Journal of Animal Research: v.5 n.3, p. 473-477. September 2015

DOI: 10.5958/2277-940X.2015.00081.9

Prevalence and Economic Significance of Hydatidosis in Cattle Slaughter at Debretabore Abattoir, North Gondar, Amhara region, Ethiopia

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ABSTRACT

Hydatidosis, caused by the larval stage of *Echinococcus granulosus*, is one of the most important helminthzoonosis in the world. The distribution of hydatidosis is normally associated with underdeveloped countries, especially in rural communities where humans maintain close contact with dogs and various domestic animals, which may act as intermediate hosts. A cross-sectional study on bovine hydatidosis was conducted in Debretabore municipality abattoir from July 2012 to September 2012 with the aim of investigating the prevalence and economic losses in cattle slaughtered for human consumption. Out of the total 384 cattle examined 106 (27.64%) were found infected with hydatidosis. From the examined animals 51 (13.28%), 34 (8.85%), 16 (4.17%) and 5(1.3%) contained hydatid cysts in their lungs, livers, hearts and kidneys respectively. Age related infection was significant in that older animals were more infected (P<0.05). Assessments of hydatid cyst with body condition scoring were made; accordingly cattle with poor body condition scouring had higher prevalence (p= 54.72%), medium (33.02%) and fat (12.26%) were examined from infected animals. Plan based control measure against the source of infection of Hydatidosis should practice for decreasing tendencies in prevalence.

Keywords: Bovine, Debretabore, hydatidosis, prevalence

Hydatid disease is the name given to the condition caused by the zoonotic tape worm Echinococcus granulosus. The tape worm spends most of its adult life in the infestation of its definitive host namely, canids and in a particular the dog. The tape worm eggs are convoids in the canid's faces and as the result of ingesting the eggs infestation as to the intermediate host. However, humans can become accidentally infected and hydatid cyst may develop throughout the body. Therefore, cystic Echinococcosis or hydatidosis is a disease caused by a metacestode of Echinococcus granulosus. The disease is not apparent to farmers but is of considerable economic and public health importance (Deplazes and Eckert, 1996) in farm animals. It causes considerable economic loss due to condemnation of edible organs, decreased meat and milk production. Reduced hide and flee value and decreased in fecundity (Rausch, 1995).

The incidence of human hydatid disease in any country is closely related to the prevalence of the disease in domestic animals and highest where there is a large dog population and high sheep production (Khuroo, 2002). The most frequent strain associated with human cystic hydartidosis (Echinoccocosis) appears to be the common sheep strain (G1) (Beard, 1988) recent molecular characterization of human and animal Echinococcus granulosus is isolates demonstrated that the camel strain (G6) source of infection to humans (Urquhart *et al.*, 1996). The possible occurrence of disease in human in Ethiopian was indicated earlier by (Hubbert 1975). Data on the prevalence of animal is provided reliable indicator of the existence of environmental condition hosts, several studies have been conducted on live stock hydatidosis in different part of Ethiopia particularly through the externship program of the department but there is no study conducted so far in

Debretabore town. Hence the present research project was undertaken with the aim to determine the prevalence and show major affected organs during ante mortem and post mortem inspection of hydatidosis in bovine.

MATERIALS AND METHODS

Study Area

The studies were conducted in Debretabore municipality abattoir. Debretabore is the capital city of South Gonder zone and its located 667km far from Addis Ababa to the North. It has an altitude of 2523 meter above sea level. The mean annual rain fall of the study area is 1599mm, the annual minimum and maximum temperature is 9^{o}c and 25^{o}c respectively. There are about 65,314 human population and there were also different live stocks namely, bovines (17998), equines (2863), goats (6620), pigs (36) and poultry (3808) (WAO, 2004).

Study Population

The study animals' comprises indigenous cattle slaughtered at Debretabore municipality abattoir. The cattle slaughtered in this abattoir come from different area around the city.

Study Design

The study design had been a cross-sectional study had been conducted at Debretabore municipality abattoir on three randomly selected days of the five slaughtered days of a week from July 2012 to September 2012.

Sample Size and Sample Method

Simple random sampling method had been used for sampling and 95% confidence interval had been used, the sample size was determined by the formula (Thrusfied, 2005). The sample size was determined by taking expected prevalence 50% since there was no previous study conducted in the area.

$n=1.96^2 x\ p\ (1-p)/d^2$

Where n= number of animals to be sampled

P= expected prevalence

d =desired absolute precision. Then by taking 50%

d =5% n=384

As stated above, the confidence interval chosen 95% so that d=5% by substituting the value in the formula the required sample size calculated to be 384.

Study Methodology

Regular visit had been made to conduct ante mortem and post mortem examination of 384 slaughtered animals. During the ante mortem inspection the age, sex and body condition of each individual animal is assess and recorded animals based on enumerated marks on their body surface using and this marking was transferred to all visceral organs after slaughtering the animals. During the postmortem examination through visual organ particularly the lung, liver, heart and kidneys were carried out according to produced by (FAO, 1994). Statistical programme SPSS version 15.0 was employed for the data analysis. The prevalence was calculated as positive samples dived by the total samples examine and multiply by 100 and used chi square (x^2) test as well as significance p value for comparison of result with dependent variables like age, sex, body condition and sampling agro ecology. The study period range from July 2012 to September 2012.

RESULTS

Out of a total of 384 indigenous cattle slaughtered at Debretabore municipal abattoir 106 (27.64%) were found infected with one or more hydatid cysts involving different organs. Rate of infection of hydatidosis in different age groups (>5 and <5 years) was statistically significant (P<0.05) (Table 1).

Table 1. Prevalence of Bovine hydatidosis with regard to age groups in at Debretabore municipal abattoir

Age groups (yrs.)	No animals examined	No. of infected animals	Prevalence	X^2-value	P-value
Group 1 (>5)	226	84	37.17%	11.795	0.0237
Group 2 (<5)	158	22	13.92%		
Total	384	106			

In this study hydatid cysts were detected in (33.33%) of the female and (27.07%) of male cattle but there was no statistically significant difference in prevalence of cattle hydatidosis between sexes (P>0.05) (Table 2).

Table 2. Distribution of hydatid cyst in different sexes at Debretabore municipal abattoir

Sex	No animals examined	No. of infected animals	Preva-lence	X^2-value	P-value
Female	33	11	33.33%	0. 602	0.539
Male	351	95	27.07%		
Total	384	106			

Out of 106 cattle infected 51 (13.28%) have hydatid cyst in their lungs, 34 (8.85%) in livers, 16 (4.17%) in hearts and 5(1.3%) in kidneys (Table 3).

Table 3. Distribution of hydatid cyst in different organs

Organs	No. infected	Prevalence from infected animals	Prevalence from total examined animals
Lung	51	48.1%	13.28%
Liver	**34**	**32.08%**	**8.85%**
heart	16	15.09%	4.17%
Kidney	5	4.72%	1.3%
Total	106		27.6%

Table 4. Prevalence in different Body conditions

Body condition	Total examined	Positive	Prevalence	No. affected organs			
				Lung	Liver	Heart	Kidney
Lean	113	58	54.72%	23	13	9	3
Medium	192	35	33.02%	17	6	5	1
Fat	79	13	12.26%	11	15	2	1
Total	384	106		51	34	16	5

Assessments of hydatid cyst count with body condition scoring were made; accordingly cattle with lean body condition scouring had higher prevalence (P= 54.72%), medium (33.02%) and fat (12.26%) from infected animals were examined (Table 4).

It was difficult to precisely trace back the geographical origin of all animals slaughtered and relate the findings to a particular locality. However, some of them were brought from Weyibla Selamieko, Tseguradeko, Gassay, Sefatira, Gara and dengorse.

DISCUSSIONS

Hydatidosis is known to be important in livestock and public health in different parts of the world and its prevalence and economic significance has been reported by different workers in different geographical areas. The prevalence may however vary from country to country or even within a country. The prevalence of the present study in cattle was (27.64%). (29.69%) slaughtered at Ambo municipal abattoir is comparable to those cattle slaughtered at Tigray region (22.1%) (Weldegiorgis *et al.*, 2009), central Sudan 3% (Elmahdi *et al.*, 2004) and Morocco 22.98% (Azlaf and Dakkak, 2006). A higher prevalence of hydatidosis (48.7%) has been reported from Ngorongoro district of Arusha region, Tanzania (Ernest *et al.*, 2009). A lower prevalence rate was also reported from Burdur (Turkey) 13.5% (Umur, 2003) and from Thrace (Turkey) 11.6% (Esatgil and Tuzer, 2007). The variation in prevalence between different countries and regions may be attributed mainly to strains difference in *E. granulosus* that exist in different geographical situations (Arene, 1985). Other factors like difference in culture, social activity and attitude to dog in different regions might have contributed to this variation (Macpherson, 1985). The prevalence rate of (27.64%) 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's to pet animals around homesteads. Moreover, poor public awareness about the disease and presence of few slaughter houses 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<0.005) 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 Umur (2003), Azlaf and Dakkak, (2006) and Esatgil and Tuzer (2007). From the organ prevalence study, lung is found to be the most commonly affected organ. This might be due to the fact that cattle are slaughtered at older age. During this period the liver capillaries are dilated and most cysts directly pass to the lungs. Additionally, it is possible for the hexecenth embryo to enter the lymphatic circulation and be carried via the thoracic duct to the heart and lungs in such a way that the lung may be infected before the liver and / or instead of the liver (Arene 1985). Similar findings were reported by Olika (1997). But, this result contradicts with Soulsby (1982).

Lung harbored higher number of large and medium sized cysts, while liver was found to harbor higher number of small and calcified cysts. The high number of large and medium sized cysts in lung may be due to relatively softer consistency (Symth, 1974). The higher number of calcified cysts in the liver could be attributed to the reticulo-endothelial and connective tissue of the organ (George and Diame, 1981). This finding is similar to the findings of Himones, (1987). The result of the present study revealed that lung is the most common organ followed by liver. This result is similar to other workers such as Soulsby (1982). It has been stated that relatively softer consistency of lungs allow earlier development of cyst; and fertility of hydatid cysts may show a tendency to increase in advanced age of the host. This may also be related to reduction in immunological compatibility of the host at their older ages of infection (Hubbert 1975).

To study the economic losses due to hydatidosis in cattle, both direct and indirect losses were considered. The calculation of the direct losses is based on condemned organs (lung, liver, heart, spleen and kidney) and the indirect losses were assessed on the basis of live weight reduction due to hydatidosis. In calculating cost of condemned edible organs and carcass weight loss, ten different meat sellers were interrogated randomly to establish the price per unit organ and the collective price of lung, liver, heart, spleen, and kidney was determined. Average price was drawn out from that data and this price index was later used to calculate the meat loss in terms of Ethiopian birr (ETB). Average annual slaughter rate of cattle in Ambo municipality abattoir was estimated based on retrospective analysis of data recorded from three years. A 5% estimated carcass weight loss due to bovine hydatidosis described by Weldegiorgis *et al*. (2009) was taken into account to determine the carcass weight loss. Average carcass weight of an Ethiopian zebu was taken as 126 Kilo gram, as estimated by International Livestock Center for Africa (Umur, 2003). The annual economic loss due to bovine hydatidosis at Ambo municipality abattoir from direct and indirect losses was estimated to be 160,032.23 Ethiopian birr. In addition to losses incurred in the abattoir, hydatidosis could have economic impact due to invisible losses like impaired productivity; for example, reduced traction power of oxen which results in reduced crop production. Moreover, cost of control, loss of life, productivity and treatment cost in humans magnifies the economic losses. In conclusion, the prevalence rate in bovine hydatidosis also causes substantial visible economic losses due to condemnation of the organs in the study area.

CONCLUSION AND RECOMMANDATIONS

Hydatidosis is a disease of considerable important for public health. It is found that lung and liver is the most affected organ than other visceral organs (heart and kidney). The high prevalence rates reported in this study clearly indicated that lack of plan based on control measure against the source of infection of this disease which is attributed for increasing tendencies in prevalence. In the rural area, most farmer kept at least one dog and they are usually used to guard the livestock in area outside the farm house at grazing sites with resultant contamination of pasture with their feaces, which may contain eggs of *Echinococcus granulosus* and infection of domestic animals.

Based on the aforementioned conclusion the following recommendations are forwarded:

- The existing slaughter house should be properly fenced, access to any carnivores must be denied, disposal pits which are deep and wide must put in places proper disposal and buried of infected carcass and organs, keeping away dogs from the slaughter house and another important control measures needed to be practiced in the area.
- The habit of giving uninspected and uncooked offals to dogs by the community should be discouraged.

- Public awareness should be created about the danger of the disease, special attention being given to abattoir workers and dog owners.
- Backyard slaughtering of animal should be prohibited through designing and reinforcing of legislations, construction of the slaughter house which fulfill the necessary facilities and implementation of proper meat inspection services.

REFERENCES

Arene, F. 1995. Prevalence of hydatidosis in domestic livestock in the Niger Delta. *Trop. Anim. Health Prod.,* **17(1)**: 3-5

Azlaf, R. and Dakkak, A. 2006. Epidemiological study of the cystic echinococcosis in Morocco. *Vet. Parasitol.,* **137**: 83 – 93.

Beard, T. 1988.Evidence that a hydatid cyst is seldom as old as the patient, *Lancet*, 2: 30-32.

Deplazes, R. and Eckert J. 1996. Diagnosis of the Echinococcus muliloalexiex infection in final host *Appl.. Parasite*., **37**: 245-252.

Elmahdi, I., Ali, Q., Magzoub, M., Ibrahim, A., Saad, M. and Romig, T. 2004. Cystic echinococcosis of livestock and humans in central Sudan. *Ann. Trop. Med. Parasitol.,* **98(5)**:473 – 479.

Ernest, E. Nonga, H., Kassuku, A. and Kazwala, R. 2009. Hydatidosis of slaughtered animals in Ngorongoro district of Arusha region, Tanzania. *Trop. Anim. Health Prod., 41(7):1179-1185.*

Esatgil, M. and Tuzer, E. 2007. Prevalence of hydatidosis in slaughtered animals in Thrace, *Turkey. Turkiye Parazitoloji Dergisi*, **31(1)**: 41 – 45.

FAO. 2004. Food African Organization

George, K. and Diame, K. 1981. Hydatid disease in Ethiopia, Clinical survey with some immunodiagnostic results. *Am. J. Trop. Med. Hyg.*, **30(3)**: 645-652.

Hubbert, W. 1975. Disease transmitted from animal to man 6thed.USA, Charles Thomas publishers. Pp 690-1206

Khurro, M. 2002. Hydatid disease current status and recent advances .*Anim. Sauid. Med.*, **122**:56-64.

Macpherson, L.1985. Epidemiology of hydatid disease in Kenya. A study of domestic intermediate hosts in Masaialand. *Transac. Royal Soc. Trop. Med. Hyg.*, **79**: 209-217.

Olika, F. 1997.Study on prevalence and economic significance of hydatidosis ruminants and *Echinococcus granulosus* in dogs in and around Assella. DVM thesis, AAU, FVM, Debre-Zeit, Ethiopia.

Soulsby E.L. 1982. Helminthes Arthropods and protozoa of domesticated animals, 7th edition, Philadelphian, Pp. 119-389.

Symth, D. 1994. Introduction Animal Parasitology. Londen, Hodder Stoughton. Pp. 259- 273.

Thrusfied, M. 2005.Veterinary Epidemiology. 2nd edn. Blackwell science Ltd, UK.

Umur, S. 2003. Prevalence and Economic Importance of cystic Echinococcosis in Slaughtered Ruminants in Burdur, Turkey. *J. Vet. Med.*, **50**:247-252.

Urquhart, G., Armour, J., Duncan, J., Dunn, A. and Jennings, F. 1996. Veterinary parasitology, 2nd edn. Oxford, Long man scientific and technical press, UK, Pp. 100-109.

WAO. 2004. Woreda Agricultural Office of Meket Woreda.

Weldegiorgis, K., Ashenafi, H., Zewdie, G. and Lobago F. 2009. Echinococcosis / hydatidosis: its prevalence, economic and public health significance in Tigray region, North Ethiopia. *Trop. Anim. Health Prod.,* **41(6)**: 865-871.