



Prevalence of gastrointestinal helminth parasites of equines in central zone of Kashmir Valley

A MARIA¹, R A SHAHARDAR² and M BUSHRA³

Sher-e-Kashmir University of Agriculture and Technology-Kashmir, Srinagar,
Jammu and Kashmir 190001 India

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ABSTRACT

Faecal samples (550) from equines were examined in central zone of Kashmir valley from September 2009 to July 2010 and 95.09% were found positive for ova of one or other gastrointestinal helminths. Nematodes were most prevalent helminths (95.09%) followed by cestodes (1.45%). Among nematodes Cyathostomes were found to be the most prevalent (94.72%), followed by *Strongylus* spp. (81.09%), *Triodontophorus* spp. (60.90%), *Dictyocaulus arnfieldi* (13.09%), *Oxyuris equi* (8.18%), *Strongyloides westeri* (6.90%) and *Parascaris equorum* (4.36%). The seasonal analysis exhibited highest infection (100%) in spring followed by 99% in summer, 94.66% in autumn and 88% in winter with nonsignificant variation. The overall prevalence of mixed infection was 91.45%. The overall mean intensity of infection was 1546.45 ± 345.47 . Highest mean intensity was recorded in spring followed by autumn summer and minimum in winter. There was nonsignificant variation in incidence and intensity of infection among different types of equines. Similarly, incidence and intensity of infection remained marginally higher in young ones and in females. Different genera of strongyle worms identified on coproculture were *Cyathostomum* spp. (62.00%) followed by *Triodontophorus* spp. (8.00%), *Gyalocephalus* spp. (7.33%), *Strongylus vulgaris* (6.00%), *Strongylus edentatus* (4.00%), *Trichostrongylus axei* (4.00%), *Poteriosomum* spp. (3.00%) and *Oesophagodontus* spp. (3.00%).

Key words: Equines, Gastrointestinal helminths, Kashmir Valley, Prevalence

The equine population of India is 1.074 million, consisting of 0.534, 0.100 and 0.440 million horses, mules and donkeys respectively (Livestock Census 2003). The state of Jammu and Kashmir does not lag behind and there are 2.34 lakh equines, comprising 1.7, 0.40 and 0.24 lakh horses/ponies, mules and donkeys (Statistical Digest 2007–08). Among the diseases affecting equines, helminth infections are much extended (Pereira and Vianna 2006). Worldwide, equines are exposed to helminth parasites from different groups resulting in significant morbidity and mortality (Hodgkinson 2006). The most common helminths of horses include the small and large strongyles, along with tapeworms, ascarids, pinworms, and the lungworms (Meara and Mulcahy 2002). In India very few systematic studies on prevalence of parasitic infestations in equines have been carried out and it appears that in Jammu and Kashmir state only one such study is on record (Pandit *et al.* 2008). The present study was conducted to find out prevalence of gastrointestinal helminth parasites affecting

equines of central zone of Kashmir valley; and to find out seasonal variation and intensity of gastrointestinal helminth parasites affecting equines of central zone of Kashmir valley.

MATERIALS AND METHODS

Faecal samples (550) were collected directly from the rectum from September 2009 to July 2010 for studies on the prevalence of GI helminths of equines, viz. ponies, horses, mules and donkeys respectively of both sexes and from both age groups, viz. young equines (≤ 3 years) and adult equines (> 3 years) reared locally by farmers and fed locally available feed in central zone of Kashmir valley (Budgam, Ganderbal and Srinagar districts). A minimum of 150 samples were collected randomly from different equine species in each season, viz. spring (March-May), autumn (September-November) and winter (December-February) with the exception of summer (June-July) in which only 100 faecal samples were collected.

Samples were examined microscopically by qualitative techniques using centrifugal sedimentation and floatation methods to determine the incidence of infections (Soulsby 1982a). Randomly selected 40 faecal samples were examined

Present address: ¹Assistant Professor (mariaabbas122@gmail.com), Apollo College of Veterinary Medicine, Agra road, Jaipur. ²Professor and Head, ³Guest lecturer, Division of Veterinary Parasitology (shahardar@gmail.com, bushrashah@gmail.com).

in each season by quantitative technique (Stoll's dilution method) to determine the intensity of infection i.e. eggs per gram (EPG) of faeces. About 120 faecal samples found positive for strongyle eggs and not receiving prior treatment with 10% formalene were subjected to Pooled coproculture and the third stage larvae were identified to generic level as per the key of Soulsby (1965), Anonymous (1971) and Georgi (1985). The results were subjected to standard statistical analysis using Z-test as per Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

Out of 550 equine faecal samples examined, 523 (95.09%) were found positive for ova of one or other helminth parasite. The overall annual prevalence rate of GI helminths varied nonsignificantly from 80.00% (horse) to 100.00% (mules and donkeys) (Table 1). The observed overall prevalence of GI helminths recorded in present study is in close proximity with the observations of Hassan *et al.* (2005) in Pakistan, Uslu and Guclu (2007) in Turkey, Pandit *et al.* (2008) in India and Umur and Mustafa (2009) in Turkey and Francisco *et al.* (2009) in Spain.

Among nematodes, strongyles were most prevalent (94.72%). Cyathostomes (94.72%) were most prevalent among strongyle worms followed by *Strongylus* spp. (81.09%) and *Triodontophorus* spp. (60.90%). Other nematodes recorded were *Dictyocaulus arnfieldi*, *Oxyuris equi*, *Strongyloides westeri* and *Parascaris equorum*. Among cestodes, only anoplocephalid type of eggs were found with a prevalence of 1.45%. Our observations are in closeness with Fikru *et al.* (2005) as regards prevalence rates of equine strongyles (92.80%) in Ethiopia; Pandit *et al.* (2008) as regards prevalence rates of cyathostomes (95.00%), *Strongylus* spp. (81.19%), *D. arnfieldi* (14.10%), *O. equi* (9.40%), *S. westeri* (6.19%) and *P. equorum* (4.01%) in equines of Kashmir valley. According to Reinemeyer *et al.* (1984) feature of encystment mainly shown by small strongyles leads to their selection and survival leading to decreased prevalence of large strongyles and increase in cyathostome population up to 100%. Lyons *et al.* (1990) stated that low prevalence of large strongyles was because of their longer prepatent period in comparison to small strongyles.

The seasonal incidence of GI helminth infection in equines ranged nonsignificantly ($P>0.05$) from 88.00% in winter to 100.00% in spring (Fig. 1). Our observation is similar to the observation made by Pandit *et al.* (2008) who reported highest gastrointestinal helminth infection of 100.00% in spring and lowest of 80.26% in winter in Kashmir valley in equines. The lower rate of infection in winter might be because of lower temperature which causes delay in hatching resulting into low availability of infective larvae. The highest strongyle faecal egg output observed in our study in spring after low faecal egg output of winter is also comparable to the findings of Eydal (1983) who reported that strongyle egg output

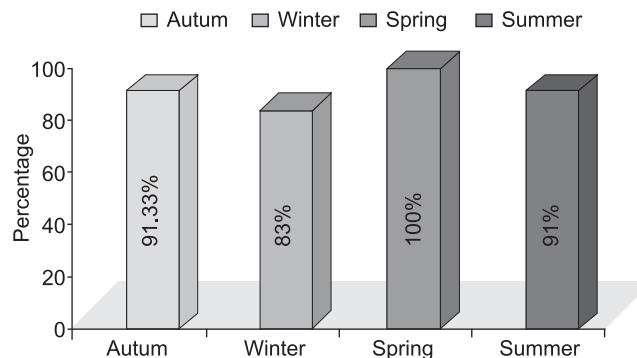


Fig. 1. Seasonal prevalence of infection in equines based on faecal examination in central zone of Kashmir valley.

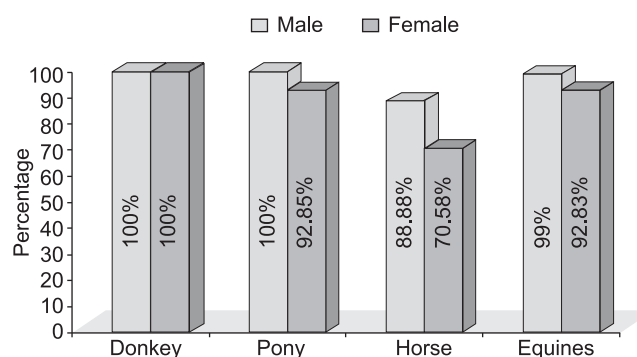


Fig. 2. Sex wise comparative prevalence of gastrointestinal helminths in equine host species based on faecal examination in central zone of Kashmir valley.

usually follows a seasonal pattern reaching its peak in spring followed by a decrease in winter. In the present study 100 and 99% prevalence rates were found for strongyles in spring and summer. Similar seasonal trend was also reported by Herd *et al.* (1985) and Reinemeyer (1984) who observed 2 distant peaks of strongyle faecal egg output in spring and summer instead of a single peak. Our observation is also supported by Eysker *et al.* (1990); Klei (1992) and Love and Duncan (1992), who suggested that the decreased prevalence of small strongyles in winter might be attributed to the arrested development of cyathostomes due to the unfavourable environmental conditions for development and survival of the free living stages in this season.

Mixed infection of helminth parasites was observed in 91.45% samples. Nonsignificantly higher prevalence of mixed infection was found in mules (96.36%), followed by ponies (93.33%), donkeys (85.00%) and horses (68.57%). Such high prevalence of mixed infection could be attributed to the close confinement of equines due to higher stocking density per unit area.

Strongyle worm infection was nonsignificantly ($P>0.05$) higher in young ones (96.8%) as compared to adults (94.11%). According to Uhlinger (1993) heavy ingestion and establishment of strongyle larvae in young equines is because of their habit to graze around manure where greatest number

Table 1. Overall prevalence of gastrointestinal helminth parasites of equines in central zone of Kashmir valley based on faecal examination

Host	No. screened	Strongyle worms			Total	Other nematodes				Total nematodes	Cestode		Total GIT helminths
		A	B	C		D	E	F	G		H		
Pony	Adult	330 (94.28 ^a)	278 (79.42 ^a)	209 (59.71 ^a)	330 (94.28 ^a)	0 (0.00 ^a)	0 (0.00 ^a)	0 (0.00 ^a)	0 (0.00 ^a)	0 (0.00 ^a)	330 (94.28 ^a)	6 (1.71 ^a)	330 (94.28 ^a)
	Young	70 (100.00 ^a)	70 (100.00 ^a)	70 (100.00 ^a)	70 (100.00 ^a)	0 (0.00 ^a)	27 (38.57 ^b)	5 (7.14 ^a)	40 (57.14 ^b)	40 (57.14 ^b)	70 (100.00 ^a)	0 (0.00 ^a)	70 (100.00 ^a)
Total	420 (95.23)	400 (82.85)	348 (64.42)	279 (95.23)	400 (0.00)	0 (6.42)	27 (1.19)	5 (9.52)	40 (9.52)	40 (95.23)	400 (1.42)	6 (95.23)	400
Horse	Adult	10 (70.00 ^a)	7 (70.00 ^a)	1 (10.00 ^a)	7 (70.00 ^a)	0 (0.00 ^a)	0 (0.00 ^a)	5 (50.00 ^a)	0 (0.00 ^a)	5 (50.00 ^a)	7 (70.00 ^a)	0 (0.00 ^a)	7 (70.00 ^a)
	Young	25 (84.00 ^a)	21 (84.00 ^a)	15 (60.00 ^a)	21 (84.00 ^a)	0 (0.00 ^a)	2 (80.00 ^a)	14 (56.00 ^a)	2 (80.00 ^a)	16 (64.00 ^a)	21 (84.00 ^a)	1 (4.00 ^a)	21 (84.00 ^a)
Total	35 (80.00)	28 (80.00)	28 (45.71)	16 (80.00)	28 (0.00)	0 (5.71)	2 (54.20)	19 (5.71)	2 (60.00)	21 (80.00)	28 (2.85)	1 (80.00)	28
Donkey	Adult	10 (100.00 ^a)	10 (100.00 ^a)	0 (0.00)	10 (100 ^a)	0 (0.00 ^a)	0 (0.00 ^a)	0 (0.00 ^a)	0 (0.00 ^a)	0 (0.00 ^a)	10 (100.00 ^a)	0 (0.00 ^a)	10 (100.00 ^a)
	Young	30 (100.00 ^a)	30 (100.00 ^a)	7 (23.33 ^a)	30 (100.00 ^a)	22 (73.33 ^a)	9 (30.00 ^a)	0 (0.00 ^a)	3 (10.00 ^a)	29 (96.66 ^a)	30 (100.00 ^a)	1 (3.33 ^a)	30 (100.00 ^a)
Total	40 (100.00)	40 (100.00)	40 (17.5.00)	7 (100.00)	40 (55.00)	22 (22.50)	9 (0.00)	0 (7.50)	3 (72.50)	29 (100.00)	40 (2.50)	1 (100.00)	40
Mule	Adult	55 (96.36)	30 (54.54)	33 (60.00)	53 (96.36)	50 (90.90)	0 (0.00)	0 (0.00)	0 (0.00)	50 (90.90)	55 (100.00)	0 (0.00)	55 (100.00)
	Young equines	125 (96.80 ^a)	121 (96.80 ^a)	92 (73.60 ^a)	121 (96.80 ^a)	22 (17.60 ^a)	38 (30.40 ^a)	19 (15.20 ^a)	45 (36.00 ^a)	85 (68.00 ^a)	121 (96.80 ^a)	2 (1.60 ^a)	121 (96.80 ^a)
Total	425	400 (94.11 ^a)	325 (76.47 ^a)	243 (57.17 ^a)	400 (94.11 ^a)	50 (11.76 ^a)	0 (0.00 ^b)	5 (1.17 ^b)	0 (0.00 ^b)	55 (12.94 ^b)	402 (94.58 ^a)	6 (1.41 ^a)	402 (94.58 ^a)

Values with same superscript within a column do not differ significantly ($P>0.05$). Figures in parenthesis represent positive percentage. Legend: A, cyathostomes; B, *Strongylus* spp.; C, *Triodontophorus* spp.; D, *Dictyocaulus arnfieldi*; E, *Strongylus* spp.; F, *Parascaris equorum*; G, *Oxyuris equi*; H, Anoplocephalid eggs.

Table 2. Intensity of infection in different equine species based on faecal examination

Host		Sex/ age	Samples screened in autumn	Mean EPG	Samples screened in winter	Mean EPG	Samples screened in spring	Mean EPG	Samples screened in summer	Mean EPG	Total (mean EPG ±standard error)	
Pony	Adult	Male	4	1600.00	4	580.00	4	2200.00	4	1600.00	1495.00 ^a ±388.20	1600.00 ^a ±190.24
		Female	4	1760.00	4	660.00	4	2400.00	4	1620.00	1610.00 ^a ±414.88	
	Young	Male	4	1800.00	4	840.00	0	0	0	0	1320.00 ^a ±678.82	
		Female	0	0	0	0	4	2500.00	4	1640.00	2070.00 ^a ±608.11	
Donkeys	Adult	Male	4	1600.00	4	640.00	4	1740.00	4	1540.00	1380.00 ^a ±288.90	1465.00 ^a ±136.91
		Female	4	1680.00	4	760.00	4	1880.00	4	1640.00	1490.00 ^a ±287.44	
	Young	Male	4	1700.00	4	800.00	0	0	0	0	1250.00 ^a ±636.39	
		Female	0	0	0	0	4	1900.00	4	1700.00	1800.00 ^a ±141.42	
Horse	Adult	Male	4	1600.00	4	733.33	4	2000.00	4	1833.33	1541.66 ^a ±325.22	1687.49 ^a ±170.41
		Female	4	1800.00	4	833.33	4	2200.00	4	1700.00	1633.33 ^a ±332.22	
	Young	Male	0	0	0	0	0	0	0	0	0	
		Female	4	2100.00	4	950.00	4	2500.00	4	2000.00	1887.50 ^a ±661.28	
Mule	Adult	Male	4	1700.00	4	566.66	4	2200.00	4	1600.00	1516.66 ^a ±395.81	1516.66 ^a ±395.81
Total (mean EPG±standard error)			40	1734.00 ^a ±49.99	40	736.33 ^b ±41.39	40	2152.00 ^b ±88.95	40	1687.33 ^a ±45.18	1546.45±345.47	

Values with same superscript within a column do not differ significantly (P>0.05).

of infective larvae are found. Our observation of finding *Strongyloides westeri* eggs only in young equines and not in adult equines is probably because of the fact that foals usually develop a satisfactory immunity against *S. westeri* infection by 15–23 weeks after birth (Soulsby 1986). Our observation is quite akin to the observations made by Beelitz *et al.* (1996) who reported that eggs of *Parascaris equorum* were found only in equine young ones and not in adult equines; Francisco *et al.* (2009) and Von Samson-Himmelstjerna (2009) who reported highest prevalence of *Parascaris equorum* in equines of less than 3 years of age and Mirck (1978) who reported that eggs of *Oxyuris equi* were not found in adult horses and ponies. According to Soulsby (1982b) previous infection and age of the host afford some protection against reinfection and hence disease is usually seen in young equines.

Female equines revealed higher prevalence (98.93%) of GI helminths than males (92.83%) (Fig. 2) which lies in corroboration with the observation made by Umur and Mustafa (2009) who reported no significant differences between infected equines, in terms of sex. The comparatively nonsignificant higher infection rate in female equines might

be due to stress factors like lactation and also due to relaxation of immunity during later periods of gestation which enhances the susceptibility to various parasitic infections.

Highest mean EPG was recorded in spring (2152.00±88.95) followed by autumn (1734.00±49.99) and summer (1687.33±45.18) but the lowest EPG of 736.33±41.39 was recorded in winter (Table 2). The lowest intensity of infection during winter in present study might be due to larval inhibition because of unfavourable climatic conditions outside the host. The peak mean EPG observed during March and April in our study might be due to resumption in the development of hypobiotic larval (L₄) after chilled winter. Our findings are in conformity to the observations made by Devender Pal (2002) who reported higher EPG in equines less than 5 years of age than in equines more than 5 years of age. One possible explanation for higher EPG in young equines compared to adult equines could be due to susceptibility of young ones to infection and development of immunity in adult equines.

Different genera of strongyle worms identified on coproculture were *Cyathostomum* spp. (62.00%) followed by *Triodontophorus* spp. (8.00%), *Gyallocephalus* spp.

(7.33%), *Strongylus vulgaris* (6.00%), *Strongylus edentatus* (4.00%), *Trichostrongylus axei* (4.00%), *Poteriostomum* spp. (3.00%) and *Oesophagodontus* spp. (3.00%). The prevalence rate of unidentified larvae was 6.66%.

The higher prevalence of gastrointestinal helminth parasites in equines revealed that equines in Kashmir valley are maintained under unhygienic conditions and thus need periodical veterinary attention. There is need to carry out further studies on prevalence of parasitic infections in equines to evolve package of practices for timely treatment of infected animals and to evolve control measures.

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