Original Research

Prevalance of Caprine amphistomosis in Mathura district of Uttar Pradesh (India)

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Abstract

A total 2488 rumen screened for amphistome and 240 faecal samples of goats from Mathura were examined for prevalence studies. Prevalence of amphistomosis by rumen examination was divided in three major group viz. heavy, moderate and light infection. The total maximum month wise prevalence was reported in July (21.87%) followed by September (19.15%). The minimum prevalence was observed in month of December (8.73%) followed by November (9.44%). The highest overall season wise prevalence on the basis of rumen examination was reported in summer (16.67%) followed by monsoon (16.64%) and winter (10.53%). The prevalence on the basis of faecal examination (n= 240) revealed 17.08% during August to October 2016. Female goats (19.20%) were found more susceptible to amphistomosis in comparison to male (11.11%). Morphologically three species of amphistomes viz. Paramphistomum epiclitum (95.60%), Gastrothylax crumnifer (3.20%) and Fischoederius spp. (1.08%) were identified from rumen.

Key words: Goat Amphistomes, Mathura (Uttar Pradesh), Prevalence

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Introduction

Goats are integral part of the livestock production systems in crop-livestock mixed agriculture in the developing countries like India but the benefits obtained from goats today do not match with their actual potential. Diseases contribute to the constraints of goat production, particularly due to parasitic diseases including trematodes for which goat act as definitive hosts. Among the parasitic diseases, paramphistomosis, caused by digenetic trematode (fluke) of the superfamily Paramphistomoidea is one of the least explored and almost totally neglected trematodal infectious diseases by veterinary parasitologists.

It is one of the most pathogenic disease in domesticated animals causing heavy economic losses in respect of reduce feed conversion, meat and milk production in animal industry (Horak 1967; Kilani *et al.*, 2003), that toll several thousand crores of rupees annually (Shabih and Juyal, 2006). Yamaguti (1971) listed 62 species of paramphistomes of domestic ruminants from various countries. Paramphistomosis is caused by specific species of the parasite in a particular region with different pathogenicity (Mehlhorn, 2008). *Paramphistomum. cervi*, *P. explanatum*, *Gastrothylax crumenifer*, *Cotylophoron cotylophorum*, *Fischoederius elongates*, and *Fischoederius cobboldi* have been recorded from Asia (Boray, 1959; Malek, 1980; Hanna *et al.,* 1988; Wang *et al.,* 2006). Clinical outbreaks of paramphistomes from different places suggested that *Paramphistomum epiclitum, P. cervi, Gastrothylax crumenifer, Gigantocotyle explanatum, Cotylophoron cotylophorum* and *Fischoederius elongatus* are the predominant species in domestic ruminants of India (Hassan *et al.,* 2005). Among them, most prevalent amphistomes in India are *P. epiclitum, G. crumenifer, Fischoederius elongatus, F. cobboldi* and *Gigantocotyl explanatum* with the prevalence ranging 50–70% (Dutt, 1980; Hafeez and Avastthi, 1987; Matto and Bali, 1991; Prasad and Varma, 1999). Incidence of amphistomosis in cattle, buffaloes, sheep and goat has been reported in different states of India from time to time (Chhabra *et al.,* 1972, Chhabra and Gill, 1975; Varma *et al.,* 1989 and Manna *et al.,* 1994). The mortality rate due to immature paramphistomosis is very high and is reported to reach 90% in the sheep and goats and 40-60% in the calves. In the Indian subcontinent, immature paramphistomosis of domestic ruminants ranks next to fasciolosis and the mortality can reached up to 88% in sheep and goats (Dutt, 1980; Choudhury, 1994; Agrawal, 2003). A very few study was done on the prevalence of amphistomosis in goat of Mathura district. However, the prevalence of amphistomiasis in goat using rumen examination of slaughtered goats, faecal examination of goats randomly collected from nearby areas of Mathura in association with season, has not been studied properly. Therefore this study was an attempt to record the prevalence of amphistome in goats in relation to parasite burden and seasonal changes.

Materials and Methods

Collection of Parasites

A total 2488 rumen screened for amphistomes at army slaughter house, Mathura (U.P.) for heavy, moderate and low infections from October 2015 to June 2017. Month wise and season wise prevalence of amphistomsis were calculated by using these data. The infection of amphistomosis was divided in three major groups *viz.* Heavy (almost complete rumen infected with amphistomes), moderate (approximately half the surface area of rumen were infected with amphistomes) and light (only one or two patches of amphistomes were present in rumen). Beside this a total 92 rumen heavily infected with amphistomes were collected in clean polythene bags and transported with ice packs immediately to Department of

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Parasitology, College of Veterinary Science & Animal Husbandry, Mathura (Uttar Pradesh), for identification of amphistome species by morphology. Faecal samples were also collected from 240 goats by random sampling from nearby villages of Mathura district for presence of amphistome eggs. Two to three pellets were collected from each goats per rectally in clean polythene faecal bags and transferred to laboratory under cold conditions.

Processing, Preservation and Identification of Parasites

Parasites were removed gently from rumen with the help of forceps and transferred into a beaker containing PBS. Preservation and identification of amphistomes were done as per protocol given by Bhatia *et al*., 2016 with some minor modifications. Briefly, collected amphistomes were flattened by gentle pressing them between two slides and fixed in 10% formalin for 18-24 hours. Next day formalin fixed amphistomes were thoroughly washed in running water for sufficient time to remove formalin. After that amphistomes were left for few hours in alcoholic carmine stain for proper staining. The stained amphistomes were washed thoroughly in running water to remove excess stain. Destaining with 1% acid alcohol was done after completion of staining. Again samples were washed in 70% alcohol and dehydrated in 70%, 90% and absolute alcohol for 1 hour, each. Clearing of amphistomes were done in clove oil and at last amphistomes were mounted permanently by DPX on glass slide. Amphistomes were identified by their morphology (Soulsby, 1982).

Result and Discussion

Rumens of goats slaughtered for human consumption at Army slaughter house, Mathura (Uttar Pradesh) were observed for prevalence of caprine amphistomosis from October 2015 to June 2017. The infection of amphistomosis was divided in three major groups *viz.* Heavy, moderate and light infection (Table 1).

In the present investigation, prevalence of amphisotmosis in goats was found 14.67% (by rumen examination of slaughtered goats) and 17.1% (by faecal examination). In the present study, rumen examination of slaughtered goats showed prevalence of low level of infection of amphistomosis (localized) was (7.99%) followed by moderate level (4.06%) and high level (2.21%). High levels of localized infection in adult animals was in agreement with Khani *et al*. (2008) and Halium *et al*. (2014). They suggested that animals develop resistance after exposure to the parasite, which protects them against the massive infections of mature flukes. In the present study, the overall highest prevalence was found in month of July (21.87%). Similar to present study, the highest prevalence rate in month of July (33.33%) and August (43.3%) was also observed in previous study (Mahalik, 2015). The possible reason was that the monsoon season is the most conductive to the breeding of snail viz. *Indoplanorbis, Lymnea* and *Gyraulus* spp. (Swarnkar *et al*.,

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2014). In this study, the higher prevalence rate was observed in summer season (16.67%) and monsoon season (16.64%) followed by winter season (10.53%) (Table 1).

Table 1: Month and season wise prevalence of amphistomosis by rumen examination of slaughtered goats

Months	No. of rumen examined	Heavy infected goats	Moderate infected goats	Low infected goats	Total infected goats	Season	Number of Rumen Examined	Heavy infected goats	Moderate infected goats	Low infected goats	Total infected goats
Nov	254	4 (1.57)	5(1.97)	15(5.91)	24(9.45)	Winter	969	10(1.03)	28(2.89)	64(6.6)	102(10.53)
Dec	252	2 (0.80)	6(2.38)	14(5.56)	22(8.73)						
Jan	251	1(0.40)	9(3.58)	19(7.57)	29 (11.60)						
Feb	212	3(1.41)	8(3.77)	16 (7.55)	27(12.74)						
Mar	233	8(3.43)	11(4.72)	20(8.58)	39(16.74)	Summer	858	26(3.03)	45(5.24)	72(8.39)	143(16.67)
Apr	186	4(2.15)	10(5.38)	16(8.60)	30(16.13)						
May	227	6(2.64)	13(5.73)	20(8.81)	39(17.18)						
Jun	212	8(3.77)	11(5.19)	16(7.55)	35(16.51)						
Jul	64	2 (3.12)	5 (7.81)	7(10.94)	14(21.87)	Monsoon	661	19(2.87)	28(4.24)	63(9.53)	110(16.64)
Aug	160	5(3.12)	4(2.50)	16(10.0)	25 (15.63)						
Sep	141	4(2.84)	6(4.26)	17(12.10)	27(19.15)						
Oct	296	8(2.70)	13(4.39)	23(7.77)	44(14.86)						
Total	2488	55(2.21)	101(4.06)	199 (7.99)	355 (14.27)	Total	2488	55(2.21)	101(4.06)	199(7.99)	355(14.27)

**Values in parentheses are written in percentage*

The observations of present study were in agreement with the previous studies (Swarnakar *et al.*, 2014; Godara *et al*., 2014; Jas *et al*., 2017). They suggested that the higher prevalence rate of paramphistomosis might be due to significantly increase in snail population during monsoon that act as intermediate hosts, resulting in higher prevalence of those trematode infections in rainy season. The higher prevalence of amphistomosis was also reported in summer season followed by monsoon and winter season in goats of Jabalpur, Madhya Pradesh (Dixit *et al*., 2017). The possible suggested reason was ingestion of metacercariae as a result of local overcrowding around water bodies. Bansal *et al*. (2015) also found the higher prevalence of amphistomes in summer.

Faecal examination reports of the present study showed that female goats were more susceptible to amphistomosis (19.2%) as compared to male goats (11.1%) (Table 2). The higher percentage of infection in the females might be due to the alteration in the physiological condition of the animals during pregnancy and lactation (production activity) and also the lack of feed supplement for production, which may lead to the lowering of body resistance of the females (Uddin *et al*.,2006).

Table 2: Sex wise prevalence of amphistomosis

Sex	Total Sample Collected	Total Animals Found Positive
Male	63	7(11.11)
Female	177	34(19.2)
Total	240	41 (17.08)

**Values in parentheses are written in percentage*

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The three species of amphistomes were identified by morphological examination viz. *Paramphistomum epiclitum*, *Gastrothylax crumnifer* and *Fischoederius* sp. with prevalence rate of 95.6%, 3.2% and 1.08% respectively. Scientists suggested that India can be considered as the infective capital of *P. epiclitum* and *G. crumenifer*, *Feschioederus elongatus* and *Gigantocotyle explanatum* infections with the estimated prevalence rate 50–70% (Dutt, 1980; Hafeez and Avastthi, 1987; Matto and Bali, 1991; Prasad and Varma, 1999). The highest prevalence of *Paramphistomum cervi* (65.28%) was also reported from Bangladesh (Uddin *et al*., 2006). *Gigantocotyle explanatum* was not identified in the present study because this species of amphistome resides in bile duct that was not part of this study (Table 3).

Table 3: Distribution of amphistome species in rumen

S. No.	No. of rumen used	*Paramphistomum epiclitum*	*Gastrothylax crumnifer*	*Fischoederius* sp.
1	92	88 (95.6)	3 (3.2)	1 (1.08)

**Values in parentheses are written in percentage*

Conclusion

The present study clearly indicates that caprine amphistomosis is a major issue that can play an important role in hindering the goat development in the country. So, development of sustainable cost effective control strategies against amphistomes is required.

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