

Research Article

Identification and prevalence of *Paramphistomum cervi* in naturally infected water buffaloes of central Punjab, Pakistan

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Abstract

Gastrointestinal trematode parasites especially *Paramphistomum cervi* are accountable for health hazards in buffalo of central Punjab. A total of 289 rumens and reticulums of buffaloes were examined for the presence of *Paramphistomum cervi* by visiting local abattoirs. The trematodes were preserved in 70% alcohol for identification based on its morphological characteristics. The results of our study showed that 17.3 percent buffaloes were infected by *Paramphistomum cervi* in central Punjab. The correlation between worm burden and area was found to be non-significant ($p > 0.05$) indicating the presence of trematode in all districts of study area. Highest average worm burden was observed in Sargodha and lowest in Mandi Bahauddin. The correlation between worm burden and age was highly significant ($p < 0.05$), while correlation between worm burden and study area was non-significant ($p > 0.05$). Furthermore, highest worm burden was noted in buffaloes of having 22 year age. It was concluded that *Paramphistomum cervi* is prevalent in central Punjab. The availability of fresh water snails serving as intermediate host, existence of extensive water channel system and poor grazing management of animals being practiced in these areas should be managed to control the trematode infections.

Key words: *Paramphistomum cervi*, trematode, buffalo, prevalence.

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Introduction

Pakistan is blessed with an enormous livestock population as part of its agricultural sector, which contributes 11.6 per cent to the national gross domestic product (GDP) and 55 percent to agriculture GDP. The number of buffaloes in Pakistan is 29.9 million. It provides sources of income for 45 percent of the country's labor force and 60 percent of the rural population [1]. Buffalo is contributing 12.1% to the world, 38.0% in Asia, 55.0% in India, 16.4% in China, 50.8% in Egypt, 65.2% in Nepal and 66.6% in Pakistan's total milk production [2].

Buffalo is dairy animal which is important for their draft meat, dung that used as a fertilizer and fuel when it is dried. It can reach at puberty, without reasonable nutrition and female produce calves every 9 to 11 months, but unfortunately many parasites infect them and reduce productivity. Many species of Paramphistomes cause the disease Paramphistomosis leading to lower nutrition conversion and decrease in weight and milk production in grazing livestock [3]. The prevalence of paramphistomosis in Asia is 30-60 percent in some areas and highest prevalence rate has been

noticed in the tropical and subtropical region, particularly in Africa, Australia and Russia [4,5].

One of the gastrointestinal trematode parasite, *Paramphistomum cervi* is an obligate intracellular and a digenea trematode infecting large ruminants. The genus *Paramphistomum* is derived from the Greek word amphistomes meaning having double mouth (Murphy *et al.*, 2008). The mature worm is conical in shape and pink in color when it is alive, having the length varying from 5-12mm. Oral sucker is present at the anterior end and posterior end has large ventral sucker. Its dorsal surface is convex while other one is concave [6]. The eggs (miracidiae) hatch in the water and infect planorbid or bulinid freshwater snails which are its intermediate host, after different stages the metacercaria enter into definitive host [7].

P. cervi causes lethal to fatal infection in host by attaching itself to host intestinal mucosal lining. Severe kind of paramphistomosis is caused when the immature worms sucking pieces of the mucosa into sucker causing strangulation, necrosis and hemorrhage. Anorexia and diarrhea develops 2 - 3 week post infection [8]. The parasite has seven different types of papillae on the oral and acetabular surfaces. The tegumental syncytium

lining the pharynx and acetabulum is thinner and has a higher capacity for vacuolation than the general tegument and is an important factor in osmoregulation [9].

The gastrointestinal amphistomes *P. cervi* are prevalent in buffaloes causing severe to mild kind of infection by destroying the host rumen and reticulum. The hypothesis of the present study was that *P. cervi* dominating in the gastrointestinal tract in buffaloes and cause severe infection if present excessively. The objectives of our study were to identify and determine its prevalence in naturally infected water buffaloes.

Materials and Methods

The present study was based on buffaloes of central Punjab including Chiniot, Sargodha, Gujranwala, Faisalabad, Sheikhpura, Mandi Bahauddin, Pindi Bhattian brought to abattoirs in Rawalpindi and Islamabad. The study was conducted in August 2011 to January 2012 and continuous examination was done on monthly bases. The gastrointestinal tract of 289 buffaloes of different districts was examined for the presence of *Paramphistomum cervi* parasite. *P. cervi* was collected from the rumen and reticulum of infected buffaloes. The specimen was preserved in 70% alcohol and transported to Parasitology laboratory, Department of Zoology, PMAS, AAUR for further processing and identification.

The collected trematodes were stained by using borax carmine, aceto carmine followed by dehydration process with 30, 50, 70, 90 percent and absolute ethanol for 15-30 minutes depending upon the size and thickness of the specimen. Trematodes were then transferred and passed through a mixture of equal volume of xylene and absolute alcohol. After dehydration the specimen was cleared with xylene and treated with clove oil for 1-2 minutes. Then permanent slide was prepared in dopexamine hydrochloride (DPX) mount. For histology the trematodes were processed by applying eosin and hematoxylin staining procedures. The morphometrical measurement was carried out by Filar ocular micrometer as described by Liu *et al* [5].

The data obtained for worm burden was tabulated using Microsoft Excel (MS Excel 2010, Microsoft Corporation). Statistical analyses were performed with Statistical Package for the Social Sciences (SPSS version 16.0). The correlation between worm burden and colony, worm burden

and age, and worm burden and area was determined.

Results and Discussion

The results of our study revealed that 50 buffaloes out of 289 were infected with *Paramphistomum cervi*, showing 17.3 percent infection in the gastrointestinal tract of buffalo (Table 1). Our results are in accordance with Raza et al as demonstrated 20 % prevalence of *P. cervi* in buffaloes in District Muzaffar Garh [10]. While, Tariq et al observed 6.7% and 7.07% *P. cervi* infection in goats of Kashmir valley, Pakistan [11]. This might be due to the grazing habitat of goat that usually graze as compare with buffalo who graze close to the ground and likely to have more chances of getting infection of *P. cervi*.

Table 1: Correlation between age and average worm burden

Age of buffalo (Years)	Average worm burden	Infected individuals	Correlation
16	48.8		
17	71.5		
18	134.7		
19	139	17.30%	
20	146.5		
21	155.4		
22	384.5		

Paramphistomum infection varies from area to area as observed in the present study. The correlation between area and worm burden is non-significant ($p > 0.05$). The highest average worm burden 291 in Faisalabad district followed by 287 in Sargodha, however the lowest average worm burden were seen in Mandi Bahuddin district (Table 2).

The presence of *P. cervi* infection in all districts of central Punjab might be due to several factors viz., availability of intermediate host and existence of conducive environment that facilitate the survival and development of this parasite in water bodies especially well developed channel system. The average worm burden varies from district to district that might be due to involvement of different management practices at farm level. Our results are constant with Barger, who had reported that the grazing management of specific area facilitates the egg hatching and larval development of parasite [12, 18].

The correlation between worm burden and age was highly significant ($p < 0.05$) and the highest average of worm burden is noticed at the age of 22

years and lowest at age of 16 years. The coefficient of age is 9.358 with p-value 0.0008 i.e. <0.05, so it is significant. It also means that as one unit change in age may increase 9.358 worm burdens on average. The highest worm burden increase due to high grazing rate and exposure to grasslands and lack of anthelmintic drugs. Raza et al also concluded that the prevalence is higher in younger animals as compared to adult buffaloes (p < 0.0001), however the prevalence varied with different species of helminths in age groups [4].

As different slaughter houses of Rawalpindi were visited and approximately all of them were females, so higher female in abattoir may be due to lower productive efficiency or loss of reproduction. A variety of factors like age, sex and breed of the host, grazing habits, level of education and economic status of farmers, standard of management and anthelmintic used can influence the prevalence of helminths [13, 17].

Table 2: Districts wise frequency of *Paramphistomum cervi* and correlation of worm burden

Sr. No	Districts	Frequency	Average Colony	Average worm burden	Standard error	Correlation
1	GRW	12.50%	5.28	270.00	92.84	R = 0.114 *non-significant (p > 0.05)
2	SHP	15.78%	6	180.33	76.64	
3	CHN	31.25%	2.2	84.60	42.58	
4	PB	20.63%	3.4	122.46	22.92	
5	MBD	11.76%	3.6	71.33	37.26	
6	FBD	10.86%	6.4	291.20	136.02	
7	SGD	27.27%	7	287.33	88.76	

Conclusions

Paramphistomum is an important helminth disease caused by *Paramphistomum cervi* and one of the major obstacles for livestock development in Pakistan causing remarkable direct and indirect losses at different parts of the country. The high level of Paramphistomum in buffaloes in the present study represents the high rate of infection and immense economic losses to the country. In line with this finding, it is recommended that farmers who rear buffaloes should improve the provision of feeds to their animals so that the animal can have good body condition that confers some level of resistance against Paramphistomum infections. Besides, they should be able to regularly treat their animals with the appropriate anthelmintics and awareness should be spread on the prevention and control methods of Paramphistomum.

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