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PREVALENCE AND ASSOCIATED RISK FACTORS FOR AMPHISTOMOSIS IN BUFFALOES OF JAMMU REGION, INDIA

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ABSTRACT

The prevalence and associated risk factors for amphistomosis in buffaloes of Jammu region (India) were assessed for one year study using faecal examination. The overall prevalence was recorded to be 16.61% (279/1680). Seasonally, the highest prevalence was found in monsoon season (32.6%), followed by summer (23.8%), post-monsoon (6.4%) and winter (3.6%) seasons. Animals above 1 year of age had significantly higher ($P<0.05$) prevalence (17.47%) than animals up to 6 months (7.1%) of age groups. Females had a non-significant ($P>0.05$) higher prevalence (16.94%) than the males (12.29%). Between agro-climatic zones, the buffaloes of irrigated area had a significantly higher ($P<0.01$) prevalence (24.3%) in comparison to rain-fed area (8.9%). From the study, it can be concluded that the season, age and agro-climatic conditions have direct effect on the prevalence of amphistomosis in buffaloes and the administration of an efficient anthelmintic during summer and rainy seasons can reduce the burden of this economically important parasite.

Keywords: *Bubalus bubalis*, buffaloes, amphistomosis, Jammu, prevalence, season

INTRODUCTION

The buffalo, commonly called black diamond, plays a versatile role in socio-economic upliftment of farmers in rural agricultural communities. In India, the buffaloes are the largest producer of superior quality milk and lean meat (Edith *et al*., 2011). Their high sensitivity to solar radiation is comforted by wallowing nature in water bodies which predisposes them to snail-borne helminthic diseases. Among these, amphistomosis is one of the major health problems which severely limit the productivity of buffaloes resulting in economic losses to poor and marginal farmers of the region (Katoch *et al*., 2009). The hot and humid sub-tropical environmental conditions of the region are favourable for the survival and propagation of larval stages of amphistomes as well as the snail intermediate host (Godara *et al*., 2014b). Therefore, the current study was conducted to know the prevalence and risk factors associated

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with amphistomosis in buffaloes of Jammu region (India).

MATERIALS AND METHODS

Study area and collection of faecal samples

The one-year study was conducted during August 2020 to July 2021. The study area is located between 30° 40' North latitude and 74° 50' East longitude and is divided into two parts- one is irrigated area which is located at the height of 270 meters above the sea level and the second one is rain-fed area (Kandi belt) which is located at the height of 327 meters above sea level. In the study area, mainly buffaloes are reared by the farmers for milk production.

The faecal samples were directly collected from the rectum of animals in morning hours. The fresh faecal samples were also collected from the ground when the animals were found in the act of defaecation. The faecal sample from individual animal was kept in a separate polythene bag and tied carefully, and then it was numbered properly. The faecal samples were brought to the laboratory and examined (within 24 h of collection). A total of 210 faecal samples were collected in each season, and 840 samples in all 4 seasons of a year from rainfed and irrigated areas each (n=1680). The animals were divided into three groups according to their age, i.e. up to 6 months, more than six months to 1 year and above 1 year of age. The sex (male/female) of animals was noted on the poly bags.

The meteorological data such as temperature, humidity and rainfall were collected from Meteorological Division, Faculty of Agriculture, Sher-e-Kashmir University of Agriculture Sciences and Technology, Chatha, Jammu (Figure 1). The study area has been divided into four seasons: monsoon (July to September), post-monsoon (October to November), winter (December to February) and summer (March to June).

Faecal examination

The qualitative examination of faecal samples was done by thin (direct) smear method and sedimentation method as described by Soulsby (1982). For quantitative examination, the faecal samples were examined by Stoll's dilution method (Soulsby, 1982) to determine the number of eggs per gram of faeces (EPG).

Statistical analysis

The prevalence data was analyzed by Chi-square test of independence (Snedecor and Cochran, 1989). The EPG data was analyzed by one-way ANOVA, followed by Duncan multiple range test for ranking of significantly different means. A P-value ≤ 0.05 was considered significant.

RESULTS

The overall prevalence of amphistomosis in buffaloes of Jammu region (India) was recorded to be 16.61% (Table 1). A significant difference ($P<0.01$) was recorded on *Chi-square* analysis in the seasonal prevalence of amphistomosis. A higher prevalence was recorded during monsoon (32.6%) and summer (23.8%) seasons in comparison to post-monsoon (6.4%) and winter (3.6%) seasons (Table 1). The highest EPG (mean±SEM) was observed in monsoon season (32.14±2.5), followed by summer (27.14±2.6), post-monsoon (26.55±4.9) and winter (3.33±0.1) seasons (Figure 2) and it was statistically significant ($P>0.01$).

Among the different age groups of buffalo population examined, maximum prevalence was recorded in animals above 1 year of age (17.47%), followed by above 6 months to 1 year of age group (15.58%) and the least in up to 6 months of Age group (7.1%) and it was statistically significant (P<0.05). The female buffaloes had a non-significant (P>0.05) higher prevalence of amphistomosis (16.94%) than the male buffaloes (12.29%) (Table 1).

Between agro-climatic zones, the buffaloes of irrigated areas had a significantly higher (P<0.01) prevalence of amphistomosis (24.3%) in comparison to buffaloes from rain-fed area (8.9%) of Jammu region (Table 1). The animals of irrigated area showed significantly higher (P<0.01) EPG (24.82±1.7) in comparison to animals of rain-fed area (9.05±1.1).

DISCUSSION

In the current study, although amphistomosis was encountered throughout the year, the highest prevalence was recorded in monsoon season with maximum egg output. There was a sudden rise in the prevalence of amphistomosis from early months of summer onwards. Due to enhancement of temperature during early summer months, many cercariae are released by over-wintered snail population. This is a major risk period for amphistomosis in the pasture grazing animals. Besides, with the onset of rainy season in June-July, a new crop of snails is produced which further increases the number of cercariae on the pasture resulting in a gradual build-up of fluke population and release of higher number of eggs during monsoon season (Garg *et al*., 2009). Further, the egg count started increasing from late summer months, attained peak in rainy season and then decreased sharply during post-monsoon and winter seasons as observed herein (Godara *et al*., 2014b). Earlier study from the Jammu region also reported amphistomosis as one of the common gastrointestinal parasitic infections of buffaloes (Katoch *et al*., 2009).

The significantly higher (P<0.05) prevalence in the older animals could be due to their more field grazing while younger animals are generally kept stall fed and mainly provided dry grass in which the rate of contamination with metacercariae is low (Hajipour *et al*., 2021). Probably, it could be the result of previous exposure which led to immunity, moderating the intensity of re-infection and maintaining high level of egg production by adult flukes (Pfukenyi *et al*., 2005). Besides, longer period (5 to 9 months) taken by flukes to mature in vertebrate host is also responsible for lower prevalence rate in younger animals (Brown, 1994). These findings are similar to Mahato and Rai (1992); Pfukenyi *et al.* (2005). It was observed that the sex had no effect on the prevalence of amphistomosis in buffaloes. The slightly higher prevalence in females could be attributed to genetic predisposition and hormonal effects. The significantly higher (P<0.01) prevalence of amphistomosis in buffaloes of irrigated area could be due to favourable ecological conditions (perennial irrigation of fields) for snail intermediate host. On the other hand, the rain-fed area is not suitable for survival and development of snail intermediate host because this lowland rain-fed area has dry and calcareous soil with rain fed rivulets which remain dry during the majority of year (Godara *et al*., 2014a).

From the study, it can be concluded that the season, age and variations in agro-climatic conditions have direct effect on the prevalence of

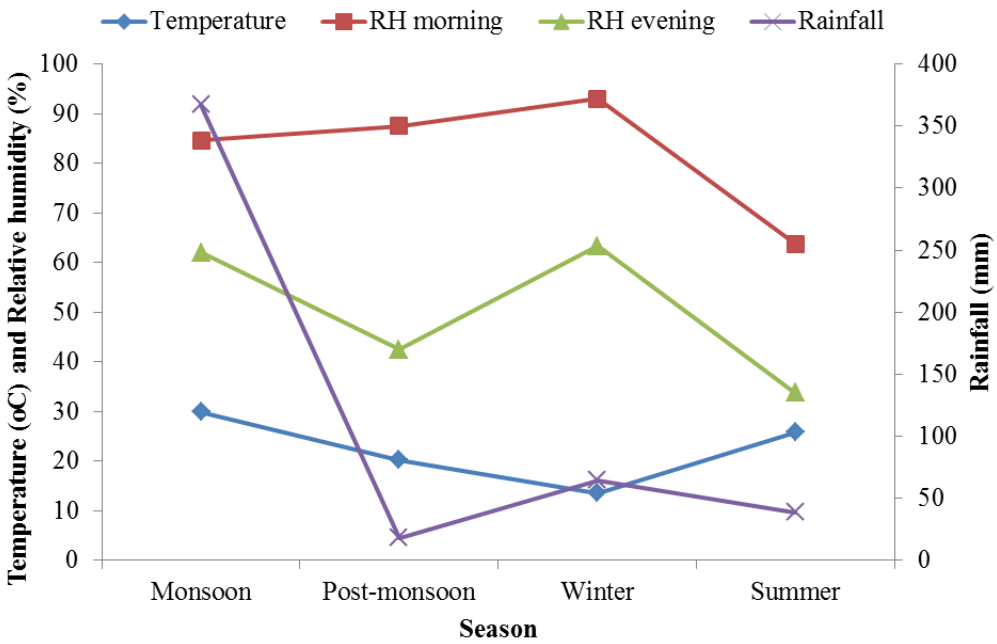

Figure 1. Season wise graphical representation of meteorological data of Jammu.

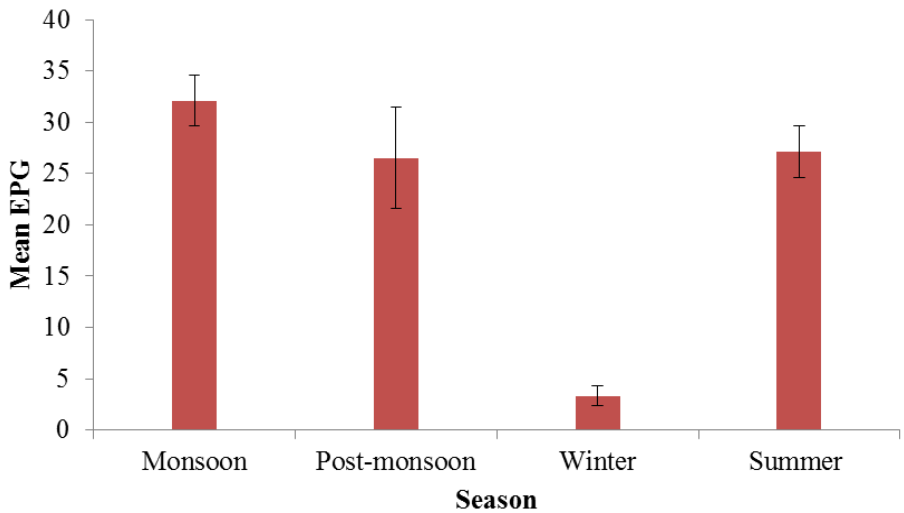

Figure 2. Seasonal egg per gram (mean±SEM)) of amphistomes of buffaloes of Jammu region.

Table 1. Prevalence of amphistomosis in buffaloes of Jammu region.

Groups		Examined	Positive (%)
Season	Monsoon	420	137 (32.6)
	Post-monsoon	420	27 (6.4)
	Winter	420	15 (3.6)
	Summer	420	100 (23.8)
	χ^2 value	-	176.44**
Age	up to 6 m	127	9 (7.1)
	> 6 m - 1 y	77	12 (15.58)
	> 1 y	1476	258 (17.47)
	χ^2 value	-	9.18*
Sex	Female	1558	264 (16.94)
	Male	122	15 (12.29)
	χ^2 value	-	1.77
Area	Irrigated	840	204 (24.3)
	Rain-fed	840	75 (8.9)
	χ^2 value	-	71.52**
	Total	1680	279 (16.61)

*P<0.05, **P<0.01.

amphistomosis in buffaloes and the administration of an efficient anthelmintic during summer and rainy seasons can reduce the burden of this economically important parasite which will help to maintain the optimum growth and productivity of buffaloes of the
region.

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