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Hydatidosis in slaughtered cattle at Meki municipal abattoir, public health significance and community knowledge on the transmission of the disease, Oromia, Ethiopia

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Abstract

A cross-sectional study on Bovine hydatidosis was conducted with the aim of investigating the prevalence, the localization, fertility and cyst viability in cattle slaughtered at Mekimunicipal abattoir and to asses' community knowledge on the transmission of the disease. Out of the total 384 cattle examined 164 (42.70%) were found infected with hydatidosis. From the examined animals,71 (43.29%), 60(36.59%), 22(13.41%), 2(1.22%), 8(4.88%) and 1(0.61 %) contained hydatid cyst in their lungs, livers, lungs and livers, hearts, spleens and kidney, respectively. Age related infection was significant in that older animals were more infected ($P<0.05$, $x2 = 15.259$, $df = 6$).There was no statistically significant difference between infection rate and origin, sex and body condition score of the animals. In the sphere of size determination, there were 162(55.29%) small, 90 (30.72%) medium and 41(13.99%) large sized cysts. Concerning the fertility test, 107(36.52%), 120(40.96%) and 66(25.52%) were fertile, sterile and calcified cysts respectively. The questionnaire survey indicated that there is knowledge gap that may predispose the communities to hydatidosis infection. Backyard slaughtering, improper management of condemned organs, slaughter wastes and body of dead animals were frequent activities in the study area.Thefindings of this study indicated that bovine haydatidosisis highly prevalent in slaughtered animals in the study abattoir. Meanwhile, the close association of people with dogs especially children who can easily acquire this disease may further exacerbates the risks indicating very low knowledge of the local community on the way of transmission of the diseases as well as predisposing risk factors. Therefore, implementing public education and control strategies targeting both the parasites and the intermediate hosts are recommended.

Keywords: Abattoir, Cattle, Fertility, Hydatidosis, Meki, Prevalence

Introduction

Cystic echinococcosis (CE) (Hydatidosis), caused by the larval stage of *Echinococcus granulosus*, is recognized as being one of the world's major zoonoses (Torgerson and Budke, 2003). Echinococcus species require two mammalian hostsfor completion of their life-cycles. Segments containing eggs or free eggs are passed in the faeces of the definitive host, a carnivore. The eggs are ingested by an intermediate host, in which the metacestode stage and protoscolices develop. The cycle is completed if such an intermediate host is eaten by a suitable carnivore (Eckert *et al*, 2002*).*

The global distribution of the parasite is in part because of its ability to adapt to a wide variety of domestic and wild intermediate hosts. It is a cyclozoonotic entity and is more important in rural areas where close association existing between dogs, men and domestic animals (Dentand Kelly, 1976). Diagnosis of echinococcosisin dogs or other susceptible carnivores depends on the demonstration of adult cestode of the echinococcus in their feces and diagnosis in intermediate host depends on the detection of the larval cyst which infects almost any organ, particularly the liver and lung (OIE, 2008).

This cyclozoonosis requires two vertebrate hosts to uphold the life cycle (Eckert and Deplazes, 2004). Dogs are the primary definitive hosts for the parasite where as livestock acting as intermediate hosts and humans can accidentally become intermediate hosts (Budke*et al*., 2006). It also imposes enormous economic losses in the livestock industry due to condemnation of edible organs and lowering the quality of meat, milk and wool production (Craig *et al*., 2007).

Humans become infected by ingestion of egg passed in the feces of dogs (Budke*et al*., 2006) and infection with *Echinococcus granulosus* typically result in a slowly growing parasitic disease most frequently seen in the liver, in 52-77% of cases (Morris and Richards, 1992; Timothy *et al.*, 2001). The pathogencity of hydatidosis depends on the extent and severity of infection and the organs on which it is situated. Occasional rupture of hydatid cysts often leads to sudden death due to anaphylaxis, hemorrhage and metastasis (White *et al*., 2004). The adult Echinococcusis considered to be harmless to the definitive host, except when it occurs in large numbers, which may cause severe enteritis. There are few available data on the clinical effects of the cystic hydatid disease in animals since the cyst is slow in growing and animals are often slaughtered before it manages to create sufficient pressure on the tissue or organs.

When undertaking surveillance work with *E. granulosus* in intermediate hosts, it is vitally important that data are stratified and reported according to the age of the animal slaughtered, prevalence rates are strongly age dependant (Torgerson and Heath, 2003). Older animals may be heavily infected even if when animals have very few larvae (OIE, 2008).

Echinococcosis/hydatidosis is a zoonotic disease that occurs throughout the world and causes considerable economic losses and public health problems in many countries. Sheep, goats, cattle, camels, buffaloes, pigs, horses and donkeys have been repeatedly found infected with hydatid cysts (Dalimi *et al.*, 2002; Lahmar *et al.*, 2004; Daryani *et al.*, 2006; Acosta-Jamett *et al.*, 2010). The global hyatidosis infection prevalence rates reported were 22.98% in cattle, 10.58% in sheep, 12.03% in camels, 17.80% in equines and 1.88% in goats (Azlaf and Dakkak, 2006).The disease occurs throughout the world and causes considerable economic losses and public health problems in many countries including Ethiopia (Endrias, 2010). The public health and economic significances of hydatidosis lies on the cost of hospitalization, medical and surgical fees, loss of income and productivity, permanent or temporary incapacity to work social consequence hydatidosis of disability and mortality (Macpherson *et a*l., 1984). In food animal hydatidosis has an adverse effect on production causing decreased production of meat, milk, wool, reduction in growth rate and predisposition to other diseases.

In Ethiopia hydatidosis is the major cause of organ condemnation in most abattoirs (Gebretsadik Berhe, 2009; Nigatu Kebede, 2010; Feyesa Regassa *et al.,* 2010) and leads to huge economic losses.

For several years, hydatidosis in Ethiopiais a disease of public health importance where in one region (Tigray), nine cases of human hydatidosis were reported since 2000 (Nigatu Kebede *et al.*, 2009). Further studies in different regions should be conducted wth due attention to mode of transmission, rick factors and community knowledge about the diseases as to design community based control strategies. The main objectives of this study were therefore [1] To determine the prevalence of hydatidosis in cattle slaughtered at Meki municipal abattoir [2] To see the localization, fertility and viability of the cyst [3] To Assess community knowledge on the transmission of the disease.

Materials and Methods

Study Area

The study was conducted at Meki municipal abattoir in Meki town which is found about 135 km South East of Addis Ababa in Oromia regional state at altitude of 8°9′ N, longitude of 38°49′ E and an elevation of 1900 m.a.s.l. It is the administrative center of DugdaBora district with the mean annual maximum and minimum temperature are 27.6^{o}Cand15.2^{o}C respectively.

Study Animals

The study animals were indigenous zebu cattle brought to the abattoir from the surrounding areas. A total of 384 indigenous zebu cattle slaughtered at Meki municipal abattoir were included in the study. During ante-mortem examination, each study animal was given an identification number; and age was determined. Estimation of age was done by the examination of the teeth eruption (De Launta and Habel, 1986). Two age groups were considered: above 5 years and below 5 years. The majority of cattle that were slaughtered in the abattoir were adult male having good body condition and older than 5 years. similar to other parts of the country the cattle in these areas are managed under the traditional or extensive management system which is characterized by grazing on pasture but sometimes the owners give special intensive care for those cattle intended for fattening purpose.Almost all the cattle presented for slaughtering in the study area were males; infection rate regarding sex variation was included.

Sample Size estimation

The sample size was calculated according to the formula given by Thrusfield (2005) by considering 50% expected prevalence and 5% accepted error at 95% confidence interval using this formula:

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

Where n =sample size
Pexp = expected prevalence;
d= absolute precision; the estimated sample size was conducted on 384 head of cattle during the study period.

Study design and Study methodology

A cross-sectional type of study was carried out in the study area from November, 2014 to April, 2015 on randomly selected animal. In this study, animals were grouped in age, sex origin and body condition

Asntemortem inspection

Regular visit were made to conduct ante mortem examination of animals brought for slaughter. During antemortem inspection data like origin, age, sex, and body conditions of each animal was recorded. The body condition score was ranked as poor, medium and good (Nicholson and Buttrworth, 1986).

Post-mortem inspection

During postmortem examination visceral organs such as lung, liver, heart, kidneys and spleen were

inspected for the presence of hydatid cyst by applying the routine meat inspection procedures (Herenda *et al*., 2000). The total numbers of mature cysts obtained per organ were counted in different organs. The cyst burden per organ was also recorded. Counting was difficult in very close cysts particularly in liver. After all cysts in an organ were counted, they were subjected to systematic size measurement (diameter) using a ruler and classified as small cyst (<2cm), medium cyst (2-4 cm) and large cyst (>4cm) as per the criteria of (Dalimi *et al.*, 2002). The fertility and sterility of hydatid cyst was recorded in order to investigate the viability of the cyst. Fertile cysts were subjected to viability test. Fertility or sterility of hydatid cyst was determined by the method used by (Weldegiorgis *et al*., 2009).

Examination of cysts for fertility and viability

Based on the presence or absence of brood capsules containing protoscolices in hydatid fluid, cysts were identified and classified as fertile and infertile according to the method described by Macpherson (1985). Infertile cysts were further classified as sterile (fluid filled cyst without protoscoleces) or calcified (Soulsby, 1982). To test the viability, the cyst wall was penetrated by a needle and opened and the contents were examined microscopically (40x) for the amoeboid-like peristaltic movements of protoscolices according to the standard procedure (Smyth and Barrett, 1980). In doubtful cases, a drop of 0.1% aqueous eosin solution was added to equal volume of protoscolices on a microscope slide with the principle that viable protoscolices completely or partially exclude the dye while the dead ones take it up (Smyth and Barrett, 1980;Macpherson, 1985). Sterile hydatid cysts are characterized by their smooth inner lining, usually with a slight turbidity of the contained fluid and typical calcified cyst that produced a gritty sound feeling upon incision (Parijia, 2004).

Retrospective data on Cystic Echinococcosis (CE)

To assess the status of human hydatidosis in the study area retrospective data from Dugda district health station casebooks were collected, analysed and health workers working were interviewed.

Questionnaire survey

To awareness public knowledge on the hydatiosis closed ended questionnaire were administered. The sample size required for the questionnaire survey was 100. The sample size for the questionnaire survey was calculated by using the formula given by Arsham (2002). N=0.25/SE2; Where, N= sample size and SE (Standard Error) =5% A total 100 volunteer respondents from different sex, age, level of education, occupation and religion were selected using random sampling based on willingness to participate in the questionnaire survey.

Data management and analysis

The data generated were stored in Microsoft excels preadsheet and analysed using STATA version11.0. Percentages, chi square test, univariable logistic regression were performed, to quantify the association between risk factors and hydatiosis and odds ratios and CI were used to quantify the degree of association between risk factors and the disease and multivariable logistic regression analysis were used. Only the independent variables showing co linearity <50%and P<0.25 were included to final model analysis. These variables were categorized during data analysis. The categories of the variables were as follows: species of animals, age sex, breed, body condition and origin of animals.

Ethical Considerations

To make this study ethically sound all the important topics in public health ethics such as consents of the participants for the study were asked and acknowledged first. The entire moral, cultural, religious values of the community were respected. The confidentiality of information and privacy of participants during sample collection and interview was protected. Access to confidential records and computer files was limited by keep in records under lock and key**.**

Results

Disease prevalence

Out of a total of 384 heads of indigenous zebu cattle slaughtered at Meki municipal abattoir 164 (42.71%) were found infected with one or more hydatid cysts involving different organs. Prevalence of hydatidosis in different age groups (>5 and <5 years) was statistically significant (P<0.05, df =6)while NO significant differences ((P> 0.05).)observed between different body conditions(Table1).

Table 1: Prevalence of bovine hydatidosis in slaughtered cattle at Meki municipal abattoir based on different variable categories

Variable categories	No.of examined	No of infected	prevalence	x2	p-value
Age					
Group 1 (<5 years)	85	24	28.24		
Group 2(>5 years)	299	140	46.82	15.259	0.018
Total	**384**	**164**	**42.71**		
Sex					
Male	357	153	42.86		
Female	27	11	40.74	4.264	0.641
Total	**384**	**164**	**42.71**		
Origin					
Meki	151	61	40.40		
Batu	94	44	46.81		
Arsinegele	59	34	57.63		
Bulbula	56	17	30.36		
Koka	24	8	33.33	31.711	0.134
Total	**384**	**164**	**42.71**		
Body condition					
Poor	11	7	63.64		
Medium	93	46	49.46		
Good	280	111	39.64	11.734	0.467
Total	**384**	**164**	**42.71**		

Out of 164 cattle infected 71(43.29%) have hydatid cyst in their lungs, 60 (36.59%) in livers, 22 (13.41%) in lungs and livers, 2(1.22%) in heart, 8(4.88%) in spleen and 1(0.61%) in kidneys (Table 2).

Table 2: Distribution of hydatid cyst in different organs hydatidosis in slaughtered cattle at Meki municipal abattoir

Organs	No. of infected organs	Prevalence from infected animal	Prevalence from total examined animals
Lung	71	43.29	18.5
Liver	60	36.59	15.6
Lung+Liver	22	13.41	5.7
Heart	2	1.22	0.5
Spleen	8	4.88	2.1
Kidney	1	0.61	0.3
Total	**164**	**100**	**42.70**

Cyst characterization

The various size of cysts found in different organs. Higher numbers of large and medium sized cysts were found in lungs, while higher numbers of small and calcified cysts were found in liver (Table 3 and 4)

Table3: Distribution of cysts based on sizein slaughtered cattle at Meki municipal abattoir

Organ	Number of cyst	Small (%)	Medium (%)	Large (%)
Lung	147	71(48.30)	51(34.69)	25(17.01)
Liver	131	86(65.65)	32(24.43)	13(9.92)
Heart	3	2(66.67)	1(33.33)	0(0)
Spleen	11	2(18.18)	6(54.55)	3(27.27)
Kidney	1	1(100)	0(0)	0(0)
Total	**293**	**162(55.29)**	**90(30.72)**	**41(13.99)**

A total of 93 infected lungs, 82 infected livers, 2 infected hearts, 8 infected spleens and 1 infected kidney were examined by opening and inspecting them with the naked eye. The examination indicate that 62hydatid cysts (42.12%) in lungs, 39(29.77%) in liver, 4(36.36%) in spleen and 2(66.67%) in heart had protoscolices attached either to the germinal layer or in its fluid. This suggests fertility of the cysts. The rest of the cyst were sterile and calcified (Table 4).

Table 4: Fertility rates and viability of protoscolices in slaughtered cattle at Meki municipal abattoir

organ	Fertile		Sub-total	sterile	calcified	total
	viable	**Non viable**				
Lung	43 (69.35)	19(30.65)	62(42.12)	73(49.67)	12(8.16)	147(50.17)
Liver	28(71.79)	11(28.21)	39(29.77)	39(29.77)	53(40.46)	131(44.71)
Heart	0(0)	2(100)	2(66.67)	1(33.33)	0(0)	3(1.02)
Spleen	0(0)	4(100)	4(36.36)	6(54.55)	1(90.09)	11(3.75)
kidney	0	0	0	1(100)	0(0)	1(0.34)
Total	**71(66.36)**	**36(33.64)**	**107(36.52)**	**120(40.96)**	**66(25.52)**	**293(100)**

Human hydatidosis, Cystic echinococcosis (CE)

According to the information obtained from heath workers and retrospective study of Dugda district health station case books, there three human hydatidosis cases clinically diagnosed in the past six years during chest x-ray at Adama referral hospital. Lack of modern diagnostic facilities was the main drawback according to the health workers which hampered the diagnosis of hydatidosis in humans in the study area.

Questionnaire survey

Out of 100 respondents, only 7% had ever heard about hydatid disease (CE). CE being a zoonotic disease, people had little knowledge on zoonotic infections. On the other hand, 48% of the respondents reported that they usually exercise back yard slaughtering on holy days as well as for meat market purposes. Similarly, they do not know the public and environmental health risk hazards of this type of slaughtering animals.

Table 5: Questionnaire survey on public attitude and practice to identify risk factors

Questionnaire items	Response	Respondents number	
		Number	**%**
Dog ownership	Yes	70	70
	No	30	30
Housing system	Indoor	22	31.4
	Outdoor	17	24.3
	Both	31	44.3
Hand washing practice after contact with dog, dog feces, soil	Yes	98	98
	No	2	2
Practice washing vegetables before raw consumption	Yes	98	98
	No	2	2
Presence of separate housing for dogs	Yes	17	24.3
	No	53	75.7
	Yes	48	48
Home slaughtering of animals	No	52	52
Feed offal to their dogs	Yes	67	95.71
	No	3	4.25
Knowledge on the transmission of disease by eating uncooked viscera	Yes	89	89
	No	11	11
Do you know if dogs transmit disease to humans?	Yes	94	94
	No	6	6
Treat or vaccinate their dogs	Yes	24	34.2965.71
	No	46	
Frequency of dog treatment	Once a year	15	21.43
	Twice a year	8	11.43
	Not at all	47	67.14
Knowledge on the transmission of disease from dogs to human	Yes	86	86
	No	14	14
Knowledge on dog tapeworm	Yes	17	17
	No	83	83
Knowledge on hydatidosis	Yes	7	7
	No	93	93

Among the persons interviewed, 70% (70/100) owned dogs, but only 34.29% (24/70) of them vaccinate or treat their dogs regularly or occasionally. Moreover, 24.3% of them allow their dog to roam outside their compound. The feeding practice of dog owners was also assessed and the result showed that 95.71% (67/70) of the dog owners feed raw condemned visceral organs without cooking or checking for any abnormality on the organs. On hand washing, the participants reported that (98/100) people wash their hands especially when they are going to eat light foods, but most of the people reported to wash their hands without soap.

Discussion

Hydatidosis is known to be important in livestock and public health in differentparts of the world and its prevalence and economic significance has beenreported by different workers in different geographical areas. The prevalencemay however vary from country to country or even within a country.In Ethiopia most cattle are generally slaughtered at their older ages, when they are no more needed for work. The same is true at Meki municipal abattoir, they slaughter at old ages. Therefore old cattle have had higher exposure possibilities to infection than young cattle by hydatidosis. The prevalence of hydatidosis is varied from year to year and from place to place, even from month to month due to difference in culture, social activities and attitudes to dogs in different regions and geographical locations.

Based on the data collected in this cross-sectional study, the prevalence of bovine hydatidosis was found to be 42.70%. The current finding is greater than to those cattle slaughtered at Tigray region 22.1% (Kebede *et al* 2009b) and Gondar (24.3%); It was less than the previous findings of 48.7% in Ngorongoro districts of Tanzania (Ernest *et al.*, 2008). 46.5% in Debre Zeit (Jobre *et al.*, 1996.). This may be attributed to differences in environmental conditions, livestock stocking intensity and livestock movement that contribute to the differences in prevalence rates.The variation in prevalence within the same species of animals could be attributed to the differences in seasonal variation, geographical locations and strain differences. Besides these, factors like difference in culture, social activity and attitude to dog in different regions might have contributed to this variation (Njorog *et al.,* 2002)

The prevalence rate of 42.71% in the study area was high. This might be due to the abundance and frequent contact between the infected intermediate and final hosts. It could also be associated to slaughtering of aged cattle, which have had considerable chance of exposure to the parasitic ova, backyard slaughtering of small ruminants, and provision of infected offal to pet animals around homesteads. Moreover, poor public awareness about the disease and presence of few slaughterhouses could have contributed to such a higher prevalence rate.

With regards to rate of infection of hydatidosis in different age groups of cattle, significant difference ($P<0.05$) was observed. Animals with more than 5 years of age were highly affected. The difference in infection rate could be mainly due to longer exposure time to *E. granulosus*. This finding is similar to the finding of (Azlaf and Dakkak, 2006) and (Esatgil and Tuzer, 2007).

The majority of the cattle slaughtered in this abattoir were adult older than 5 years. Hence they were exposed to *E. granulosus* over a long period of time, with an increased possibility of acquiring the infection. Previous studies strongly suggested that the prevalence of bovine hydatidosis is profoundly influenced by age of the animal (Torgerson *et al*, 2005; Lahmar *et al*, 2001).

The higher prevalence in lung associated with the fact that cattle are slaughtered at older age. At this period the capillaries of liver are dilated and most cysts passed to the lungs. Besides this, it is possible for the hexacanth embryo to enter the lymphatic circulation and be carried via the thoracic duct to the heart and lung in such case the lung will be infected before liver. The reason for higher proportion of medium and large sized cysts in the lungs is due to its softer consistency which can accommodate expansion of cysts (Taylor e*t al*, 2007)

Out of the total 293 hydatid cysts 162(55.29%), 90 (30.72%) and 41 (13.99%) were small, medium and large sized cysts respectively (Table3). The high proportion of small cysts may indicate infection of animals as a result of heavy rainfall and continuous grazing in the past rainy seasons or due to immunological response of the hosts, which might have reduced the expansion of cyst size. Moisture and rainfall favor the survival of eggs of *E.granulosus* species and at the same time eggs may get chance to be disseminated by flood (Yihdego, 1997).

The liver and lung are the most commonly infected organs. The heart and kidney are the least affected organs in the study animal. Similar findings were also obtained by various workers and it's indicated that the liver and lungs are the most commonly affected organs with hydatid cyst due to the reason that there are the first large capillary fields encountered by the blood borne onchosphere. However, development of hydatid cysts occurs occasionally in other organs and tissue when onchosphere escape in to the general systemic circulation (Smyth and Barret, 1980).

A greater frequency of medium-sized and large-sized cysts was found in the lung than in the liver, while the liver harbored a large number of small-sized and calcified cysts. The reason for the higher percentage of medium and large cysts in the lungs is the softer consistency of the lung, while the higher number of calcified cysts in liver could be attributed to relatively higher reticuloendothelial cells and abundant connective tissue reaction of the organ. The higher proportion of small cysts may be due to immunological response of host which might preclude expansion of cyst size (Torgerson, 2002). In examining the condition of cyst fertility and viability, the overall percentage of fertile cysts in this study was (36.52%). In the comparison of the fertility rate among the organs, it was higher in the lungs than in the liver. It has been stated that the relatively softer consistency of lung tissue allows the easier development of the cyst, and the fertility rate of hydatid cysts may show a tendency to increase with advancing age of the hosts (Himonas, 1987). This may be attributed probably due to reduced immuno-logical compatibility of animals at their older age of infection. The variation between tissue resistances of the infected organs may also influence the fertility rate of hydatid cyst.

Information about prevalence and fertility of hydatid cysts in various organs of cattle are important indicators of potential source of infection to perpetuate the disease to dogs. In our study the percentage of fertile cysts recovered was 36.52 %.This is low compared to 70% in the Great Britain, 96.9% in South Africa and 94% in Belgium (Arene, 1985) but high compared to (Elmahdi *et al.*, 2004) and (Ernest *et al*., 2008) who reported 22% and 21.3% fertile hydatid cysts from central Sudan and Ngorongoro district of Arusha region, Tanzania, respectively. (Elmahdi *et al., 2004*) also reported low (3%) prevalence from Central Sudan. Hydatid cyst condition tends to follow size dependent pattern in that most of the small cysts were calcified. This can be due to the host defense mechanisms of killing more efficiently with parasitic larvae at the early stage of development (Himones, 1987).

The complete absence of reported human hydatid cases from Meki health station may not suggest that the study region is free of this disease. The lack of modern diagnostic facilities, clinical similarities with other disease and its asymptomatic appearance and extended incubation period added to the inability to afford medical treatment by the most vulnerable section of the society could have contributed to the obtained result. Moreover, further study in this regard is necessary. This result is similar to other worker such as (Endrias, *et al.*, 2010).

The questionnaire survey indicated that hydatidosis is not familiar to the communities in the study areas, as the majority of the respondents reported that they did not hear or aware about hydatidosis. This is consistent with other studies in Tanzania, majority of the respondents have not aware of (Ernest *et al.*, 2009) hydatidosis and in Iran found that very low level of knowledge about hydatidosis in the pastoralist. Higher proportion of the respondents closed contact with non-dewormed dogs. The close association of people with dogs especially children who can acquire this disease when they are still young and signs come later in life further exacerbates this factor. Similar results reported in Tanzania, many households (89.1%) had dogs which did not deworm regularly and managed under free-range system (Ernest *et al.,* 2009) . This idea was supported by (Gathura and Kamiya, 1990) that they reported with high incidence rate in the northern (higher contacted of dogs) than in the southern Kenya due to cultural difference.

Backyard slaughter of small ruminants and disposal of raw condemned organs through offering to dogs were the common practice, a situation which may lead to the increased environmental parasitic load. Similar results were observed in Tanzania, majority of community had their dogs managed freely with feed raw condemned materials to their dogs (Ernest *et al*., 2009).

In this study, only a small proportion (7%) of the participants had an awareness of echinococcosis. This is lowcompared to with the work of Tigre (2012) who reported that 32.2% of the study participants had an awareness of echinococcosis. The variation in the level of awareness could be due to the difference in the study groups, where the previous study was conducted only on butchers and abattoir workers who might be familiar with the problem unlike our study groups which incorporates a variety of respondents. The awareness level of participants in this study was similar to that reported by (Kebede *et at.*2010) and (Zelalem,2012) who indicated an awareness level of 0 and 8% of the households had awareness about zoonotic echinococcosis, respectively. The lower level of awareness about echinococcosis could also be due to the longer incubation period of the disease in humans, in which it takes up to 30 years to manifest clinical signs (CFSPH, 2011).

In this study, 70 % of the participants owned dog(s) and 24.3% of them said they let their dogs freely roam outside their compound. The presence of large numbers of non-restricted dogs plays a crucial role not only in transmission of rabies but also in contaminating the environment with tapeworm eggs which could subsequently infect humans. Among the dog owners, 95.71% of them reported that they fed offal to their dogs regardless of the safety status of the offal. Feeding the viscera of infected slaughter animals to dogs was reported to facilitate the transmission of the sheep strain of *Echinococcus granulosus* and this was suggested to consequently increase the risk that humans will become infected (Moro and Schantz, 2009).

Conclusion and Recommendations

The prevalence of hydatidosis in cattle slaughtered at Meki municipal abattoir was high and this showed that hydatidosis was one of the most important zoonotic disease in the study area. Three cystic echinococcosis cases were reported during chest x-ray examination. This was due to favouring factors keeping of dogs in close association with ruminants, low public awareness on the role of offal in transmitting hydatid cysts, feeding of dogs with hydatid infected organs and backyard slaughtering practices. With regard to rate of infection of hydatidosis in different age groups of cattle older animals were more affected. Regarding the cyst size small sized cysts were frequent in livers while large sized cysts in lungs. Up on characterization of the cysts majority of them were located in liver and lung. In conclusions, the questionnaire survey on public clearly indicated that generally poor knowledge of the disease, its sources of infection and transmission, the throwing of slaughter wastes on to open ground, the frequency of dog ownership, and the ability of owned non-dewormed dogs to roam freely around and within houses and have none of simple slaughter house in the district are all causes of concern human and animal hydatidosis. Public health education is highly imperative to build up public awareness about the sources of infection and its control and prevention method in the communities, increased awareness and collaboration between animal health assistants/veterinarian and human health professionals should also be strengthened in Meki in sharing knowledge on zoonoses and working together to identify and control zoonoses.

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

Health extension works should be conducted for butchers, abattoir workers, and dog owners about mode of transmission and the public health hazard of hydatidosis

Public education is required on the importance of proper disposal of condemned offal's and prohibition backyard slaughter that might contribute for the control of the diseases

In endemic areas of hydatidosis immunological screening of animals should be carried for early detection of infected animals

The construction of municipal abattoir with fencing and disposal system of infected organs particularly in rural

Close collaboration and coordination between veterinary and medical authorities at all level is required.

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