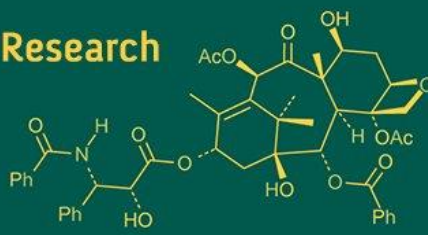


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
 ISSN Online: 2617-4707
 NAAS Rating (2026): 5.29
 IJABR 2026; 10(5): 664-667
www.biochemjournal.com
 Received: 12-03-2026
 Accepted: 16-04-2026

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Prevalence study of paramphistomosis in goats of Jaipur region, Rajasthan, India

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DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i5h.8493>

Abstract

Paramphistomosis is an economically important parasitic disease of ruminants caused by trematodes of the family Paramphistomatidae. The present study was undertaken to determine the prevalence of paramphistome infection in goats in the Jaipur region of Rajasthan. Faecal samples from 50 goats of different age groups and sexes were examined using standard coprological techniques, and the overall prevalence was recorded as 24%. The prevalence in slaughtered goats was found to be 26.6%. Statistical analysis indicated a significant association between age and infection, whereas sex was not found to be a determining factor. The study highlights the influence of environmental conditions and host-related factors on the occurrence of paramphistomosis in goats.

Keywords: Paramphistomosis, goat, prevalence, epidemiology, morphological identification

1. Introduction

Paramphistomosis is a snail-borne parasitic disease affecting both large and small ruminants and is widely distributed in tropical and subtropical regions. The disease is caused by trematodes belonging to the family Paramphistomatidae, commonly known as rumen flukes. These parasites inhabit the rumen and reticulum of ruminants, where adult flukes are generally non-pathogenic, but the immature stages migrating through the small intestine cause severe pathological changes such as enteritis, diarrhea, and weight loss (Radostits *et al.*, 2010) [13]. The lifecycle of these parasites involves freshwater snails as intermediate hosts, which release infective stages that encyst on vegetation. Infection occurs when animals ingest contaminated pasture (Pinedo *et al.*, 2010) [12].

In semi-arid regions like Jaipur, climatic factors such as rainfall, humidity, and water stagnation influence the survival of snails and thereby affect the epidemiology of the disease. Paramphistomosis is a widely distributed parasitic disease of ruminants and occurs more frequently in areas where environmental conditions favour the survival and multiplication of intermediate snail hosts, particularly aquatic and amphibious snails (García-Dios *et al.*, 2024) [4].

Goat farming is an important livelihood activity in Rajasthan, but parasitic infections significantly reduce productivity (Kamaraj *et al.*, 2010) [8]. Therefore, the present study was conducted to assess the prevalence and associated risk factors of paramphistomosis in goats of this region.

2. Materials and Methods

The current investigation was carried out in and around Jaipur, located in the semi-arid eastern plain region of Rajasthan from December 2025-March 2026. The area typically receives an annual rainfall ranging between 500 and 700 mm, while temperatures fluctuate from approximately 8.3 °C in cooler months to about 40.6 °C during hotter periods.

A total of 50 goats of varying ages and both sexes (male and female) were randomly selected for the study. Based on age, the animals were grouped into young (0-1), adult (1-8), and old categories (>8) to evaluate differences in susceptibility.

Faecal samples were collected directly from the rectum of each animal using clean, airtight containers such as screw-capped bottles and plastic bags. Each sample was properly labelled with details including animal identification number, breed, sex, age, date, and location of

collection. For parasitological examination, sedimentation and direct smear techniques were employed to detect paramphistome eggs, following established procedures. Identification was carried out based on morphological characteristics such as size, shape, and the presence of an operculum.

Additionally, gastrointestinal tracts from a limited number of slaughtered goats (15) were collected from local abattoirs to assess seasonal prevalence and distribution of parasite species in relation to age, sex, and breed. In the laboratory, freshly collected gut samples were immersed in normal saline (0.9%), opened carefully, and examined. The recovered parasites were washed in 1% sodium chloride solution to remove mucus and debris, processed and identified under microscope using standard parasitological methods.

Statistical analysis was performed using the chi-square test to evaluate the association between infection status and variables such as age and sex. A p-value of less than 0.05 was considered statistically significant.

3. Results

The results of the present study revealed that in coprological survey of 50 goats, 12 animals were found positive for paramphistome infection, resulting in an overall prevalence of 24%. The eggs of paramphistomes were relatively large, oval in shape, and possessed a distinct operculum at one end, transparent or lightly coloured (Fig.1). Out of the slaughtered goats (15), amphistomes were recovered from 5 goats leading to a prevalence of 26.67%.

Age-wise distribution indicated that older goats showed comparatively higher prevalence, followed by young and adult animals. This trend suggests that prolonged exposure to contaminated grazing areas increases the likelihood of infection. Younger animals also showed infection, indicating early exposure to infective stages (Table 1)

Table 1: Age-wise Prevalence of Paramphistomosis in Goats (n = 50)

Age Group	No. Examined	No. Infected	Prevalence (%)
Young	15	3	20.00
Adult	25	5	20.00
Old	10	4	40.00
Total	50	12	24.00
χ^2 Value	2.67*		

*Indicates significance $p < 0.05$

Sex-wise analysis revealed that both male and female goats were equally susceptible, and no statistically significant difference was observed. Clinical signs observed in infected animals included emaciation, diarrhoea, and pale mucous membranes, indicating anemia and poor nutritional status. Statistical analysis using the chi-square test showed a significant association between age and infection, whereas sex did not show any significant relationship (Table 2).

Table 2: Sex-wise Prevalence of Paramphistomosis in Goats (n = 50)

Sex	No. Examined	No. Infected	Prevalence (%)
Male	25	6	24.00
Female	25	6	24.00
Total	50	12	24.00
χ^2 Value	0.0 ^{NS}		

^{NS} Non significant $p > 0.05$

Adult paramphistomes recovered from ruminants were identified to be *Paramphistomum cervi* typically robust, fleshy trematodes exhibiting a characteristic conical or pyriform (pear-shaped) body, presence of a well-developed posterior sucker, known as the acetabulum, which is larger than the oral sucker. The body surface was smooth and lacks spines, freshly collected specimens ranges from pale pink to reddish colour. *Paramphistomum cervi* is further distinguished by the position and structure of its acetabulum, which is subterminal and occupies a significant portion of the posterior end (Fig. 2). The overall body length ranged from 12.8 to 14.9 mm, with a width of approximately 4-6 mm. The testes are typically arranged in a tandem or slightly oblique manner along the median line, while the ovary was situated anterior to the testes. The uterus was coiled and extends forward, eventually opening through the genital pore located near the anterior region.

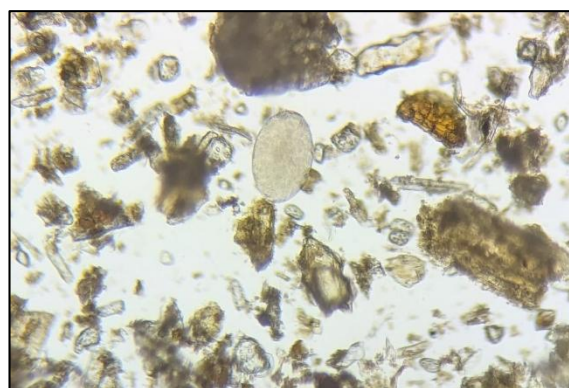


Fig 1: Microscopic identification of *Paramphistomum cervi*



Fig 2: Morphological view

4. Discussion

The prevalence of paramphistomosis shows considerable variation across different regions of India due to differences in climatic and ecological conditions. In Uttarakhand, a large-scale epidemiological study reported an overall prevalence of 9.69 percent in domestic ruminants, indicating relatively lower infection levels in hilly regions (Tariq *et al.*, 2014) [18]. In contrast, studies conducted in Jammu revealed moderate prevalence, with 13.6% infection in goats based on coprological examination and up to 30.9% in abattoir studies (Godara *et al.*, 2013) [5]. Similar study in Mathura region have recorded a copro-prevalence of 17.08% (Jaiswal *et al.*, 2018). Another field and abattoir-based investigation reported prevalence rates of 19.7 percent in goats and up to 31.9 percent under slaughterhouse conditions, highlighting

the influence of diagnostic methods and environmental exposure (Ojha *et al.*, 2024) ^[11]. A coprovalence of 24% and isolation of gross parasites from slaughtered goats (26.67%) were observed in the present study, indicating a moderate level of paramphistome infection in goats of the Jaipur region. This comparatively lower prevalence, when contrasted with studies conducted in humid and tropical areas, may be attributed to the semi-arid climatic conditions prevailing in Rajasthan. In regions with higher rainfall and persistent moisture, the survival and multiplication of freshwater snails, which act as intermediate hosts, are significantly enhanced, thereby increasing the transmission potential of the parasite (Elsokkary *et al.*, 2009) ^[3]. In contrast, the relatively dry conditions in Jaipur limit the availability of suitable aquatic habitats required for snail proliferation, ultimately reducing the overall infection pressure. *Paramphistomum cervi* has been detected in the present study, which is a common amphistome species detected around the country. *P. cervi* has also been implicated to cause outbreak in South Andaman district where goats were reared under semi intensive managerial system and allowed to graze in t in surrounding marshy land (Sujatha *et al.*, 2023) ^[17]. The present research also recorded higher prevalence in older goats, which can be explained by cumulative exposure to infective metacercariae over time. As animals continue grazing in contaminated pastures, the likelihood of repeated ingestion of infective stages increases, leading to a gradual build-up of parasite burden. Younger animals, on the other hand, although susceptible, may exhibit comparatively lower prevalence due to shorter exposure duration and developing immune responses (Khani *et al.*, 2008) ^[9]. Repeated exposure to the parasite may lead to the development of partial immunity, which can reduce the severity of infection but may not completely eliminate the parasite. As a result, older animals may harbour adult flukes without showing severe clinical signs, acting as carriers and contributing to the persistence of infection within the herd. It is also possible that subclinical infections in younger animals remain undetected due to lower egg output during early stages of infection.

The absence of significant differences in infection rates between male and female goats suggests that sex does not play a major role in determining susceptibility to paramphistomosis. This finding supports the hypothesis that environmental exposure, grazing behaviour, and management practices are more influential factors than inherent biological differences between sexes (Dorny *et al.*, 2011) ^[2]. In traditional farming systems of the Jaipur region, both male and female goats are generally reared under similar conditions, which likely contributes to the uniformity in infection rates.

Furthermore, management practices such as uncontrolled grazing in low-lying areas, use of common water sources, and lack of regular anthelmintic treatment can contribute to the maintenance and spread of infection. In rural areas of Jaipur, goats often graze freely, increasing their exposure to contaminated vegetation. The absence of systematic parasite control programs further exacerbates the problem, allowing the parasite lifecycle to continue uninterrupted.

6. Conclusion

The present investigation emphasizes that paramphistomosis remains an important parasitic disease affecting goats in the Jaipur region, with *Paramphistomum cervi* identified as the

principal species involved. Effective control strategies should focus on integrated approaches, including strategic anthelmintic treatment, improved grazing management to avoid high-risk areas, and measures to control snail populations. Regular monitoring through fecal examination and awareness among livestock owners are essential to minimize the impact of the disease. Understanding epidemiological factors is essential for developing effective control strategies tailored to the local conditions of the Jaipur region. Further studies involving larger sample sizes and seasonal analysis are recommended to better understand the epidemiology and to develop region-specific control programs.

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