,000

There was no significance difference was observed between marital status and educational level of the respondents. Prevalence was higher in divorced and widow than other, 100% and 75% respectively. Prevalence of Taeniasis was, 53% in college or university graduates, 52% in primary school and 47.4% in secondary school observed.

Out of 86 volunteer interviewed respondents 60 (69.7%) of them have known the risk eating raw meat, 41 (62.5%) of them were positive for Taeniasis and 26 of respondents didn't aware of the risk of raw meat consumption of these 46.2% of them were infected with Taeniasis as shown in Table 6.

Economic Loss Evaluation Using Pharmaceutical Inventories: An inventory of pharmaceutical shops (pharmacies and drug stores) was conducted in Jimma town. This inventories was conducted in 10 volunteer pharmacies and drug stores. Estimates of yearly adult Taeniacidal drug doses and their costs were recorded through personal interviews with individuals in charge of their sales, using their records for the year of 2013/2014. A total of 22, 936 adult Taeniacidal drug doses were sold for a total of 67, 905 Ethiopian Birr (Table 8). Mebendazole doses of 1, 164 were sold for 2,880EB, Niclosomide doses of 6, 924 were sold for 22,752EB (Vermox® Doses of 2, 880 were sold for 7, 550) and Niclosamide doses of 6, 924 were sold for the most frequently sold drugs for the treatment of Taeniasis and praziquantel doses of 6, 884 were sold for 22, 752 was the second sold drug in this town as indicated in Table 7.

DISCUSSION

The overall prevalence of *Cysticercusbovis* among the carcasses inspected at Jimma municipal abattoir was found as 5.1%, this study in agreement with finding of Megersa in the same study area (4.4 %), Dawit, [11] in Gondar (4.9%), Alula [20] 5.4% at Kombolcha. However, the present study showed lower prevalence than the findings of Getachew [21] from DebreZeit (13.8%), Hailu [13], Ahmed [22] from Nekemt (21%) and Abunna [14] from Hawassa (25%). Inversely, lower prevalence than this study was reported from developed countries, such as 0.48-1.08% in Germany Abusier[23] and 0.9% in Cuba [24].

Regarding the predilection site of the cyticercus in the intermidiate hosts, many researcher come with different results. Ahmed [22], Hailu [13] and Amsalu [25] reported that tongue is frequently affected by cyst.

The present study which was carried out in Jimma municipal abattoir revealed that higher prevalence of *Cysticercusbovis* were found in triceps muscle 44 out of 102 cysts, followed by longisimus (34/102) muscle, thigh muscle 15/102, diaphragm 3/102, heart and liver 3/102 for each. In this study most frequently affected organ was triceps muscle. This study finding is in line with finding of Getachew [21] and Abunna[14] indicated that the triceps being most frequently affected muscle. According to Gracey *et al.* [26] cattle throughout Africa, important predilection site are the triceps muscle, this is due long journey of animals in search of feed, muscle activity increases which increases blood flow to triceps muscle which facilitates distribution of onchosphere to triceps muscles. The variations in anatomical distribution depend on a number of factors, such as blood kinetics and animals' daily activities, age, breed and the geographical area concerned and parasite strain. Any geographical and environmental factors affecting blood kinetics in the animal affect the distribution of oncospheres as well and hence the predilection sites [27]. According to Wanzala *et al.* [28] all the parts of carcasses were equally important as predilection sites for cysticerci and could be equally used during routine meat inspection at slaughter houses except for rumen, fat layers, spleen and skin. Another reason for difference in distribution of cysts could be skills and motivation of meat inspector, the speed of the slaughter activity and meat inspection facilities are among the contributory factors [29].

Body condition scores of the animals were found as statically insignificant ($p>0.05$). This is due to the fact that all animals that were brought to slaughter house from the same management system kept under extensive management system hence, all animals have equal chance of acquiring eggs of *Taeniasaginata* during grazing in the pasture. In contrast to this finding, Abunna [14] reported that Prevalence of *cysticercusbovis* is higher in poor body conditioned than animals which are good body conditioned. This is due to the emaciated carcass and organs of these, animals where it is easier to detect the cysts compared to fatty and well-conditioned animals.

A well-formulated questionnaire is an important tool for the detection of *T.saginata*in the carrier population, in individual cases as in mass investigations [30]. The prevalence of human Taeniasis was recorded based on the questionnaire indicated an overall infection rate of 58.1% which indicates that the importance of Taeniasis in Jimma town and surrounding kebeles. The result of this study slightly agrees with the finding of Abunna [14] who reported an overall infection rate of 64.2% in Hawassa town. However, the infection rate in the present study was relatively lower than the finding of Hailu, [13], 79.5% in East Shoa and Dawit [11] 69.2% who reported in Gondar. On the other hand Regassa *et al*. [31] reported a lower prevalence of 50.6% in Wolaitasoddo town. The reason for this variation may be related to the habit raw meat consumption, hygienic status of the community, management system of cattle, the level of environmental contamination and degree of awareness of different societies about Taeniasis transmission. Moreover, some individuals in a society may become shy to tell openly about Taeniasis infection and that may undermine the true infection rate of the disease.

In this study no statistically significant difference were observed between the proportion of taeniasis in Muslim and Christian community. This result is in line with the finding in Ethiopia [14,13,10]. The reason behind the similarity of different religion group may be they share same culture and habit of raw meat consumption in the study area regardless of their religion. However, According to Regassa [31] reported that Christians had more Taeniasis than Muslims. The conflict between the two studies might be due to differences in the study methodologies and sample size determination.

In this study there was no statically difference was observed between those who award and didn't aware the risk of raw meat consumption. This indicates that lack of awareness is not contributory factor for the prevalence the Taeniasis in the society rather than deep rooted raw meat consumption. In Ethiopia, even professionals who aware of risk of raw meat consumption (veterinarians and medical professionals) often consume raw meat to enjoy with their relatives and friends during festivals and other occasions. So that to prevent and control Taeniasis routine meat inspection should be applied in all abattoirs found in the country.

In this study there was no statically significant difference was observed between sexes. Hailu [13], Dawit [11] and Tembo [10] in Ethiopia and Fan [32] in Taiwan reported a higher prevalence of Taeniasis in males than females in contrast to the finding of [26] Who reported that females were found to be more frequently affected than males in a ratio of 2:1 in contrary to the report of others, significant variation was not observed between the two sexes, perhaps as there was no difference between them with regard to meat consumption in restaurants. Additionally, males often invite their female partners outside the homes.

CONCLUSION AND RECOMMENDATION

The overall prevalence of bovine cyticercosis in cattle at Jimma Abattoir was found to be 5.1%. Stastically analysis showed that there were no significant difference was observed in prevalence of bovine cysticercosis between different age group and body condition. The prevalence of taeniasis in human was found to be 58 %. This prevalence was associated with occupational exposed group and habit of raw meat consumption. There were no significant difference was observed between different age group, sex, religion, educational level, marital status and awareness of taeniasis.

Economic evaluation was estimated using pharmaceutical inventories. Annual taenicidal drug doses of 22,936 worthing 67, 905 Ethiopian birr. Based on findings of this study it can be concluded That, the prevalence of *Taeniasaginata*cysticercosis is associated with the habit of eating raw beef such as kitfoand kourt, lack of adequate meat inspection, defecation in bushes and backyard slaughter might have contributed for the high prevalence in cattle and human. The abattoir survey, Questionnaire surveys and pharmaceutical inventories showed that *T. saginata*was important parasitic disease in the area in terms of its consumers had contracted taeniasis.

Therefore, based on above conclusion the following recommendations are forwarded:

- Routine meat inspection should be applied in all slaughter houses.
- The farmer should be encouraged to engage in intensive management system rather than extensive system of animal production to reduce exposure rate.
- Construction of sanitary latrines in the rural areas should be encouraged and improve meat inspection procedures with all parts of various carcasses need is considered.
- Traditional slaughtering in the rural area should be replaced with modern slaughter houses.
- Cattle should be restricted the access of the cattle to surface drinking water and by supplying them with fresh water instead.

REFERENCES

1. Engels, D., C. Urbani, A. Belotto, F. Meslinand and L. Savioli, 2003. The control of human neurocysticercosis: which way forward? Acta Tropica, 87:177-182.
2. EFSA (European Food Safety Authority), 2006. "Opinionof the scientific panel on biological hazards welfare (AHAW) on "Review of the community summary report on trends on sources of zoonses, Zoonotic in 2004.
3. Mcgavin, M.D., W.W. Cartton and J.F. Zachary, 2001. "Muscle. Ini Thomson's Special Veterinary Pathology. "2nded.
4. Belino, E.D., 1997. Some observations on *Taeniasaginata* cysticercosis in slaughtered cattle in Nigeria. International Journal of Zoonoses, 2(2): 92-99.
5. Wanzala, W., N.M. Kyule, K.H. Zassin, A.J. Onyango-Abuje, K.E. Kangoethe, H. Ochanda and J.S. Harrison, 2006. Evaluation of Cysticercosis in Kenyan cattle." Parasitology Reseach.
6. Giesecke, W.H., 1997. Prevalence and economic implications of Taeniasis (cysticercosis in South Africa.
7. Dorny, P., N. Praet, Deckers and S. Gabriel, 2009. Emerging food-born parasites. Veterinary Parasitology, 163: 196-206.
8. Cabaret, J., S. Geerts, M. Madeline, C. Ballandonne and D. Barbier, 2002. The use of urban sewage sludge on pastures: The cysticercosis threat. Veterinary Research.
9. Jones, T.C., R.D. Hunt and W.K Norval, 1997. Veterinary Pathology. 6th ed. Hong Kong: Lippincott Williams and Wilkings 1st ed. USA: Mosby, 431: 651-54.
10. Tembo, A., 2001. Epidemiology of *Taeniasaginata*, Taeniasis/ Cysticercosis in Three Selected Agro Climatic Zones. Faculty of Veterinary Medicine, Free University of Berlin, Berlin: MSc Thesis.
11. Dawit, S., 2004. Epidemiology of *Taenia Saginata* Taeniasis and Cysticercosis in North Gondar Zone, North West Ethiopia. Faculty of Veterinary Medicine, Addis Ababa University, Debrezeit, Ethiopioa: DVM Thesis.
12. Nigatu, K., 2004. C. Bovis: Development and evaluation of serological tests and prevalence at Addis Ababa Abattoir. MSc Thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debrezeit, Ethiopia.national Training Course. V.II, Moscow.
13. Hailu, D., 2005. Prevalence and risk factors for *T. saginata* cysticercosis in three selected areas of eastern Shoa. Addis Ababa University, Faculty of Veterinary Medicine, DebreZeit, Ethiopia, MSc Thesis.

14. Abunna, F., G. Tilahun,B. Megersa and A. Regassaa, 2007. Taeniasis and its Socio economic implication in Hawassa Town and its Surroundings, Southern Ethiopia. East African Journal of Public Health, 4(2): 73-79.
15. Central Statistical Authority (CSA), 2003. Livestock population of Ethiopia, Central StatisticAuthority, Addis Ababa, Ethiopia.
16. Thrusfield, M., 1995. Veterinary Epidemiology. 2nd ed. Blackwell Science.
17. Megersa, B., E. Tesfaye, A. Regassa, R. Abebe and F. Abunna, 2011. Bovine cysticercosis in cattle slaughtered at Jimma municipal abattoir, South Western Ethiopia: Prevalence, cyst viability and its socio-economic importance. Veterinary World, 3: 257-262.
18. OIE, 2004. Cysticercosis: In Manual of Diagnostic Tests and Vaccines for Terrestrial Animals.
19. Cabaret, J., S. Geerts, M. Madeline, C. Ballandonne and D. Barbier, 2002. The use of urban sewage sludge on pastures: The cysticercosis threat. Veterinary Research.
20. Alula, A., 2010. Major Metacestodes in Cattle Slaughtered at Kombolcha ELFORA Abattoir, North East Ethiopia: prevalence, cyst viability, organ distribution and socio economic implication. Faculty of Veterinary Medicine, Hawassa University, Hawassa, Ethiopia, DVM Thesis.
21. Getachew, B., 1990. Prevalence and significance of *Cysticercusbovis* among cattle slaughtered at Debrezeit Abattoir. Addis Ababa University, Faculty of Veterinary Medicine, DebreZeit, Ethiopia: DVM Thesis.
22. Ahmed, I., 1990. Bovine Cysticercosis in Animals Slaughtered at Nekemte Abattoir. DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit.
23. Abusier, S., C. Epe, T. Schnieder, G. Kedein and M. Kühne, 2006. Visual Diagnosis of *Taeniasaginata* Cysticercosis during meat inspection. Parasitology Research, 99: 405-409.
24. Sau'rez, H.M. and R.M. Santizo, 2005. Epidemiology of the *Taeniasaginata* complex and C. bovis in Ciego De Avila province of Cuba. Rev Pathology Tropic, 34: 43-52.
25. Amsalu, D., 1989. Prevalence and Significance of *Cysticercusbovis* Among Slaughtered Cattle at Debrezeit Abattoir. Faculty of Veterinary Medicine Addis Ababa University, Debrezeit, Ethiopia DVM Thesis.
26. Gracey, J.F., D.S. Collins and R.J. Huey, 1999. Meat Hygiene. 3rd edition.W.B. Saunders Company Ltd: pp: 669-678.
27. Scandrett, B., S. Parker, L. Forbes, A. Gajadhar and P. Dekumyoy, 2009. Distribution of *Taeniasaginata* cysticerci in tissues of experimentally infected cattle.Veterinary Parasitology, pp: 223-231.
28. Wanzala, W., J.A. Onyango-Abuje, E.K Kang'eth, K.H. Zessin, N.M. Kyule, M.P.O. Baumann, H. Ochanda and L.J.S. Harrison, 2003. Control of *Taeniasaginata* by post-mortem examinaton of carcasses. Jornal of Africa health science, 3(2): 68-76.
29. Oryan, A., N.S. Gaur, N. Moghadar and N.H. Delavar, 1998. Clinco-Pathological Studies in Cattle Experimentally Infected with *Taeniasaginata* eggs. Journal of East Africa Veterinary Association, 69(4): 156-162.
30. Frolova, A., 1982. Epidemiology of Taeniasis: Zoonoses Control Collection of Teaching Aids for International. Moscow.
31. Regassa, A., F. Abunna, A. Mulugeta and B. Megersa, 2009. Major metacestodes in cattle slaughtered at WolaitaSoddo Municipal abattoir, Southern Ethiopia: Prevalence, cyst viability, organ distribution and socioeconomic implications. Tropical Animal Health and Production, 41: 495-1502.
32. Fan, P., 1995. Annual Economic loss caused by *Taeniasaginata*asiaticataeniasis in three endemic areas of East Asia. Southeast Asian Journal of Tropical Medicine and Public Health, 28/1: 217-221.