Global Veterinaria 6 (4): 374-377, 2011
ISSN 1992-6197

Study on *Taenia hydatigena* in the Slaughtered Sheep (*Ovis bharal*) and Goats (*Capra hircus*) in Maharashtra, India

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Abstract: Present study deals with the morphology and prevalence of *Taenia hydatigena* from domestic sheep *Ovis bharal* and domestic goats *Capra hircus*. Total of 668 domestic goats and 837 sheep were investigated for infection with *Cysticercus tenuicollis* from different slaughter houses of Maharashtra state during 2010. Results indicated that, 127 sheep (15.17%) and 157 goats (18.75%) was infected with *Cysticercus tenuicollis* cysts. The difference was significant ($P<0.05$). and a morphological character in hooks was significantly different in *Taenia hydatigena* in sheep and goat.

Key words: *Taenia hydatigena* · Sheep · Goats · Maharashtra · India

INTRODUCTION

Taeniidae is the family of class cestoda and order Cyclophyllidea infects the dog and is transmitted to a range of intermediate host species which causes diseases like echinococcosis and cysticercosis. Infection with the larval stage of some species of Taenia is having veterinary importance due to condemnation of infected offal or meat to causes of economic loss [1-3]. The cysticerci of *Taenia hydatigena* are responsible for a high degree of morbidity and mortality in livestocks [4]. Migration of cysticerci in the liver may cause haemorrhagic and fibrotic tracts and serofibrinous peritonitis occurs on approximately day 10 p.i. [5, 6]. This may result in condemnation of the liver at slaughter houses. Heavy infections and traumatic hepatitis in young lambs are leading to death [5]. The reported prevalence of cysticerci was 16.7% in sheep [7], 34.2% and 21.4% in goats and sheep respectively [8], 8.3% in goats [9], 33.3% in goats [10], In Uttar Pradesh, India, prevalence of cysticerci was 37.03% and 34.2% in sheep and goats respectively [11].

The intraspecific variability similar to found in Echinococcus, should be expected in other Taenia species perpetuating through synanthropic hosts [12]. There are some evidences are also provided by different investigators within several species of Taenia on morphological, biochemical, physiological and other data [13]. Taeniasis and cysticercosis was reported by [14 -17] in Iran. In India, report of the differences in biochemical parameters of *Taenia hydatigena* cysticerci from goat and pig origin that probably represent two different strains [4].

The present work was conducted to determine the prevalence and morphology of *Cysticercus tenuicollis* in sheep and goats in Maharashtra, India.

MATERIALS AND METHODS

For the morphological study of rostellar hook, omentum of slaughtered sheep and goats in different abattoirs of Maharashtra state was collected and transferred to laboratory for further investigations during the period from January to December 2010. The invaginated scolexes were collected for analysis of larval rostellar hook morphology.

Cysticerci attached to the omentum or mesenteries and invaginated scolex were collected from each slaughtered sheep and goats for analysis of larval rostellar hook morphology. For the total number of rostellar hooks, 30 protoscoleces per sample and for hook measurements 20 protoscoleces per sample, 10large and 10small hooks per rostellum was used.

Protoscoleces were mounted in polyvinyl lactophenol and sufficient pressure was applied to the coverslip to compress the hooks to lie flat. All measurements were made by using a calibrated eyepiece micrometer under oil immersion. The number, shape and arrangement of rostellar hooks were studied and several components such as blade length, handle length, guard length, total length of large and small hooks was measured.

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For the statistical analysis, difference between infection rates of cysticerci and the mean values obtained from rostellar hooks were analyzed by Fisher exact, t-test and Mann-Whitney test, as appropriate. Significance was declared at a P-value <0.05.

RESULTS AND DISCUSSION

Out of total 668 domestic goats and 837 sheep were investigated for infection with *Cysticercus tenuicollis* cyst. The results indicated that, 127 sheep (15.17%) and 157 goats (18.75%) was infected with *Cysticercus tenuicollis* cysts. (Table 1) The cysts in sheep and goats had a tendency to be located more in the omentum. However, a low percentage were found in other organs, this difference between infections rate of omentum and other organs was significant (P<0.05).

Morphological analysis of the rostellar hooks from sheep and goats *Cysticercus tenuicollis* are given in table 2. The appearance of rostellum from samples of sheep and goats origin was similar, with two rows of alternating large and small hooks. A characteristic large rostellar hooks of cysticerci in sheep and goats was similar. Some morphological characters of small rostellar hooks of cysticerci, including total length, handle length and guard length from sheep and goats, was significantly different, P<0.05. The present investigation showed that sheep and goat was 15.17 and 18.75% frequently infected with *Cysticercus tenuicollis* respectively. The infection rate was higher in goats than in sheep and grazing behavior and management can be considered as the major reasons for this.

In this study the prevalence of *Cysticercus tenuicollis* in sheep and goat was relatively lower than that reported in other countries. In Nigeria, a prevalence of 21.4 and 34.2% recorded in sheep and goats, respectively [8], while [10] recorded 33.3% in goats. Lastly in Germany a prevalence of 16.7% reported in sheep [7]. The infection rate with *Cysticercus tenuicollis* in this study was higher in goats than in sheep. Similar observations were made by some other authors [8 and 18].

On the contrary in India a prevalence of 37.03% of cysticerci recorded in sheep and 27.29% in goats [11]. In the present study the predominant predilection site of cysticerci was (85.82%) and (75.79%) was in the omentum of sheep and goats. (Figure 1) respectively.

The morphological analysis of rostellar hooks was done by 30 protoscoleces per sample for the total number of rostellar hooks and from 20 protoscoleces per sample, 10large and 10small hooks per rostellum for hook measurements. Other authors analyzed a similar sample size for morphological study of protoscoleces in *Echinococcus granulosus* [19 - 24]. The present study showed that handle length, total length and guard length

Table 1: Infection rate, organ distribution of *Cysticercus tenuicollis* cysts from slaughtered sheep and goats of Maharashtra India in 2010

	Infected organs									
Host	Omentum N° (%)	Liver N° (%)	Mesentery N° (%)	Lung N° (%)	Heart N° (%)	Gall Bladder N° (%)	Uterus N° (%)	Peritonum N° (%)	Urinary Bladder N° (%)	Rumen N° (%)
Sheep	109(85.82)	13(10.23)	1(1.27)	1(1.27)	1(1.27)	2(1.57)	0	0	0	0
Goats	119(75.79)	18(11.46)	2(1.27)	1(0.63)	1(0.63)	1(0.63)	5(3.18)	4(2.54)	3(1.91)	3(1.91)

Table 2: Rostellar hook characteristics of *Cysticercus tenuicollis* cyst from slaughtered sheep and goats of Maharashtra India (mean ± SE., n = 30)

Rostellar characteristics		Sheep origin Arrangement of hooks alternating in 2 rows	Goat origin Large and small hooks Large and small hooks alternating in 2 rows
Large hooks	No. of hooks	15.33 ± 1.33	14.66 ± 0.5
	Blade length (µm)	94.8 ± 7.4	95.7 ± 5.48
	Handle length (µm)	104.3 ± 7.19	103.55 ± 8.76
	Guard length (µm)	35.65 ± 5.07	37.9 ± 7.48
	Total length (µm)	199.1 ± 10.93	198.7 ± 10.49
Small hooks	No. of hooks	15.44 ± 1.42	14.77 ± 0.66
	Blade length (µm)	73.55 ± 5.12	74.65 ± 6.64
	Handle length (µm)	61.3 ± 9	67.45 ± 9.75
	Guard length (µm)	31.75 ± 4.2	34.1 ± 5.70
	Total length (µm)	134.85 ± 11.63	141.8 ± 8.33

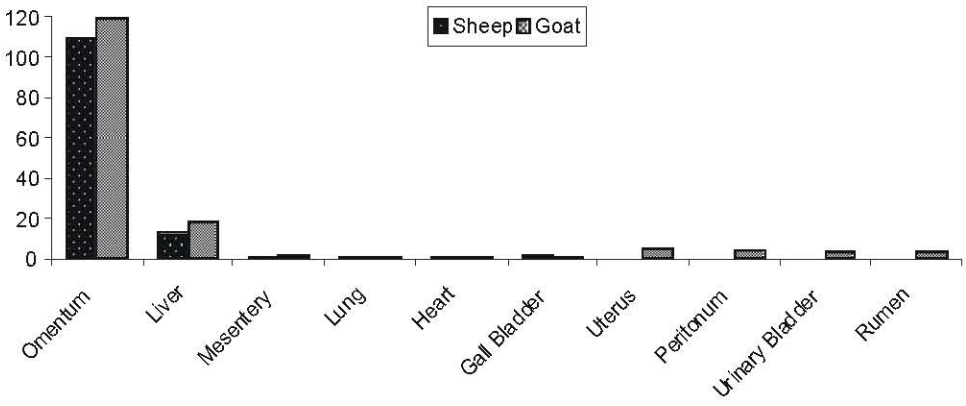

Fig. 1: Infection rate and organ distribution of *Cysticercus tenuicollis* cysts from slaughtered sheep and goats of Maharashtra India in year 2010

of small hooks in protoscoleces from sheep and goats were significantly different ($P<0.05$). Results of the present study are similar to the situation found in *Echinococcus granulosus*, where different strains isolated from a variety of hosts reflects differences in the morphological characterization of larval rostellar hooks.

The reports of marked differences in the development and growth pattern, biochemical characterization and NADH dehydrogenase subunit 1 sequences in *Taenia hydatigena* cysticerci of different host origin [4,26, 27]. In the light of these studies, the *Taenia hydatigena* cysticerci isolated from sheep and goats possibly represent two different strains and it is speculated that in cysticerci, the problem of speciation is similar to that occurring in *Echinococcus granulosus*. Further studies on isoenzyme characterization, DNA probe and ND1 sequences are now required in order to ascertain the strain variation in cysticerci [27-29].

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