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Prevalence of ovine platyhelminth parasite infections in Ganderbal area of Kashmir valley

M SHAHNAWAZ*[1], R A SHAHARDAR[2], Z A WANI[3] and S A SHAH[4]

Shere Kashmir University of Agricultural Sciences and Technology, Shuhama, Srinagar, Jammu and Kashmir 190 001 India

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Helminth parasitism in sheep in general, and platyhelminths in particular cause major economic losses globally to the livestock industry and farming community as a consequence of deaths of infected animals, reduced weight gains and the condemnation of affected organs after slaughter (Dorny *et al*. 1996). The epidemiology of some gastrointestinal parasitic infections in sheep of Kashmir has been reported earlier (Pandit *et al*. 1989, Pandit *et al*. 2003). However, the data on epidemiology of gastrointestinal parasitism is scanty and also to provide a foundation for the improved control of helminths in sheep, the aim of the present investigation was to record the prevalence of sheep platyhelminths in Ganderbal area of Kashmir by post mortem examination.

The study area is located in north-east of Kashmir valley situated between 34.7° to 34.22° N latitude and 74.4 to 74.56°E longitude with an average altitude of 5100 ft. above sea level. Climatologically, winters are extremely cold (2 to 10°C) with heavy snowfalls while as summers are pleasant (33°C). The investigation was carried out from September 2008 to August 2009 and 55 samples of gastrointestinal tracts, liver and lungs of locally reared sheep purchased from butcher shops/collected from dead animals from different areas of Ganderbal district were screened thoroughly for the presence of parasites. Mesentery with a loop of intact intestine was seen against light to visualize the blood flukes, if any in the mesenteric veins. The isolated parasites were counted and grouped into different categories on the basis of gross morphological features and the site of recovery. The collected parasites were kept in normal saline till fixation.

Representative specimen of the trematodes and cestodes (scolex, few immature, mature and gravid segments) were collected and flattened between 2 slides. The 2slides were tied with a piece of thread and placed in hot 30% alcohol or 5% formalin for 24 h. The parasites were then dislodged from the slides and preserved in 70% alcohol or 10% formalin. Staining of the parasites was done in borax carmine alum and acetic alum stain and mounted in DPX or Canada balsum. Identification of the mounted specimens was done on the basis of morphological criterion described by Soulsby (1982), Urquhart *et al.* (1996) and Bhatia *et al.* (2006). The data was analyzed using z-comparison test.

Nine species of platyhelminths, viz. *Fasciola gigantica*, *Dicrocoelium dendriticum*, *Paramphistomum cervi*, *Cotylophoron cotylophorum*, *Gastrothylax crumenifer*, *Carmyerius spatiosus*, *Moniezia expansa*, *Avitellina centripunctata* and *Stilesia globipunctata* were recorded in addition to the metacestodal stages of *Taenia hydatigena* (*Cysticercus tenuicollis*) and *Echinococcus granulosus* (hydatid cysts). These species were reported by others (Achi *et al.* 2003, Pandit *et al.* 2003, Yadav *et al.* 2006).

Overall prevalence rate of platyhelminth infection was 74.54% with trematodes and cestodes found in 45.45 and 52.72% animals respectively (Table 1). Among trematodes, *D. dendriticum* had the highest prevalence rate of 34.54% followed by *F. gigantica* (12.72%) and paramphistomes (7.27%). The higher prevalence of *D. dendriticum* might be due to grazing on foothills during early spring and late autumn where land snails and ants are found in large numbers. Wang *et al.* (2006) found 28.5–48.8% prevalence of trematode parasites in local sheep of China. Ferre *et al.* (1994) recorded 26.70–47.40% prevalence of *D. dendriticum* in sheep of NW Spain, while as Mostafa *et al.* (1996) reported 12–15% incidence rate of *F. gigantica* in small ruminants of Bangladesh. Tariq *et al.* (2008) observed 7.60 and 7.20% prevalence of paramphistomes in sheep of Kashmir valley through gastrointestinal tract and faecal examination, respectively. Thus the findings of other authors are in line with our observations. Among cestodes, *S. globipunctata* had the highest infection rate (38.18%) followed by *M. expansa* (23.63%) and *A. centripunctata* (5.45%). Louw (1995) found 5.10 to 65% prevalence of *S. globipunctata* which is in

Present address: [1-3]([1]email: mirshahnawaz23@gmail.com). Division of Veterinary Parasitology; [4]Assistant Professor (e mail: vetshowket@gmail.com) Division of Veterinary Pathology, Faculty of Veterinary Science and Animal Husbandry.

Table 1. Overall prevalence of platyhelminth parasites in adult and young sheep

Host	No. of samples examined	Trematodes				Cestodes				Total Platyhe-lmiths	G	H
		A	B	C	Total	D	E	F	Total			
Adults	39	6 (15.38[a])	18 (46.15[a])	2 (5.12 [a])	21 (53.84[a])	9 (23.07[a])	2 (5.12 [a])	17 (43.58[a])	21 (53.84[a])	30 (76.92 [a])	4 (10.25[a])	3 (7.69 [a])
Lamb and hogget	16	1 (6.25 [a])	1 (6.25 [a])	2 (12.50 [a])	4 (25.00 [a])	4 (25.00 [a])	1 (6.25 [a])	4 (25.00 [a])	8 (50.00 [a])	11 (68.75 [a])	1 (6.25 [a])	0 (0.00 [a])
Total	55	7 (12.72)	19 (34.54)	4 (7.27)	25 (45.45)	13 (23.63)	3 (5.45)	21 (38.18)	29 (52.72)	41 (74.54)	5 (9.09)	3 (5.45)

Figures within parenthesis indicate percentage.
Values with same superscript in a column under a subgroup do not vary significantly (P<0.05)
A, *Fasciola gigantica;* B, *Dicrocoelium dendriticum;* C, *Paramphistome* spp.; D, *Moniezia expansa;* E, *Avitellina centripunctata;* F, *Stilesia globipunctata;* G, hydatid cyst; H, *C. tenuicollis.*

agreement with the present observations. Observed prevalence of *M. expansa* is comparable to the findings of Azad *et al.* (1997), Rehbein *et al.* (1997) and Grelloni *et al.* (2000). Hydatid cysts were found in 9.09% and *Cysticercus tenuicollis* in 5.45% animals. Mixed infections were found in 19 (34.54%) out of 55 animals.

Seasonwise platyhelminth infection rate was highest in spring (86.66%) and lowest in autumn (50.00%) with 80.0 and 76.92% in summer and winter respectively (P<0.05). In line with this seasonal trend are the observations of Marinov (1997) who found highest intensity of helminth infection in the months of March, April and May. Trematode infection was highest in winter (61.53%) followed by spring (60.00%), summer (40.00%) and autumn (16.60%). *D. dendriticum* showed higher infection rate of 53.84% in winter followed by spring (46.66%), summer (26.66%) and autumn (8.30%) (P<0.05). *F. gigantica* revealed a higher prevalence of 38.46% in winter. A uniform prevalence rate of 6.66% was found during spring and summer while as no infection was detected in autumn (P<0.05). Higher trematode infection in winter is in agreement with the findings of Pandit *et al.* (2003) while Jarjees (2000) and Atlas *et al.* (2003) reported higher infection rate of *Fasciola* and *Dicrocoelium* infections in winter, respectively. Paramphistome infection exhibited a different pattern with highest prevalence in summer (13.33%) followed by autumn (8.30%) and spring (6.66%) season while as no infection was detected during winter season (P<0.05). Higher infection rate of paramphistomes in summer is also reported by various workers (Yadav *et al.* 2006, Khajuria and Kapoor 2003, Tariq *et al.* 2008) which is due to concentration of snail population around areas of natural water in drier months which also have the palatable grazing leading to concentration of the intermediate hosts and animals over a small area enhancing the chances of heavy infection. Prevalence of cestode was highest in spring (60.00%) and lowest during autumn (41.60%). Similar prevalence rates of 53.84 and 53.33% were observed during winter and summer, respectively (P<0.05). Higher infection rate of *S. globipunctata* was observed during summer (53.33%) compared to spring (46.66%), winter (38.46%) and autumn (8.30%) (P<0.05). *A. centripunctata* infection was recorded to be 16.60 and 7.69% in autumn and winter, respectively, with no infection in spring and summer. Infection with *M. expansa* was highest during spring (33.33%) followed by 23.07, 20.00 and 16.60% in winter, summer and autumn, respectively (P<0.05). Higher infection rate of cestodes in spring was reported by Marinov (1997) and Sievers *et al*. (2002) while it was higher in summer (Moazeni and Ahmedabadi 2005) and autumn (Rauf *et al.* 2005).

Adult sheep had higher prevalence (76.92%) as compared to 68.75% in younger group (P<0.05) which is in line with the findings of Yadav *et al.* (2006) and Swarankar *et al.* (1996). Trematode infection rate was nonsignificantly higher in adult sheep (53.84%) than younger ones (25.0%). The prevalence rate of *F. gigantic* and *D. dendriticum* was higher in adult sheep as compared to 6.25% in lambs/ hoggets. Paramphistome infection was higher in younger ones (12.50%) compared to adult sheep (5.12%), which was also reported by Tariq *et al.* (2008). Prevalence of cestodes was nonsignificantly higher in adult sheep (53.84%) than younger ones (50.0%). *S. globipunctata* infection was higher in adult age group (43.58%) compared to 25% in younger ones (P<0.05). However, infection rate of *M. expansa* and *A. centripunctata* was higher in younger group (25.0% and 6.25%) than adult sheep (23.07% and 5.12%). Higher prevalence of monieziosis in lambs is in accordance with the findings of Rehbein *et al.* (1997) and Rauf *et al.* (2005).

The intensity of infection of all species recovered was higher in adult sheep than younger group (Table 2). Lesser gastrointestinal worm counts in younger animals was also reported by Lannoy *et al.* (1998), possible reasons being innate immunity in very young lambs due to maternal antibodies received via colostrum and lesser exposure to infected pastures (after weaning only) as compared to adults. *F. gigantica* and *D. dendriticum* had liver as the organ of

Table 2. Species, organ(s) of predilection, intensity of infection and mean worm burden of platyhelminth parasites found in sheep

Platyhelminth species	Organ(s) of predilection	Intensity of infection		Mean worm count±SE
		Adult sheep	Younger sheep	
Fasciola gigantica	Liver	2–34	32	13.85±5.04
Dicrocoelium dendriticum	Liver	34–600	230	253.47±32.9
Paramphistome spp.	Rumen and reticulum	155–630	0	393.75±114.0
Moniezia expansa	Small intestine	1–14	5–11	5.15±1.02
Avitellina centripunctata	Small intestine	1–18	4	7.66±5.24
Stilesia globipunctata	Small intestine	4–180	1–10	38.09±11.0
Echinococcus granulosus cyst	Liver and lungs	1–3	1	1.80±0.49
Taenia hydatigena cyst	Mesentery and liver	1–2	1	1.33±0.33

predilection with mean worm counts of 13.85±5.04 and 253.47±32.9 respectively. Paramphistomes showed the highest mean worm count of 393.75±114 with rumen and reticulum as the site of predilection. All the cestode species (*S. globipunctata*, *A. centripunctata* and *M. expansa*) showed small intestine as the predilection site with mean worm counts of 38.09±11, 7.66±5.24, 5.15±1.02 respectively. Hydatid cyst revealed mean count of 1.80±0.49 with liver and lungs as the site of predilection while *C. tenuicollis* was found in liver and mesentery with 1.33±0.33 mean worm count.

SUMMARY

Necropsy examination of 55 slaughtered/dead sheep from Ganderbal, Lar and Kangan tehsils of Ganderbal district revealed 74.54% platyhelminth infection with trematodes and cestodes in 45.45 and 52.72% animals respectively. *Stilesia globipunctata* (38.18%) was the most prevalent platyhelminth followed by *Dicrocoelium dendriticum* (34.54%), *Moniezia expansa* (23.63%), *Fasciola gigantica* (12.72%), paramphistomes (7.27%) and *Avitellina centripunctata* (5.45%). Amongst metacestodes, hydatid cysts (9.09%) and *Cysticercus tenuicollis* (5.45%) were also found. Infection was higher in spring season and in adult sheep. Mixed infection was found in 34.54% animals. Paramphistomes showed the highest mean worm count of 393.75±114 followed by *Dicrocoelium dendriticum* (253.47±32.90), *Stilesia globipunctata* (38.09±11), *Fasciola gigantica* (13.85±5.04), *Avitellina centripunctata* (7.66±5.24) and *Moniezia expansa* (5.15±1.02). Hydatid cysts and *C. tenuicollis* showed mean counts of 1.80±0.49 and 1.33±0.33 respectively.

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