Prevalence and Public Health Significance of
Cysticercus Bovis in and Around Debreberhan City

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Abstract: A cross sectional study was conducted during November 2010 to March 2011 to estimate the prevalence of *Cysticercus bovis (C. bovis)*, the larval stage of *Taenia saginata* (*T.saginata*) and its public health significance in and around Debreberhan cityadministration. Data were collected from abattoir, hospital and questionnaire survey to accomplish the study. Of the total 384 inspected cattle, 18 found to have *C. bovis* giving an overall prevalence 4.64%. Anatomical distribution of the cyst showed that highest prevalence of *C. bovis* was observed in shoulder muscle, followed by masseter muscle, tongue and heart. The prevalence was slightly higher in adults (6.77 %) than in young (2.24%), in females (7.45%) than in males (3.79%) But there were no statistical significant difference in prevalence between sex and organ distribution of the cyst. Of the total 384 human patients from whom secondary data were collected in Debre berhan referral hospital, 1.82% was infested by *T. saginata*. The prevalence was slightly higher in age group under 5 years(12.5%) followed by between 6 and 18(3.70%), 19 and 44 years(1.37%), zero prevalence in age group above 45, higher in females (2.57%) than in males (1.05%). But the analysis showed that no statistical significant difference in prevalence between sexes. Of the total 80 interviewed respondents, 27.5% (22/80) had contracted *T. saginata* infection, of which, the prevalence was 42.86% in age group above 45years, 10.8% between 15 and 24, 34% in males, 16.67% in females, 66.67% in farmers, 4.54% in students are higher and lower prevalence respectively. The majority of the respondent had an experience of raw meat consumption as a result of traditional and cultural practice. Human Taeniasis prevalence showed significant difference (p<0.05) with age groups, raw meat consumption, occupation and marital status. In this analysis there was no significance difference between sex, education level, usage of toilet and sources of carcass (p>0.05) in the prevalence of *T.saginata*. The findings of this study including prevalence of *C. bovis*, questionnaire survey of taeniasis prevalence and prevalence of *T. saginata* in human from the hospital survey in the study area indicated, even though relatively lower prevalence, the importance of Cysticercosis and Taneniasis both in public health and economical aspects. Therefore, due attention should be given to the public awareness and strict routine meat inspection in order to safe guard the public health.

Key words: Bovine *Cysticercosis* · Meat inspection · Public health · Prevalence · Survey

INTRODUCTION

The nation's domestic meat consumption of about 45% comes from cattle, which generates export income from the sales of live animals. In foreign trade, although the country is ideally placed to export animals to the markets of the Middle East and substantial markets of north and West Africa, export earnings is relatively low. This is mainly due to the presence of a number of unproved animal health problems, among which, *T.* *saginata /c. bovis* is one that remains a major public health problem [1].

Cysticercosis affects both the health of the consumer and more significantly the country's economy, which approach 30% when allowance is made for the loss in the carcass weight and the cost of freezing the infected meat [2].

T. saginata cysticercosis is found almost all over the world albeit at very low prevalence in developed countries. Moderate prevalence levels are seen in

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southern Asia. High prevalence rates are occurring in sub-Saharan Africa, especially in Eastern Africa where it causes an important economic loss due to contamination of meat [3]. Cysticercosis is significantly more prevalent in feed lot and in traditional farming systems than in dairy farms. It is suggested that the continuous man to animal contact and the use of causal workers in feed lots may be factors that are conducive to *T. saginata* transmission [4]. *T. saginata* infection or beef tape worm has been known in Ethiopia for many centuries with variable prevalence in different localities [5].

Taeniasis, human infestation with the adult tape worm *T.saginata*, is observed both in rural and urban areas. The disease caused by this parasite is locally known as "kosso" and is mainly related to the cherished and honored tradition of eating raw meat in most parts of the country [6]. The occurrence of the larvae of *T.aenia saginata* in cattle musculature causes *T.saginata* cysticercosis or bovine cysticercosis while the adult worms in human small intestine cause Taeniasis [7]. In humans, *T. saginata* infestation is accompanied with mild symptoms ranging from nausea, abdominal discomfort, epigastic pain, diarrhea, vitamin deficiency, excessive appetite or loss of appetite, weakness and loss of weight to digestive disturbances and intestinal blockage (Neva and Brown1994). However, in cattle, heavy infestations by *T. saginata* cysticercosis may cause myocarditis or heart failure [8]. Although the cyst may occur anywhere in the striated muscle, the predilection site, at least for the view point of routine meat infection are heart, tongue, masseter and shoulder muscles [9].

The life cycle and transmission of the parasite occur most commonly in the environments characterized by poor sanitation, primitive livestock husbandry practices and in adequate meat inspection, management and control policies [10].In Ethiopia bush defecation, the habit of eating raw beef dishes such as kitfo and kourt and backyard slaughter might have contributed for the high prevalence of bovine cysticercosis [11].

It has economic significance as well as the economic losses accruing from the condemned and downgraded carcasses and due to treatment of carcasses before human consumption are substantial [12-14].

Generally to reduce the transmission of taeniasis/ bovine cysticercosis, public education to avoid consumption of raw meat and use of latrines and improved standards of human hygiene is recommended. However, nothing is known, no information recording was there about the dynamics of prevalence of *C. bovis* in and around Debre berhan city administration.

Therefore the Objective of this Study Was Initiated:

- To provide information in the prevalence and assess public health significance of Bovine cysticercosis/*T, saginata* in and around Debreberhan city administration.
- To forward scientific recommendations to all stake holders to control the problem and help to overcome the implication that will bring about the disease.

MATERRIALS AND METHODS

Study Area: The study was conducted in and around Debre berhan, 130 km North-east of Addis Ababa. It is located 9°36″ North altitude and 39°36″ East longitude. The area is plateau and found in central Ethiopia at an altitude of 2780 meters above sea level with a bimodal rainfall pattern consisting of along rainy season ("keremit") from June to September and short rain season("belig") extending February to March. The mean annual temperature 12.6°C (6.3°C-18.8 °C), rainfall 956mm and relative humidity 59.6 were recorded [15]. In the area, extensive management system is dominant, while semi-intensive and intensive systems are rarely practiced.

Study Design: The cross sectional type of study was done for the assessment of risk factors and determination of prevalence of *C. bovis* in the study area. For the determination of prevalence, cattle that came to Debre berhan abattoir from different parts from around the study area were used and for the assessment of public health significance of the disease volunteer people in the area with different age group, sex, occupations including farmers are involved.

Sampling Technique
Active Abattoir Data: The abattoir is found at the periphery of the town to the direction of Addis Ababa on the right side of the main road. The abattoir is engaged in slaughtering of small ruminants at day time and cattle at night usually starting from 8 pm. On average 30 cattle are slaughtered daily except Wednesday and Friday. Therefore some of the cattle slaughtered during the study period were included in active abattoir survey. A total of 384 animals were included in the study. Prior to slaughtering cattle were randomly selected and registered for their identification number, age and sex. During meat inspection, the already selected animals and their respective organs were strictly cross checked and examined, this was to avoid the unnecessary mixing with

organ intended to be inspected. During post mortem inspection, palpation of the organs followed by incision was made to examine for the presence *C. bovis,* to the guideline by Ministry of Agriculture [16], for masseter muscle, deep linear incision were made parallel to the mandible; the heart were incised from base to apex to open the pericardium and incise also made in the cardiac muscle for detail examination. The Deep, adjacent and parallel incisions were made above the point of elbow in the shoulder muscle. When the cyst encountered, it was registered.

Hospital Passive Data: Data was routinely collected from Debreberhan Referral hospital in the study period from October 2010 to March 2011. 384 samples were selected with systematic random sampling technique, in which the first four patients that were coming to hospital from different areas in and around the town, four times in a week in the study period. These sampling units were observed for the presence of eggs of *Taenia species* in their stool by direct fecal smear preparation by the Parasitological laboratory department technicians of the hospital. The sampling units were registered for their age, sex and presence or absence of eggs of *Taenia species.*

Questionnaire Surveys: A total of 80 individuals from different social groups like, farmers, students, merchants, daily laborers, government employers, cookers and slaughter workers were included in the interview using a questionnaire developed before interview. Volunteer were briefed about the objective of the interview. The questionnaire were targeted on previous experience of the disease, traditional habit of raw meat consumption, marital status, age, sex, occupation with respect to contact with the raw meat.

Data Analysis: Abattoir data, hospital data and questionnaire survey result was inferred in to Microsoft Excel (MS-excel) work sheet. Age and sex of cattle in which the cyst were identified and organs of the animal which contain cyst, age and sex of human from which the stool contained eggs of T*taenia species* in case of patients that came to the hospital and sex, age, marital status, occupational related responses were registered and coded. Statistical package for social science version 16(SPSS-16) and Stata 8 was used to show and analyzed the data using statistical tools like, chi squire(x^2) and P-values less than 0.05 were used as a measure of statistical significance.

Sample Size Determination: The total numbers of cattle from the abattoir and patients from the hospital required for the study was calculated based on the formula given by Thrusfield [17] using random sampling method. In this study, 50% prevalence was considered to calculate the sample size using the following formula.

N= 1.962xpexp (1-pexp)/ d2 Where n=required sample size

Where
P^{exp}= expected prevalence
d^2 =desired absolute precision
n= 1.962x 0.5(1.0.5)/ (0.05)2 = 384 animals from the abattoir and patients from the hospital are selected by using simple random and systematic random selection methods. 80 volunteer individuals were also included in questionnaire survey.

Ethical Considerations: Ethical clearance was gained from University of Gondar, Debre berhan Referral Hospital and Debre berhan city administration. All respondents who participated in the study were asked for their willingness to participate in the study. All the reasons why the respondents were chosen and why the research was explained in the questionnaire to the study subjects. Additionally confidentiality of all the data to be gained was seriously respected.

RESULT

C. bovis **Prevalence:** Of the total of 384 inspected animals in Debre berhan abattoir, 18animals had varying number of *C. bovis* with an overall prevalence of 4.64 (18/384).

Prevalence of *C. bovis* by Age and Sex of Animals: Cattle were presented to Debre berhan Abattoir for routine meat inspection from in and around the town. The result of the present study revealed that there was statistically significant difference (P<0.05) observed among the animals of different age groups and no statistical significance difference (p>0.05) among sex of cattle in the prevalence of the disease as indicated in the following table 3.

Prevalence of *C. bovis* by Type of Organ: Analysis of the active abattoir survey showed that there was no statistically significant variation in the anatomical distribution of *C. bovis* in organs inspected as shown in table 4.

Table 3: Proportion of bovine carcasses infected with *C. bovis* with by age and sex category

Variables		No of inspected	No of infected	Prevalence	chi- square	p- value
Age group	Young	178	4	2.24	4.4661	0.035
	Adult	206	14	6.77		
Sex	Male	290	11	3.79	2.1919	0.139
	Female	94	7	7.45		

Table 4: Proportion of carcasses infected with *C. bovis* by types of organs, 2011

Organ	Negative	Positive	total
Diaphragm	376	8	384
Heart	372	12	384
Intercoastal muscle	379	5	384
Masseter muscle	367	17	384
Tongue	369	15	384
Triceps muscle	366	18	384

χ^2=11.4 P= 0.051

Table 5: Proportion of human patients infected with eggs of *Taenia saginata* by age and sex

Variables		No. of Examined	No. of infested	Prevalence (%)	$?^2$	P- value
Age group (years)	<5	16	2	12.5	13.27	0.004
	5-18	54	2	3.70		
	19-44	219	3	1.37		
	>45	95	0	0		
Sex	M	190	2	1.05	1.246	0.264
	F	194	5	2.57		

Table 6: Proportion of *Taenia saginata* contracted respondents with their age

Age group (year)	Total no.of Respondents	No. of Taenia contracted	Prevalence (%)	Chi-square value	P-value
15-24	37	4	10.8	9.6208	0.022
25-34	24	10	41.67		
35-44	12	5	41.67		
>45	7	3	42.86		

***T. saginata* Prevalence:** Secondary data was routinely collected from Debreberhan Referral Hospital from patients that were coming in the study period. Of the total 384 selected patient samples on the 7 human taenia eggs were found under direct stool examination with over all prevalence of 1.82% (7/384). The result of this study revealed that there was statistically significant difference (P<0.05) observed among the human patients of different age groups and no statistically significance difference (p>0.05) among sex of cattle in the prevalence of the disease as indicated in the following table 5.

Questionnaire Survey: A total of 80 volunteer respondents of the residents of Debre berhan and in the surrounding, who were participated on different working environments, farmers, students, merchants, daily laborers, government employers, cookers and slaughter workers were included in this particular study. About 27.5 % of the interviewed respondents had experience of contracting *T. saginata* at least once in their life.

Age: Statistical analysis showed that the prevalence of *T. saginata* was significant with different age groups of respondents (P<0.05).The aged groups above 45 (42.86%) (Old age group) years followed by between the age of 25-44 years (25-34and 35-44 years) (41.67)of the respondents (had relatively higher infection rates compared to those the respondents between the age 15-24 years (10.8%) as is indicated on the following table 6.

Sex: According to the interview conducted the prevalence of *T. saginata,* was found that sex had no significant difference (p>0.05) on the prevalence of *T. saginata* taeniosis. Females were less affected compared to male respondents as indicated (Table 7).

Table 7: The prevalence of *T. saginata* on sex differences

Sex	Totalno.of Respondents	No. of Taenia contracted	Prevalence (in %	Chi-square value	P-value
Male	50	17	34	2.8255	0.093
Female	30	5	16.67		

Table 8: The prevalence of *T. saginata* between different occupations

Occupation	Total no. of Respondents	No. of Taenia contracted Respondents	Prevalence (in %)	Chi-square value	P-value
Student	22	1	4.54	16.20	0.013
Cooker	8	3	37.5		
Merchant	9	1	11.11		
Farmer	9	6	66.67		
day laborers	8	2	25		
slaughter worker	6	3	50		
Governmental employees	18	6	33.33		

Table 9: Effects of raw meat consumption on the prevalence of *T.saginata,*

Rawmeat consumption	Total no. of Respondents	No. of Taenia contracted	Prevalence (%)	x^2	P-value
Consumed	56	22	39.26	13.0049	0.00
Not consumed	24	0	0		

Table 10: Effects of raw meat consumption on the prevalence of *T. saginata,*

Marital status	Total responden	No. taenia contracted	Prevalence (%)	Chi-square	p-value
Married	23	10	43.48	4.1336	0.042
Single	57	12	21.05		

Table 11: The prevalence of *T. saginata* between sources of carcasses for the respondents

Source of carcass	Total no. of respondents	No.Taenia contracted	Prevalence (%)	Chi-square	p-value
local butchers	59	13	22.03	4.4431	0.108
communal slaughter at village	7	4	57.14		
Home	14	5	35.75		

Occupation: In this study the occupation of the respondents was from different working condition that is, students, cookers, merchant, farmers, day laborers, abattoir workers and governmental employers. In this study the prevalence of *T. saginata* was higher in farmers (66.67) and relatively higher in slaughter worker (50), cooker (37.5) and governmental employers (33.33) as compared to others. Therefore the occupation had statically significance difference on the prevalence of taeniosis (P<0.05) as indicated in Table 9.

Raw Meat Consumption: Relatively most of the respondents had an experience of raw meat consumption as a result of this they infested by *T. saginata*. The statistical analysis of the raw meat consumption and taeniosis interaction was statically highly significant (P<0.05). Raw meat consumption is the favorite dish for most of the respondents and 70%of the respondents were the raw beef consumers and from these 39.26% had contracted the disease as indicated on Table 9.

Marital Status: There was statically significant difference between marital status and prevalence of taeniosis (P<0.05) in which it is higher in married respondents as indicated in (Table 10).

Source of Carcasses: The source of beef for most of the respondents from local butchers, some respondents slaughter at their home and few of them get from communal slaughter at village. Based on this study higher prevalence (57.14 %) was observed in respondents that have brought beef from communal slaughters and there was no statically significant difference observed (P>0.05) between Source of carcasses and prevalence of taeniasis.

Prevalence of Taeniosis by Educational Level, Usage of Toilet and Cattle Raising: Statistical analysis showed that the prevalence of *T. saginata* was significant between respondents of cattle raiser and non cattle raisers (P<0.05), no statistical difference between different educational level and usage of toilet (P>0.05).

Public Health Significance of the Disease: From Taenia contracted respondents; 22.72% once, 50% twice and 27.28% many times encountered in their life, many of them felt hunger, digestive upset, abdominal discomfort, anal pruritis, emerging tape worm segments and headache where as some felt only hunger pain and abdominal discomfort. The economic significance of the disease was in 72.73% taenia contracted respondents loss due to cost of treatments and in 23.27% absence from work and class. Again from taenia contracted respondents 68.18% has gone to clinic and the remaining not; 45.4% used modern drug, 27.3% used traditional medicine and the remaining 27.3% used both modern and traditional drugs to treat them when they felt pain of taenia.

Based on the questionnaire survey, there is no pig in their surrounding and nobody was found who likes to eat pork.

DISCUSSION

The occurance of C. bovis was 4%using meat inspection which reported among 75 examined cattle in Egypt. [13]. There were different results reported on the prevalence of bovine cysticercosis in Ethiopia by many Authors and researchers in different years. Hailu[18] in east Shoa (17.5%), Abunna et al. [19] in Awassa (26.25% Amsalu [20] in Gondar (10.6%), Nigatu [21] in Addis Ababa (7.5), Ahmed [22] in Nekemte (21%) and Dessie [2] at Assela (2.7%).

In this study, based on post mortem inspection bovine cysticercosis was detected on 4.64% of cattle presented for slaughter at Debre berhan abattoir. This finding is agreed with the previous Dawit [23] in Gondar (4.9%),and slightly higher than previous findings of Dessie [2] at Assela (2.7%). On the other hand extremely higher prevalence of C. bovis than this study was reported by Ahmed [22] in Nekemt (21%), Hailu [18] in east Shoa (17.5%) and Abunna et al., [19] in Awassa (26.25%). The reason for the lower prevalence of bovine Cysticercosis in this study might be relatively good management system and environmental hygiene applied in the study area. Another reason for the presence of difference in the prevalence bovine Cysticercosis might be due to many reasons such as time of occurrence (in the dry season higher than rain season) Nigatu [21], status of the people in the environment(keeping personal and environmental hygiene decreases the prevalence of the parasites), practical limitation of the number of incisions made during inspection (as excessive mutilation of the carcass reduce its market price) and inspection ability of the researchers [24].

Association of C. bovis with potential risk factors revealed significant relationship (p<0.05) with age being low in young (2.24%) than adult (6.77 %). This significant variation might be due to management and origin difference in which most of aged cattle comes from the rural part of the area (after the owners used for production and traction purpose) around Debreberhan city administration (area which has relatively poor management practice in keeping environmental hygiene) while the youngest mostly brings for slaughter from in the town from dairy farmers (area in which there is no pasture with the probability of fecal contamination because almost all of the people in the town uses toilet for defecation). This suggestion can be supported by [10, 25] the life cycle and transmission of the parasite occur most commonly in the environments characterized by poor sanitation, primitive livestock husbandry practices and in adequate meat inspection, management and control policies. This study disagrees with Zilalu [26] in which the prevalence is high in young (5.6%) and relatively lower in adult (4.05%). In contrary to my finding, this result is supported by (Wanzala et al. [27] due to age dependent immunity of an animal that has an important role to play in fighting against infestation and re infestation of Cysticerci. The stimulation of animals immunity following continues invasion of Onchosphers, would explain the development of strong immunity which did not allow further development of more Cysticerci from invading Onchosphers.

There was no statistical significance (P>0.05) with sex of cattle associated with C. bovis. The possible explanation for this might be due to the fact that most of the animals brought to this abattoir have similar husbandry systems and both sexes are equally exposed to the disease in the study area, which leads to equal exposure of animals to T. saginata eggs.

Regarding the predilection sites of the Cysticercus in the intermediate host, many workers come up with different results. Ahmed [22], Hailu [18] and Amsalu [20] reported tongue as being frequently affected by the cyst, while Getachew [28] have indicated the liver is the most affected organ.

The present study carried out in Debre berhan abattoir revealed that relatively higher prevalence of C. bovis were found in the triceps muscle (18/384), followed by masseter muscle (17/384), tongue (15/384), heart (12/384), diaphragm (8/384) and Intercostals muscle (5/384). But analysis of the result of this study demonstrated no significant positive relationship between location of the organ and C. bovis infestation (P=0.051

and χ^2=11.4). This difference in the prevalence of *C. bovis* in distribution in different organ may be by chance in random sampling. The result of this study is in agreement with Getachew [28] and Fufa [29] indicated that the triceps being most frequently affected muscle. Variation in the distribution of the *C. bovis* in different organs and muscle might be due to the blood kinetics and animals daily activities. Any geographical and environmental factors affecting the blood kinetics in the animal affect the distribution of Onchospers as well and hence the predilection sites varies during meat inspection (Wanzala *et al.* [27]. Another reason, difference in the skills and motivation of meat inspectors, the speed of the slaughter activities and the meat inspection facilities, are among the many other contributory factors [13].

The presence of the adult worms in human intestine may cause health problem, but it can easily be treated [29]. Taeniasis, human infestation with the adult tape worm *T. saginata*, is observed both in rural and urban areas. The disease caused by *T. saginata* infection is locally known as *"kosso"* and is mainly related to the cherished and honored tradition of eating raw meat in most parts of the country [6]. The infested person is usually parasitized by a single *T. saginata* tape worm [30].

The prevalence of *T. saginata* among the population of in and around Debre berban town was 27.5% from the questionnaire survey and 1.82% from the 2[ndary] data routinely recorded from Debreberhan Referral Hospital in the study period. This illustrates the significance of taeniasis in the study area based on the questionnaire survey and less significant based on the secondary data from the hospital. The reasons for these different results might be, as the respondents indicated in the questionnaire, (46.67%) of them from taenia contracted respondents have not ever gone to hospital while they have got Taenia infestation, the study of taeniasis in the hospital included only patients that apparently come to the hospital with in the study period (from October to March), while the questionnaire survey was included all the volunteer people who has a previous history of taeniasis and apparently taenid individuals, the number of examination is mostly once in the study period as it was stated by [31], a person should not be considered uninfected before having got three negative tests completed over 2-3 days interval.

Fufa [29] in Hawassa 64.2%, Hailu [18] in east Shoa 79.5% and Tembo [32] in Addis Ababa (89.41%) reported a relatively higher prevalence than the result of present study. This difference might be due to the fact that the differences in the habit of raw meat consumption, patient awareness, personal and environmental hygiene, public health services and close contact with the animals are attributable to the variation in the prevalence of taeniasis.

Hailu [18], Dawit [23] and Mulugeta [33] in Ethiopia and Fan [34] in Taiwan reported a higher prevalence of Taeniasis in males than females in contrast to the findings of Gracy and Collins [35] who reported that females were found to be more frequently affected than males. In contrary to the report of others, there is no statistically significant variation (P>0.05) and (χ^2 = 2.8255) were observed between sexes and infection with *taeniasis* in the present study. This result is in agreement with the work of Abuna *et al.,* [19]. This might be due to absence of any difference between them with regarding to raw meat consumption.

The present study showed that there was an association between ages of the respondents and the prevalence of *T. saginata* infection (P< 0.05) and (χ^2 = 0.02) which is in agreement with findings of Fufa [29], Hailu [18], Dawit [23] and Mulugeta [33] in Ethiopia; higher in old age groups(>45 years old). The probable explanation could be the chance of contracting taenia infections in once in their life will be higher in older individuals over the other age groups below. Because one of the objective of the questionnaire survey was to know the percentage of respondents who have got the disease even once in their life.

The interview conducted among the resident from different professional back grounds revealed that there was a significant difference (P<0.05 and x^2=16.2085). From the respondents, farmers (66.67%) followed by slaughter worker (50%), cooker (37.5%), governmental employer (33.33%),day laborers (25%) and it is relatively lower inmerchant (11.11%) and student (4.54%). Based on these results high prevalence is observed on those who have strong relationship with meat and meat by product. The result of this study was in agreement with the findings Zilalu [26], Fufa [29], Hailu [18], Dawit [23] and Tembo [32] in Ethiopia. This is due to the fact that the high exposed groups have higher access to contact with meat and meat by products. As a result of this there could be a possibility of getting infection with *T. saginata taeniosis*.

Analysis of the result of the present study also demonstrated the significant positive relationship between raw meat eaters and infection of *taeniosis* (P<0.05 and χ^2=13.0049) that is in accordance with Fufa [29], Hailu [18], Dawit [23] and Tembo [32]. This indicates that raw meat consumption is the main factors to be controlled in order to avoid the infection in man by *C. bovis*. The transmission of *T. saginata* infestation from animals to man depending on the human habit of eating or semi-raw meat like *"kitifo"* in Ethiopia.

The interaction between the marital status and the prevalence of *T. saginata* revealed that there was a significant different (P<0.05 and χ^2=4.1336) between married and single respondents; higher in the married once. This could be due to the fact that the married community had a strong economic power to visit the butchers and restaurants. Complaints by *taeniosis* suspected patient who were visiting during questionnaire were hunger, digestive up-set, Abdominal discomfort, anal pruritis, emerging tapeworm segments, headache and loss of weight. Medical costs for infected men, lowering productivity of infected workers who may be absent from work or reduce their working uneasiness [14]. In this finding the economic significance of the disease was in 72.73% *taenia* contracted respondents loss due to cost of treatments and in 23.27% absence from work and class. Based on the questionnaire survey, there is no pig in their surrounding and nobody was found who likes to eat pork. This result helps to rule out *Taenia solium* because it is difficult to differentiate easily between the two species of Taenia (*T. saginata and T. solium*) under microscopic examination.

CONCLUSION AND RECOMMENDATION

Taenia saginata is a medically and economically important *Cestodes* parasite, while infections with *C, bovis* (larva stage) cattle cause economic losses in the beef industry. In this study, the prevalence of bovine *Cysticercosis* determined by the active abattoir survey was relatively lower than the reports by different researchers in different parts of the country. Among the risk factors, age was very important and the distribution of the cyst in different organs is almost equally. The questionnaire survey also indicated that *taeniosis* is a relatively spread problem, but the secondary data from the hospital indicated the disease is not a spreading health problem among the residents of Debre berhan city and its surrounding. These results illustrates now a time the disease prevalence is low by considering time of the study and the sampling units selected on both of the studies. Some people uses traditional drugs and do not prefer to go to clinic for the disease *T. saginata*. Among the potential risk factors, age in the passive hospital survey and age, occupation, cattle raising, marital and consumption of raw meat were very important risk factors for *taeniosis*. Furthermore, it was also observed that raw and under cooked meat consumption increases the infection rate of *T. saginata*. Based on the finding of the present study, the following issues are recommended:

- 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 should be intensively encouraged for construction of simple toilet to minimize contamination of pasture with human stool, so that the cycle of *T. saginata* interrupted.
- Infected meat and meat products must undergo the process of freezing, boiling or distraction of the *Cysticerci* to avoid human infection.
- There should be strong and close interaction between medical and veterinary professionals to reduce the impact of the disease in both human and cattle population
- Public awareness should be created by the respected organ of government to the people to go to clinic and consult medical professionals instead of using traditional drug.

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