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Research article

Prevalence of pulmonary parasitic infection in goats of Mymensingh

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ABSTRACT

Pulmonary parasitic infections in goats are of considerable economic importance. The parasites cause chronic production losses as a result of reduced food conversion ratio (FCR) and weight gain. To investigate the prevalence of pulmonary parasites of goat, a total of 45 lungs were examined from Mymensingh Sadar during the period January to May, 2014 by using sedimentation and Baermann technique. Lung examination revealed that 64.4% animals were infected with pulmonary parasites irrespective of age and sex. In this study, *Dictyocaulus* sp. (8.9%), hydatid cysts (11.1%) and aberrant parasites such as *Schistosoma indicum* (11.1%), *Fasciola gigantica* (2.2%), Paramphistomum cervi (4.4%) were identified. In the age groups, higher prevalence was found in >6 yrs (71.4%) than 4-6 yrs (64.3%) and <4 yrs (62.5%). Female was 1.74 times more susceptible to pulmonary parasitic infections than male but the difference was not found statistically significant. It is suggested that goats are susceptible to pulmonary parasitic infections in Mymensingh Sadar, which may have serious effect. Therefore, detail epidemiological studies are needed for planning effective control strategies against pulmonary parasitic infections in goats.

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INTRODUCTION

Livestock is one of the important subsectors of agriculture and plays an important role in the economy of Bangladesh. About 80% rural families depends on agriculture as well as they rear livestock specially cattle, goats, and buffaloes. At present, total goat populations in Bangladesh are 252.12 lac (Bangladesh Economic Review, 2013). The geo-climatic conditions together with the water-logged and low lying areas in Bangladesh are conducive to parasitic diseases (Qadir, 1992). In fact, goats of Bangladesh are affected by various types of helminth parasites (Islam *et al.*, 1995). Pulmonary parasitic infections are one of the major causes of them (Rahman *et al.*, 2002). The losses due to parasitic infections in the form of mortality, morbidity and lower output of work, decrease in the production of milk and meat (Faiz, 1972) is 50% in Bangladesh (ADB, 1984). Lung worm (*Dictyocaulus* sp.) and hydatid cyst are common pulmonary parasitic infection in goat. Lung worms are responsible for great economic losses to breeders throughout the world (Bekele, and Abu, 2011). It occurs most frequently in goats that graze low-lying and wet pastures and cause a dry husk-like cough, weight loss, and poor performance. *Hydatid* cyst in goats and other herbivores have been recognized as the most important helminth zoonoses with a great economic and public health significance in developing countries. The economic losses from discarded lungs and liver due to hydatidosis were estimated to be about TK. 170 million in Turkey (Umur and Aslantas, 1993). Hadziosmanovic (2001) reported that more than 400 tons of liver and lungs of slaughtered animals were rejected due to hydatidosis in Croatia. The diverse agro-climatic conditions, animal husbandry practices and pasture management largely determine the incidence and severity of various parasitic diseases in a region. Epidemiological pattern of the parasitic diseases

in the different agro-climatic zones of the country provide a basis for evolving strategic and tactical control of diseases. The information on caprine respiratory diseases due to parasitic infections is still limited in Bangladesh. By considering the above mentioned facts, the present study was undertaken to investigate the prevalence of pulmonary parasites and to study gross pathology of the infections.

MATERIALS AND METHODS

Study area

The samples (lungs) were collected from different slaughter houses of Mymensingh Sadar. Identification and other study works were conducted in the laboratory of Department of Parasitology, Bangladesh Agricultural University, Mymensingh.

Study period

The study was conducted during January to May, 2014.

Selection of goats

Forty five (45) lungs were collected from the different slaughter houses. The age of the goats were determined by examining the teeth before or after slaughter following the method described by Samad (2008). According to the age, goats were divided into three groups such as <4 years (24), 4-6 years (14), and >6 years (7) of age. The sex of the goats was also recorded before slaughter.

Sample collection and preservation

After collection, the lungs together with trachea were shifted to the laboratory using polythene bag. Then individual sample was placed in a tray containing normal saline at the laboratory of Department of Parasitology, Bangladesh Agricultural University for further examination.

Examination of the lungs

The lungs were examined in the laboratory for gross lesions. The gross lesions were identified on the basis of their physical characteristics. The number, size, shape and other characteristics of lesions were recorded. The severity of pulmonary lesions was determined on the basis of size and number of lesions as well as area of individual lesions. The suspected tissue specimens (cysts) and other infected tissue were collected and fixed in 10% buffered neutral formalin solution.

Collection of parasites and other developmental stages

Parasites and other developmental stages were collected by sedimentation method and Baremann technique as described by Soulsby (1982).

Sedimentation method

The lungs together with trachea were placed on a large deep tray. The trachea and bronchi were cut open with scissors. The main bronchioles were cut open up to their tips followed by the smaller lateral bronchioles. Then the lungs were washed thoroughly in normal saline and lukewarm water in a bucket. The saline was poured through a wire mesh screen with an aperture of 0.038 mm. The saline water was taken in a beaker. After few minutes supernatant was discarded and resuspension of the sediment was done. Final sediment was taken in a petridish for collection of parasites.

Baermann technique

At first, the rubber tube was clamped so that water cannot pass from funnel to the centrifuge tube. The cheese cloth was then spreaded on the sieve. Then small pieces of lung tissue samples were placed on the cloth. The funnel was fitted with lukewarm water, so that the water level is above the sample. The mixture was then retained for 6-24 hours. Then the clamp was loosening so that the water of the bottom of the funnel goes to the centrifuge tube. The centrifuge tube was removed and centrifuged for 2-3 minutes at 2000 rpm. After centrifugation a drop of sediment was placed in clean glass slide and examined under microscope for identification of larvae.

Identification of parasites and other developmental stages

After collection, parasites and other developmental stages (larvae) were taken in a clean glass slide and a few drops of lactophenol blue stain was added for visualization of their morphological feature. A cover slip was placed over the slide and examined under microscope (10X). The parasites were identified by the morphological feature as described by Soulsby (1982).

Statistical analysis

In this study, Chi-square test was performed to assess the associations of the caprine pulmonary infections with the demographic variables such as age and sex. All of these analyses were performed by using a package program, Statistical Package for Social Sciences (SPSS).

RESULTS AND DISCUSSION

Overall prevalence of pulmonary parasitic infections in goats

During the study period, a total of 45 lungs were examined in which 29 lungs were found infected with one or more species of pulmonary parasites indicating

an overall prevalence 64.4%. The identified parasites were *Dictyocaulus* sp. (8.9%) and Hydatid cyst (11.1%). Three (3) aberrant parasites were identified such as *Fasciola gigantica* (2.2%), *Paramphistomum cervi* (4.4%) and *Schistosoma indicum* (11.1%). The overall prevalence of pulmonary lesions was 28.9% (Table.1). Pulmonary lesions include congestion, pleuritis, abscess and hemorrhage.

The present study indicates that about 64.4% goats were infected with pulmonary parasitic infections. More or less similar results were reported by Scott (1997) in Uganda (76.5%). The occurrence of these pulmonary parasitic infections were also reported by Ayana and Chanie, 2013; Jones *et al.*, 1996; Radostits *et al.*, 2000. Barberan and Bascuas (1986) reported the prevalence of verminous pneumonic lesions (85.0%) which showed dissimilar with the present findings. The differences in the overall prevalence of pulmonary infections may be due to the differences in climatic conditions, husbandry practices and inherent characteristics such as host immunity in the study regions.

Table 1: Overall prevalence of pulmonary infections in goats (n=45)

Types of Infection	No. of positive cases	Prevalence (%)
Dictyocaulus sp.	4	8.9
Schistosoma indicum	5	11.1
Fasciola gigantica	1	2.2
Amphistomes	2	4.4
Hydatid cyst	5	11.1
Pulmonary lesions	13	28.9
Sub total	29	64.4

n = Number of sample examined

In the present study, the prevalence of lungworm (*Dictyocaulus* sp.) was 8.9%. This finding is in agreement with the earlier findings of Thamsborg *et al.*, (1998) in Tanjania. The higher prevalence of *Dictyocaulus* sp. was reported by Dar *et al.*, (2012) in India (26.6%), Ayana and Chanie (2013) in Ethoipia (57.6%), Alemu *et al.*, (2006) in Northeast Ethiopia (53.6%) and Eyob and Matios (2013) in Central Ethiopia (72.4%). The lower prevalence was reported by Ali (1983) in goats (0.1%) in Mymensingh.

The prevalence of hydatid cysts (11.1%) recorded currently is similar to Desta *et al.*, (2012), Sarma *et al.*, (2000) and Islam *et al.*, (1995) which were 11.6%, 13.7%, and 11.1%, respectively. However, higher prevalence of hydatid cyst was 14.7% in Nigeria (Dada, 1980), 20.5% in Ethiopia (Mersie *et al.*, 1993), 24.7% in Turkey (Umur and Aslantas, 1993) and 47.2% in Uzbekistan (Musinov, 1999). The present report of hydatid cysts was higher than Alam (2001) in Bangladesh (0.4%) and Njoroge *et al.*, (2002) in Kenya (4.5%). The differences in the prevalence may be due to the differences in husbandry practices, the techniques of sample collection, period and place of study and environmental factors etc. which may influence this variation.

Schistosoma indicum, *Fasciola gigantica* and *Paramphistomum cervi* are found in this study as aberrant parasites. Rahman (2002) also found the aberrant parasite in his study in Mymensingh town and identified *Schistosoma indicum* (12.5%), *Fasciola gigantica* (0.9%) and *Paramphistomum cervi* (0.9%) which is appear to be more or less similar with the present findings.

Sex related prevalence of pulmonary parasitic infections in goats

In this study, it was recorded that prevalence of pulmonary parasitic infections (68.0% vs 55.0%) and pulmonary lesions (36.0% vs 20.0%) were insignificantly ($p>0.05$) higher in female than male. However, in male, prevalence was higher in case of hydatid cyst (15.0%). In female, prevalence was higher in case of *Schistosoma indicum* (12.0%). Female was 1.74 times more susceptible than male with pulmonary parasitic infections (Table 2).

Table 2: Sex related prevalence of pulmonary infections in goats (n=45)

Infection	Male (n=20)		Female (n=25)	
	No. of positive cases	Prevalence (%)	No. of positive cases	Prevalence (%)
Dictyocaulus sp.	2	10.0	2	8.0
Schistosoma indicum	2	10.0	3	12.0
Fasciola gigantica	1	5.0	0	0.0
Amphistomes	0	0.0	2	8.0
Hydatid cyst	3	15.0	2	8.0
Pulmonary lesions	4	20.0	9	36.0
Sub total	**11**	**55.0**	**17**	**68.0**
Odd ratio	1.74 (Female vs male)			
Chi-square value	3.51			
P-value	**0.62 NS**			

NS = Not significant (P>0.05)
n= Number of sample examined

From the present study, it was observed that the prevalence of pulmonary parasitic infections was insignificantly (p= 0.62) higher in female (68.0%) than male (55.0%). This finding is in the agreement with the earlier study of Anwar et al., (2000) in Pakistan (41.77%, 29.93%) and Ali (1983). The present study differs from Ayana and Chanie (2013) in Ethiopia who recorded female and male animals appear similarly affected even though very small difference applies 57.8% and 57.2%, respectively. The reason of higher prevalence of infection in the females cannot be explained exactly but it might be assumed that the alteration of the physiological condition of the female during pregnancy, lactation and parturition (hormonal influence) as well as stress leading to immune suppression may be associated with this phenomenon. Lloyd (1983) reported that higher level of prolactin and progesterone hormones make the female individual more susceptible to any infection.

Age related prevalence of pulmonary parasitic infections in goats

In the present study, it was found that prevalence of pulmonary parasites of goats were insignificantly (p>0.05) higher in age of >6years (71.4%) than 4-6 years (64.3%) and <4 years (62.5%) Table-3.

Table 3: Age related prevalence of pulmonary infections in goats (n=45)

Infection	<4 yrs (n=24)		4-6 yrs (n=14)		>6 yrs (n=7)	
	No. of positive cases	Prevalence (%)	No. of positive cases	Prevalence (%)	No. of positive cases	Prevalence (%)
Dictyocaulus sp.	3	12.5	1	7.1	0	0.00
Schistosoma indicum	2	8.3	2	14.3	1	14.3
Fasciola gigantica	1	4.2	0	0.0	0	0.0
Amphistomes	0	0.0	2	14.3	0	0.0
Hydatid cyst	2	8.3	3	21.4	0	0.0
Pulmonary lesion	7	29.2	3	21.4	3	42.9
Sub total	**15**	**62.5**	**9**	**64.3**	**5**	**71.4**
Odd ratio	1.08 (4-6 yrs Vs <4 yrs)		1.39 (>6 yrs Vs 4-6 yrs)		1.5 (>6 yrs Vs <4 yrs)	
Chi-square value	4.15					
P-value	**0.84 NS**					

NS = Not Significant (P>0.05)
n= Number of sample examined

These findings are supported by Desta et al., (2012), Alam (2001) and Ayana and Chanie (2013) in Ethiopia. Islam (1981) recorded the hydatid cysts were in animals up to 1 year (0.6%), 1 to 2 years (2.5%), 2 to 3 years (5.5%), 3 to 5 years (16.8%) and above 5 years (21.6%). The present study differ from Hoglund et al., (2001) in Sweden, Thamsborg et al., (1998) in Tanjania and Dar et al., (2012) in India who reported that the higher prevalence was in young than adult. This might be associated with the naturally acquired immunity against infection in older animals which slowly develops due to the previous exposure and better immunity against re-infection after recovering from the disease (Alemu et al., 2006).

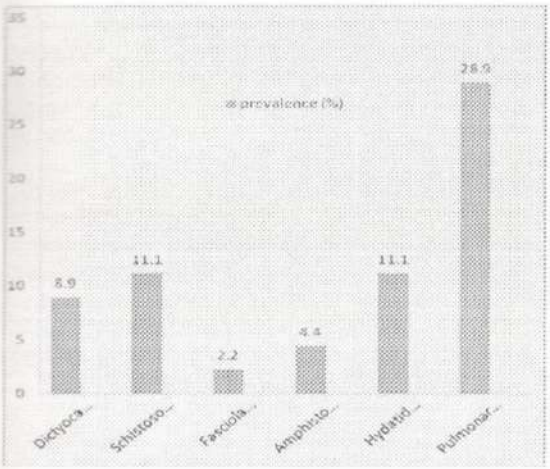

Figure 1: Overall prevalence of pulmonary infections in goat.

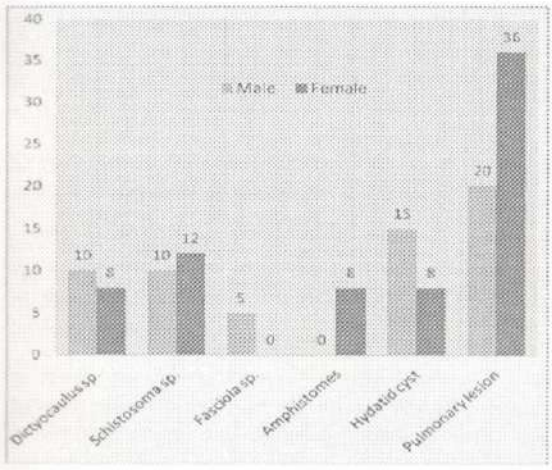

Figure 2: Sex related prevalence of pulmonary infections in goat.

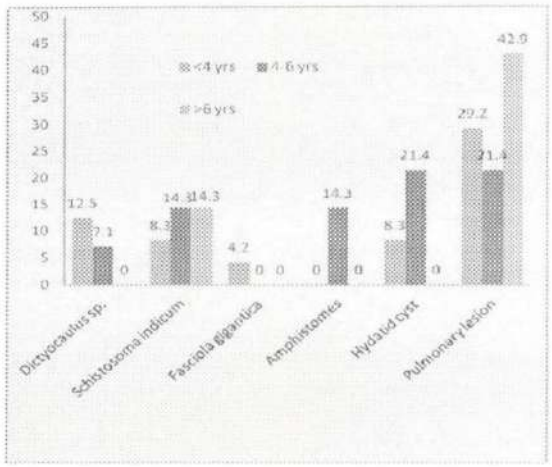

Figure 3: Age related prevalence of pulmonary infections in goat.

CONCLUSIONS

Pulmonary parasitic infections were prevalent in goats with pulmonary lesions which might have serious economic losses on livestock production. It is necessary to measure total economic loss due to pulmonary parasitic infections. So, further study is needed for thorough epidemiological investigation and to find out proper control strategies against it.

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