Hydatidosis in goats in Jammu, India

R. Godara · R. Katoch · Anish Yadav

Received: 22 August 2012 / Accepted: 8 October 2012 / Published online: 2 November 2012
© Indian Society for Parasitology 2012

Abstract The prevalence of hydatidosis was carried out in slaughtered goats ($n = 177$) by liver and lung examination at Jammu. The prevalence rate of hydatidosis was 19.8 %. A total of 14.1 % goats had cysts in both the livers and lungs while 2.3 and 3.4 % goats had cysts in the livers or lungs, respectively. A total of 9.1 % goats had fertile cysts. The adult goats (>4 years) had a significantly higher ($p = 0.01$) prevalence rate as compared to the young goats (<2 years). Sex had no significant effect on the prevalence of hydatidosis in goats. The histopathological section of the affected lungs revealed a thick coat of granulation tissue causing fibrosis. The cysts caused progressive focal pressure atrophic lesions at the sites of predilection, resulting in atelectasis, desquamation of bronchial epithelium and interalveolar haemorrhages. It may be concluded that the slaughter of food animals at an early age would help to reduce the infection prevalence in dogs and subsequently in the food animals.

Keywords Goats · Hydatidosis · Liver · Lung · Histopathology · Jammu

Introduction

Hydatidosis (echinococcosis) is one of the most common helminthic diseases of the animals occur worldwide (Ahmadi and Meshkekar 2011). It ranks first in the slaughtered

animals in India (Das et al. 2003). It is caused by larval form of *Echinococcus granulosus*. The adult parasite is found in the intestine of dog and other carnivorous. After ingestion of eggs through food or water, the cystic larvae (hydatid cysts) develop in the various organs of food animals (Soulsby 1982). The parasite is of zoonotic importance and has been reported worldwide (Parija et al. 1983; Gupta et al. 1990; Amman and Eckert 1995). This paper describes the occurrence and histopathological characteristics of the lesions of hydatidosis in the slaughtered goats in Jammu, India.

Materials and methods

The livers and lungs of slaughtered goats ($n = 177$) were examined for the presence/absence of hydatidosis at local abattoir of R.S. Pura, Jammu by weekly visits during July 2010 to February 2011. The goats slaughtered at this abattoir are those reared by natives for meat purposes. The data were recorded according to age and sex. The infested livers and lungs were brought to the laboratory and the fluid of the cyst(s) containing protoscolices was aspirated with the help of syringe and kept in normal saline for 2–3 h to examine the fertility/sterility of the cysts. The cyst(s) affected tissue samples were taken, fixed in 10 % neutral buffered formalin, and were processed for histopathological investigations following standard techniques (Luna 1968).

Results

The overall prevalence of hydatidosis in goats was 19.8 % ($n = 177$). A total of 14.1 % goats had cysts both in the livers and lungs while 2.3 and 3.4 % had cysts in the livers or lungs, respectively. A total of 9.1 % goats had fertile

R. Godara (✉) · R. Katoch · A. Yadav
Division of Veterinary Parasitology, Faculty of Veterinary
Sciences and Animal Husbandry, Sher-e-Kashmir University
of Agricultural Sciences and Technology, R.S. Pura,
Jammu 181 102, India
e-mail: godara72@rediffmail.com; godara1972@gmail.com

Table 1 Influence of age and sex on the prevalence of hydatidosis in goats

	Age			Sex	
	<2 years	2–4 years	>4 years	Female	Male
No. examined	79	52	46	71	106
% infection	11.4	21.2	32.6	25.4	16.1

Fig. 1 Liver showing multiple hydatidosis

cysts. The prevalence according to age and sex is presented in Table 1. The goats above 4 years of age had a significantly higher ($p = 0.01$) prevalence rate (32.6 %) as compared to the goats below 2 years of age (11.4 %). The females had high prevalence rate (25.4 %) than the males (16.1 %). However, the observations were statistically not significant.

Grossly, the cysts were embedded in the hepatic and lung tissues, ranging from 1.5 to 6 cm in diameter (Figs. 1, 2). After evaginations, the scolex showed two rows of rostellar hooks (Fig. 3). The histopathological section of the affected lungs revealed laminated hyaline layer infiltrated with leucocytes and surrounded by thick coat of granulation tissue causing fibrosis (Fig. 4). The cysts caused progressive focal pressure atrophic lesions at the sites of predilection, resulting in atelectasis, desquamation of bronchial epithelium and interalveolar haemorrhages (Fig. 5).

Discussion

In the Indian sub-continent, the peripatetic sheep and goat flocks mainly owned by nomads, have been an integral part of rural economy. The animals are herded over open steppe grazing lands accessible to stray dog population which

Fig. 2 Lung showing multiple hydatidosis **Fig. 3** Protoscolices with rostellar hooks ($\times 10$) **Fig. 4** Section of lung showing fibrosis (arrow) (H&E, $\times 10$)

Fig. 5 Section of lung showing desquamation of bronchial epithelium (*large arrow*) and atelectasis (*medium arrow*) and interalveolar haemorrhages (*small arrow*) (H&E, $\times 10$)

accords ample opportunities for the transmission of metacystode infections (Godara et al. 2011). Poor awareness about the use of incinerators for disposal of contaminated carcasses left over further aggravates the situation in a majority of Southeast Asian countries.

Hydatidosis has a major constraint on the livestock productivity since the time of Hippocrates (Gemmell and Roberts 1998). In India, the authentic reports on the occurrence of hydatidosis appeared in the literature since 1935 onwards (Bhalerao 1935). In a majority of hydatidosis affected animals, the cysts anchor, develop, mature, and cause asymptomatic focal lesions at the sites of predilection. The cyst(s) can develop in any part of the body. However, it is more commonly found in the liver and lungs in goats (Varma and Ahluwalia 1990). In the soft parenchymatous tissues of the lungs, the cysts grow at faster rate while the firm consistency of liver provides more resistance to the expansion of the cysts.

The adult worms remain alive for a longer period in the definitive host whereas the cysts may remain viable for the life span of the intermediate hosts. This seems to be governed by multiple factors including the quantum and periodicity of the infection intake, subsequent in situ ongoing events of the host–parasite interaction, age and acquired immune status of the animal (Godara et al. 2011). The cysts may cause progressive focal pressure atrophic lesions at the sites of predilection and remain surrounded by infiltration of mononuclear cells (macrophages, lymphocytes and giant cells) and encapsulate by fibrous tissues, followed by calcification in the chronic infections (Matto et al. 1990). The cysts in the lungs may cause desquamation of bronchial epithelium, and even death due to mechanical pressure leads to atelectasis and interalveolar haemorrhages. The characteristic histopathological findings associated with

hydatidosis and inflammatory cellular response in the goats has been in confirmation with earlier descriptions (Varma and Malviya 1986).

The present findings revealed that age had a significant ($p < 0.01$) influence on the prevalence of hydatidosis. The infection is more prevalent in the animals, aged above one year (Erbeto et al. 2010). Since the hydatid cyst develops slowly over several months, a higher infection rate in older animals would be expected. Higher infection rate in the females than the males could be attributed to genetic predisposition and differential susceptibility owing to hormonal effects. Further the females generally get more attention in the hands of farmer on account of economic reasons and those experience problems with their health and production are usually culled while it is a standard production procedure for males to be eliminated.

Ever since 1935, the hydatidosis in peripartetic goats in India has been an incessant threat on goat production. The persistent occurrence of the disease reflects upon the least concerned attitude of the planners, researchers and public health authorities. Sincere efforts are warranted to in-time diagnosis of the latent hydatidosis in the affected animals using advanced techniques in molecular biology. Since the protoscolices are usually developed in 1–2 years, the slaughter of animals at an early age would help to reduce the infection prevalence in dogs and subsequently in the food animals.

References

- Ahmadi NA, Meshkekar M (2011) An abattoir-based study on the prevalence and economic losses due to cystic echinococcosis in slaughtered herbivores in Ahwaz, south-western Iran. *J Helminthol* 85:33–39
- Amman RR, Eckert J (1995) Clinical diagnosis and treatment of echinococcosis in humans. In: Thomson RCA, Lymbery AJ (eds) *Echinococcosis and hydatid disease*. CAB International, Oxon, pp 411–463
- Bhalerao GD (1935) Helminth parasites of domestic animals in India, monograph no 6. Imperial Council of Agricultural Research, New Delhi, pp 106–111
- Das SS, Kumar D, Sreekrishnan R (2003) Hydatidosis in animals and man. In: Sood ML (ed) *Helminthology in India*. International Book Distributors, Dehradun, pp 467–509
- Erbeto K, Zewde G, Kumsa B (2010) Hydatidosis of sheep and goats slaughtered at Addis Ababa Abattoir: prevalence and risk factors. *Trop Anim Health Prod* 42:803–805
- Gemmell MA, Roberts MG (1998) Cystic echinococcosis (*Echinococcus granulosus*). In: Palmer SR, Soulsby EJJ, Simpson DIH (eds) *Zoonoses*. Oxford University Press, New York, pp 665–688
- Godara R, Borah MK, Sharma RL, Jangir BL (2011) Caprine coenurosis with special reference to hepatic coenurosis. *Comp Clin Pathol* 20:277–280
- Gupta RK, Kakkar AK, Bhagat R, Pant K (1990) Phrenomediastinal echinococcosis. *Chest* 98:1528–1530

- Luna LG (1968) Manual of histologic staining methods of the Armed Forces, Institute of Pathology, 3rd edn. McGraw Hill Book Co, New York
- Matto MR, Bali HS, Gupta PP (1990) Pathological changes in echinococcosis and coenuriasis in buffaloes. J Res 27:488–490
- Parija SC, Rao RS, Badrinath S, Sengupta DN (1983) Hydatid disease in Pondicherry. J Trop Med Hyg 83:113–115
- Soulsby EJJ (1982) Helminths, arthropods and protozoa of domesticated animals, 7th edn. Bailliere and Tindal, London, pp 119–125
- Varma TK, Ahluwalia SS (1990) Prevalence of *Echinococcus granulosus* infection in domestic animals of western and central Uttar Pradesh. J Vet Parasitol 4:67–69
- Varma TK, Malviya HC (1986) Unusual occurrence of secondary echinococcosis in goat. Indian J Parasitol 10:235–236