Prevalence of gastro-intestinal parasites in buffalo calves from different agro-climatic zones of Punjab

Jyoti · N. K. Singh · P. D. Juyal

Received: 12 October 2012 / Accepted: 4 February 2013 / Published online: 12 February 2013
© Indian Society for Parasitology 2013

Abstract Faecal samples from 1,582 buffalo calves of up to 6 months of age from 13 districts falling under four major agro-climatic zones of Punjab state, India were examined for gastrointestinal (GI) parasites for a period of one year (May 2008 to April 2009). The results revealed prevalence of GI parasitic infections as 73.58 per cent calves and *Eimeria* sp. (54.55 %) was the most prevalent GI parasite. Significant differences ($P < 0.01$) were found in overall prevalence of *Toxocara vitulorum*, strongyles and *Strongyloides papillosus* in buffalo calves of all four major agro-climatic zones of Punjab. Highest prevalence of *T. vitulorum* was recorded in undulating plain region (12.43 %) while lowest infection was recorded from western region (3.55 %). Further, the highest prevalence of strongyle infection was recorded in western region (32.26 %) and lowest in undulating plain region (19.46 %) thus showing a negative correlation in prevalence of *T. vitulorum* and strongyles. Highest and lowest infection of *S. papillosus* was recorded from central plain region (32.33 %) and western plain region (20.86 %), respectively whereas, the prevalence of *Eimeria* sp. and *Moniezia expansa* was comparable in all four major agro-climatic zones. The variation in prevalence recorded in the different agro-climatic zones is due to the climatic variation and thus the data generated could be of immense help in formulation of effective strategies for GI parasite control in different agro-climatic zones.

Keywords Agro-climatic zones · Buffalo calves · Epidemiology · Gastrointestinal parasites · Punjab

Introduction

The global population of buffaloes (*Bubalus bubalis*) spread in various countries is estimated to be approximately 195.26 million, out of which 189.79 and 112.9 million are found in Asia and India, respectively (FAO 2011). Buffaloes are raised as economically important animals because they are multipurpose animals providing milk, meat and good quality hides (Liu et al. 2009). Gastrointestinal (GI) parasitic infections are common in buffaloes particularly calves, causing considerable global economic losses to the buffalo industry and farming communities as a consequence of mortality in infected young animals and reduced weight gain. In spite of significant production losses, which may run into millions of rupees the problem is neglected due to its chronic and insidious nature (Sanyal 1998).

The diverse agro-climatic conditions, animal husbandry practices and pasture management have shown to largely affect the incidence and severity of various parasitic diseases in a region. Therefore, information on the epidemiological patterns of the parasitic diseases in different agro-climatic zones of the country would provide a basis for evolving strategic and tactical control measures against these parasitic diseases (Jithendran and Bhat 1999). However, information on the presence and distribution of GI parasites in buffalo calves from Punjab is very fragmentary and scanty (Johal and Kaur 1995; Kaur and Kaur 2008). Thus the current study was carried out to assess the effect of agro-climatic zones on the prevalence of GI nematodes, cestodes and coccidian infections in buffalo calves of Punjab state.

Jyoti (✉) · N. K. Singh · P. D. Juyal
Department of Veterinary Parasitology, College of Veterinary
Science, Guru Angad Dev Veterinary and Animal Sciences
University, Ludhiana 141004, Punjab, India
e-mail: jyoti76vet@gmail.com

Materials and methods

Location, geography and climate

The state of Punjab extends from the latitudes 29.30°N to 32.32°N and longitudes 73.55°E to 76.50°E. It covers a geographical area of 50,362 km² and lie between altitudes 180 and 300 m above sea level. Average rainfall in Punjab is 565.9 mm and ranges from about 915 mm in north to 102 mm in south. (<http://punjabonline.in/Profile/Geography/climate.asp>). The four major agro-climatic zones covering almost whole of the Punjab state viz. undulating plain region with average annual rainfall of 800–900 mm (Districts: Gurdaspur and Hoshiarpur), central plain region 500–800 mm (Districts: Ludhiana, Amritsar, Jalandhar, Patiala and Kapurthala), western plain region 400–500 mm (Districts: Moga and Sangrur) and western region <400 mm (Districts: Bathinda, Mansa, Faridkot and Ferozpur) had been selected for the study. Among these four zones western region and western plain region are most hot and dry zones whereas undulating plain and central plain zone receive maximum rainfall and have moderate humid climate.

Animals

A total of 1,582 buffalo calves aged from ten days to six months of either sex were randomly selected from villages falling under thirteen different districts representing four major agro-climatic zones of Punjab for collection of faecal samples. The study was conducted from May 2008 to April 2009 for a period of one year.

Techniques

Faecal samples were collected per rectum, placed in labelled polythene collection bags, and stored under refrigeration. Faecal samples were examined by faecal floatation using saturated salt solution and sedimentation techniques for the presence of eggs/oocysts of parasites.

Statistical analysis

Statistical analysis was performed on data by SPSS 16.0 software by applying Chi-Square test and values of $P < 0.05$ were considered as significant.

Results and discussion

Prevalence of GI parasites

The prevalence of GI parasitic infections in buffalo calves of Punjab was 73.58 per cent and *Eimeria* sp. (54.55 %) was the most prevalent GI parasite followed by *Strongyloides papillosus* (28.45 %), strongyles (23.7 %), *Toxocara vitulorum* (8.47 %) and *Moniezia expansa* (4.05 %) (Table 1). Similar high prevalence of GI parasites in buffalo calves had been reported from various parts of India (Gupta et al. 1985; Pradhan et al. 1991; Singh et al. 1993; Singh et al. 2008) and can be attributed to the fact that the favoured warm and wet environment of buffaloes also proves favourable for the development of pre-parasitic free living stages of these parasites (Muraleedharan 2005). Further, the feeding habits and habitats of buffaloes and non adoption of prophylactic measures as regular deworming with quality dewormer at recommended dose for calves in field conditions (Bilal et al. 2009) contribute heavily towards the high prevalence rates of GI parasites in buffalo calves.

was the most prevalent GI parasite followed by *Strongyloides papillosus* (28.45 %), strongyles (23.7 %), *Toxocara vitulorum* (8.47 %) and *Moniezia expansa* (4.05 %) (Table 1). Similar high prevalence of GI parasites in buffalo calves had been reported from various parts of India (Gupta et al. 1985; Pradhan et al. 1991; Singh et al. 1993; Singh et al. 2008) and can be attributed to the fact that the favoured warm and wet environment of buffaloes also proves favourable for the development of pre-parasitic free living stages of these parasites (Muraleedharan 2005). Further, the feeding habits and habitats of buffaloes and non adoption of prophylactic measures as regular deworming with quality dewormer at recommended dose for calves in field conditions (Bilal et al. 2009) contribute heavily towards the high prevalence rates of GI parasites in buffalo calves.

Agro-climatic zone wise prevalence of GI parasites

Significant differences ($P < 0.01$) were found in overall prevalence of GI parasitic infections, *T. vitulorum*, strongyle and *S. papillosus* in buffalo calves of all four major agro-climatic zones of Punjab (Table 1). Highest prevalence of *T. vitulorum* was recorded in undulating plain region (12.43 %) while lowest infection was recorded from western region (3.55 %). Whereas, the highest prevalence of strongyle infection was in western region (32.26 %) and lowest in undulating plain region (19.46 %), which proves a negative correlation in prevalence of *T. vitulorum* and strongyle in these two zones. Highest and lowest infection rates of *S. papillosus* were recorded from central plain region (32.33 %) and western plain region (20.86 %) respectively. However, the prevalence of *Eimeria* sp. and *M. expansa* was comparable with insignificant variation ($P > 0.05$) in all four major agro-climatic zones.

The variation in prevalence of GI parasites recorded in the different agro-climatic zones can be due to the differences in climatic conditions of these zones. Growth of GI parasites is closely related with climate and it can grow better in hot and humid areas whereas infection rates are lower in cold and dry areas. From the present and earlier studies (Anene et al. 1994; Lima 1998; Jithendran and Bhat 1999) the effect of climate on the prevalence of GI parasites are evident. Interestingly, the prevalence of strongyle infection was higher in the western region and western plain region of Punjab state which are comparatively drier areas with higher ambient temperatures and low rainfall. In similar studies from Brazil, *Trichostrongylus* sp. were more frequently observed in hot and dry conditions and *Cooperia* third larval stage showed more resistance to heat and dryness and also a better ability to migrate in dry conditions (Lima 1998).

Table 1 Prevalence of GI parasites in buffalo calves of different agro-climatic zones of Punjab, India

Agro-climatic zones	No. of samples (%)		Mixed infection	<i>Toxocara vitulorum</i>	Strongyle	<i>Strongyloides papillosus</i>	<i>Eimeria</i> sp.	<i>Moniezia expansa</i>
	Examined	Positive for GI parasites						
Central plain region	900	672 (74.67)	343 (38.11)	87 (9.67)	192 (21.33)	291 (32.33)	512 (56.89)	41 (4.56)
Undulating plain region	185	134 (72.43)	47 (25.41)	23 (12.43)	36 (19.46)	41 (22.16)	87 (47.03)	7 (3.78)
Western region	310	227 (73.23)	110 (35.48)	11 (3.55)	100 (32.26)	79 (25.48)	161 (51.94)	9 (2.90)
Western plain region	187	131 (70.05)	54 (28.88)	13 (6.95)	47 (25.13)	39 (20.86)	103 (55.08)	7 (3.74)
Total	1,582	1,164 (73.58)	554 (35.02)	134 (8.47)	375 (23.70)	450 (28.45)	863 (54.55)	64 (4.05)
χ^2 value	–	1,152.81*	14.42*	15.65*	17.39*	16.90*	7.08	1.72

* $P \leq 0.01$

A lot of researchers (Gupta et al. 1985; Halmandge et al. 2005) reported that growth of *T. vitulorum* is closely related with environmental conditions as it can grow better in moist and hot weather and infection rates are lower in cold and dry conditions. Prevalence rate of *T. vitulorum* was high in undulating plain and central plain regions with hot and humid climate whereas, was lower in western plain and western regions with drier climatic conditions thus, strengthening the above fact. The prevalence of strongyloidosis was highest in the central plain region as the warm, wet environment of this agro-climatic region, being also favourable for the development of the free living stages of this parasite and the lower ambient temperature with high humidity favours the percutaneous route of transmission (Gupta and Chhabra 1990; Bharkad et al. 1999). Results of the present study showed an almost comparable prevalence rate of coccidiosis in various agro-climatic zones of Punjab. The managerial practices and the conditions of the shed prove to be ideal as high humidity and moderate temperature are factors that facilitate the survival and sporulation of the coccidian oocysts (Kpahra and Singh 1986) and thus leading to higher prevalence rates. Also, no significant difference was seen in the prevalence of *M. expansa* infection in the different agro-climatic zones.

It can thus be concluded that the effects of various agro-climatic zones on the prevalence of GI parasitism in buffalo calves is significant and hence the data generated could be of immense help in formulation of effective strategies for GI parasite control.

Acknowledgments Authors are thankful to Director of Research, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana for providing facilities to carry out the research work.

References

- Anene BM, Onyekwodiri EO, Chime AB, Anika SM (1994) A survey of gastrointestinal parasites in cattle of southeastern Nigeria. *Prev Vet Med* 20:297–306
- Bharkad GP, Deshpande PD, Narladkar BW (1999) Gastrointestinal parasitosis in bovine calves in Marathwada. *J Vet Parasitol* 13:143–146
- Bilal MQ, Hameed A, Ahmad T (2009) Prevalence of gastrointestinal parasites in buffalo and cow calves in rural areas of Tobatek Singh, Pakistan. *J Anim Plant Sci* 19:67–70
- FAO (2011). FAO Statistic database (<http://www.faostat.fao.org>). Accessed 25 Jan 2013
- Gupta SK, Chhabra MB (1990) Intestinal parasitic infections in young buffalo calves and anthelmintic treatment. *Indian Vet Med J* 14:194–197
- Gupta RP, Yadav CL, Ghosh JD (1985) Epidemiology of helminth infections in calves of Haryana State, India. *Agric Sci Dig India* 5:53–56
- Halmandge S, Suranagi MD, Murugeppa A, Sudhindra Kumar SP (2005) Prevalence of ascariasis in buffalo calves in and around Bidar. *J Vet Parasitol* 19:149–151

- Jithendran KP, Bhat TK (1999) Epidemiology of parasites in dairy animals in the North West Humid Himalaya Region of India with particular reference to gastrointestinal nematodes. *Trop Anim Health Prod* 31:205–214
- Johal M, Kaur PM (1995) Prevalence and severity of nematode infection in some bovines. *J Parasitol Appl Anim Biol* 4:31–34
- Kaur H, Kaur D (2008) Prevalence of gastro intestinal parasites in domestic animals of Patiala and its adjoining areas. *J Vet Parasitol* 22:25–28
- Kpahra SS, Singh J (1986) Coccidiosis in buffalo: calves and its treatment. *Buffalo Bull* 5:9–16
- Lima WS (1998) Seasonal infection pattern of gastrointestinal nematodes of beef cattle in Minas Gerais State, Brazil. *Vet Parasitol* 74:203–214
- Liu Y, Li F, Liu W, Dai RS, Tan YM, He DS, Lin RQ, Zhu XQ (2009) Prevalence of helminths in water buffaloes in Hunan Province, China. *Trop Anim Health Prod* 41:543–546
- Muraleedharan K (2005) Prevalence of gastrointestinal parasites of livestock in a central dry zone of Karnataka. *J Vet Parasitol* 19:31–33
- Pradhan KB, Thakur DK, Sudan NA (1991) Incidence of gastrointestinal parasites in suckling calves in Ranchi. *J Res Birsa Agric Univ* 3:123
- Sanyal PK (1998) Integrated gastrointestinal parasitic management in dairy animals in Gujarat by self medication. *J Vet Parasitol* 12:17–20
- Singh R, Sahai BN, Ansari MZ, Singh SK (1993) Incidence of common helminthic infection in livestock and poultry. *J Res Birsa Agri Univ* 5:93–95
- Singh A, Gangwar AK, Shinde NK, Srivastava S (2008) Gastrointestinal parasitism in bovines of Faizabad. *J Vet Parasitol* 22:31–33