



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(6): 2232-2235
Received: 20-09-2018
Accepted: 22-10-2018

A Aiman
Division of Veterinary
Parasitology, Faculty of
Veterinary Sciences and Animal
Husbandry, Sher-e-Kashmir
University of Agricultural
Sciences and Technology of
Kashmir, Jammu and Kashmir,
India

RA Shahardar
Division of Veterinary
Parasitology, Faculty of
Veterinary Sciences and Animal
Husbandry, Sher-e-Kashmir
University of Agricultural
Sciences and Technology of
Kashmir, Jammu and Kashmir,
India

ZA Wani
Division of Veterinary
Parasitology, Faculty of
Veterinary Sciences and Animal
Husbandry, Sher-e-Kashmir
University of Agricultural
Sciences and Technology of
Kashmir, Jammu and Kashmir,
India

IM Allaie
Division of Veterinary
Parasitology, Faculty of
Veterinary Sciences and Animal
Husbandry, Sher-e-Kashmir
University of Agricultural
Sciences and Technology of
Kashmir, Jammu and Kashmir,
India

Correspondence

IM Allaie
Division of Veterinary
Parasitology, Faculty of
Veterinary Sciences and Animal
Husbandry, Sher-e-Kashmir
University of Agricultural
Sciences and Technology of
Kashmir, Jammu and Kashmir,
India

Comparative efficacy of fenbendazole, ivermectin and oxclozanide against gastro-intestinal helminths of cattle in North Kashmir

A Aiman, RA Shahardar, ZA Wani and IM Allaie

Abstract

The present work was undertaken to evaluate the therapeutic efficacy of Fenbendazole, Ivermectin and Oxclozanide against gastrointestinal (GI) helminths of cattle in Baramulla district of Kashmir valley. A total of sixty six cattle suffering from GI Helminthoses were randomly selected. Among these, the cattle suffering from nematode infection (EPG ≥ 150) were divided into three groups, each comprising of eighteen animals. First two groups were treated with Fenbendazole and Ivermectin, respectively and the third group was kept as untreated infected control. The twelve animals suffering from only trematode infections (*Fasciola* spp. or Paramphistomes) were divided into two groups. One group comprising of nine animals were treated with Oxclozanide and the other group comprising of three animals were kept as untreated infected control. Faecal samples from rectum were directly collected on '0' day before treatment and on 8th and 14th day post treatment, in animals positive for nematode infections and on 8th, 14th and 28th day post treatment, in animals positive for trematode infections. A total of 100 percent reduction in faecal egg counts was observed on day 8th and day 14th post treatment against nematodes and thus the drugs (Fenbendazole as well as Ivermectin) were 100 percent effective against trichostrongylid type of nematodes. A total of 100 percent reduction in Faecal egg counts was observed on day 8th, 14th and 28th post treatment, thereby the efficacy of Oxclozanide was 100 percent against trematodes (*Fasciola* spp. and Paramphistomes). Thus, there was no evidence of development of resistance by GI helminths of cattle at Baramulla district of Kashmir valley.

Keywords: Cattle, efficacy, fenbendazole, GI helminths, ivermectin, Kashmir, oxclozanide

1. Introduction

Milk is the primary source of income from cattle rearing in India but beef production is also picking up albeit slowly. Gastrointestinal parasitism has been recognized as one of the major causes for lower productivity. The prevalence of GI helminths has been studied by various workers [1, 2, 3, 4, 5] who reported widespread prevalence of GI helminth parasites in cattle of J&K. Control of these helminths is usually undertaken by using Anthelmintics both for prophylactic and curative purposes. The indiscriminate and widespread use of these Anthelmintics has led to the development of resistance by helminth parasites [6, 7] across the globe. Resistance to anthelmintic agents has been reported among various species of GI parasites in all parts of world including India [8, 9, 10, 11], which is slowly emerging as the resistance epicenter of south Asia [12]. In the absence of adaptation of other alternative control measures to control helminth parasites of livestock, it is necessary to conserve the efficacy of currently available Antiparasitic drugs, with the result it becomes imperative to check the efficacy of commonly used Anthelmintics from time to time, so that a proper rotational strategy is devised to delay the development of resistance. In Kashmir valley, anthelmintic resistance against GI nematodes of small ruminants has been reported by Bihaqi [13] and Allaie [14] but there was no evidence of development of anthelmintic resistance against GI parasites of cattle in central [15] and south Kashmir [16]. Therefore, the current study was undertaken to evaluate the efficacy of commonly used Anthelmintics viz; Fenbendazole, Ivermectin and Oxclozanide against GI helminths of cattle in north zone of Kashmir valley.

2. Materials and Methods

The therapeutic efficacy of different anthelmintic drugs viz; Fenbendazole, Ivermectin and Oxclozanide was determined using the Faecal Egg Count Reduction Test (FECRT) as per the guidelines of World Association for Advancement of Veterinary Parasitology (WAAVP) for detection of anthelmintic resistance [17]. For this purpose, sixty six cattle suffering from GI helminth infection were randomly selected in Rafiabad tehsil of district Baramulla. Among these, the cattle suffering from nematode infection (Trichostrongyle type of worms and having

EPG \geq 150) were divided into three groups, each comprising of eighteen animals. First two groups were treated with Fenbendazole (Group-I) and Ivermectin (Group-II), at the dose rate of 7.50 mg/kg body weight orally and 0.2mg/kg body weight subcutaneously, respectively and the third group (Group III) was kept as untreated infected control (Table-1). Faecal samples were collected from each animal of these groups on day '0', 8th and 14th for calculating EPG by Stoll's dilution method.

A total of 12 cattle were selected, which exhibited only trematode infection *i.e.* ova of either *Fasciola* spp. or Paramphistomes and were divided into two groups. One group (Group-IV) comprised of 9 cattle and received treatment with Oxyclozanide at the dose rate of 10 mg/kg

body weight orally while as the 3 animals of other group (Group-V) served as untreated infected control (Table-1). Faecal samples were collected from each animal of these groups on day '0', 8th, 14th and 28th for calculating EPG by Stoll's dilution method.

The efficacy of different anthelmintic drugs was calculated by comparing mean eggs per gram (EPG) of faeces on '0' day *i.e.* before treatment and after treatment on 8th and 14th day (for nematode positive animals) and on 8th, 14th and 28th day (for trematode positive animals) as described by Coles *et al.* [18] using formula as $FECR (\%) = 1 - X/t \times 100$; where X = Arithmetic mean of EPG 10-14 days post treatment, t = treated group and c = control group.

Table 1: Complete schedule of Drug trial in cattle suffering from GI helminthosis

GI helminth	Group	No. of cattle	Drug used	Dosage	Route of administration
Nematodes	I	18	Fenbendazole	7.50 mg/kg bd. Wt.	Oral
	II	18	Ivermectin	0.2 mg/kg bd. Wt.	Subcutaneous
	III	18	Control	-	-
Trematodes	IV	9	Oxyclozanide	10 mg/kg bd. Wt.	Oral
	V	3	Control	-	-

3. Results

3.1 Efficacy of Fenbendazole and Ivermectin against GI nematodes of cattle

Group-I animals treated with Fenbendazole were having pre-treatment mean egg per gram (EPG) of faeces on day '0' as 222.22 \pm 10.08. However, on day 8th and 14th post treatment, the total mean EPG decreased to 0.00 \pm 0.00. It was found that the drug was 100 percent effective against trichostrongylid worms on 8th and 14th day post treatment (Table-2).

Group-II animals treated with Ivermectin, exhibited pre-treatment mean EPG of 250.00 \pm 16.67 on day '0'. The mean EPG decreased to 0.00 \pm 0.00 on day 8th and 14th post treatment. A total of 100 percent reduction in faecal egg counts was observed on day 8th and day 14th post treatment against trichostrongylid worms (Table-2).

In the control group (Group-III), mean EPG of Faeces for Trichostrongyle type of worms was 216.67 \pm 9.04 on '0' day which increased to 238.89 \pm 11.32 and 250.00 \pm 12.12 on 8th and 14th day post-treatment, respectively (Table-2).

3.2 Efficacy of Oxyclozanide in trematode infections of cattle

In Group-IV, the total pre-treatment mean EPG of faeces on day '0' was found to be 144.44 \pm 17.57. Pre-treatment mean EPG for *Fasciola* spp. and Paramphistomes was 66.67 \pm 28.87 and 77.78 \pm 27.78, respectively. The total mean EPG of trematodes decreased to 0.00 \pm 0.00 on day 8th, 14th and 28th post treatment. Thus a total of 100 percent reduction in faecal egg counts was observed on day 8th, 14th and 28th post treatment and the efficacy of Oxyclozanide was 100 percent against *Fasciola* spp. and Paramphistomes (Table-3). In control group (Group-V), total mean EPG of faeces for trematodes (*Fasciola* spp. and Paramphistomes) was 100.00 \pm 0.00 on '0' day which increased to 133.33 \pm 33.33 on day 8th and to 167.67 \pm 33.33 on 14th and 28th day. The individual mean EPG for *Fasciola* spp. increased from 66.67 \pm 33.33 on '0' day to 100.00 \pm 0.00 on 8th day and to 133.33 \pm 66.66 on 14th and 28th day while as it remained constant for Paramphistomes upto 28th day (33.33 \pm 33.33) (Table-3).

Table 2: Efficacy of different Anthelmintics against Trichostrongylids of cattle

Group	Mean EPG Day '0'	Mean EPG Day '8'	FECR %	Efficacy %	Mean EPG Day '14'	FECR %	Efficacy %
I	222.22 \pm 10.08	0.00 \pm 0.00	100	100.00	0.00 \pm 0.00	100	100.00
II	250.00 \pm 16.67	0.00 \pm 0.00	100	100.00	0.00 \pm 0.00	100	100.00
III	216.67 \pm 9.04	238.89 \pm 11.32	-	-	250.00 \pm 12.12	-	-

Table 3: Efficacy of 'Oxyclozanide' against trematodes of cattle

Days	Mean EPG of treatment group and percent efficacy (Group-IV)		Total	Mean EPG of control group (Group-V)		Total
	F	P		F	P	
0	66.67 \pm 28.87	77.78 \pm 27.78	144.44 \pm 17.57	66.67 \pm 33.33	33.33 \pm 33.33	100.00 \pm 0.00
8	0.00 \pm 0.00 (100.00)	0.00 \pm 0.00 (100.00)	0.00 \pm 0.00 (100.00)	100.00 \pm 0.00	33.33 \pm 33.33	133.33 \pm 33.33
14	0.00 \pm 0.00 (100.00)	0.00 \pm 0.00 (100.00)	0.00 \pm 0.00 (100.00)	133.33 \pm 66.66	33.33 \pm 33.33	167.67 \pm 33.33
28	0.00 \pm 0.00 (100.00)	0.00 \pm 0.00 (100.00)	0.00 \pm 0.00 (100.00)	133.33 \pm 66.66	33.33 \pm 33.33	167.67 \pm 33.33

Figures within parenthesis indicate percentage F=*Fasciola* spp., P=Paramphistome

4. Discussion

In the present study, percent reduction in egg counts with Fenbendazole and Ivermectin against nematodes (Strongyle worms) and with Oxyclozanide against Trematodal infection (*Fasciola* spp. and Paramphistomes) was recorded as 100.00 percent. As per Coles *et al.* [18], these values suggest that all

the above three drugs are effective against the respective parasitic infections of cattle in Rafiabab tehsil of district Baramulla of north Kashmir as the criteria for efficacy *i.e.* FECR% is more than 95.00 percent and as such there is no evidence of development of resistance against these drugs by the respective helminth parasites.

Fenbendazole was found to be 100 percent effective against Strongyle worms on 8th and 14th day post treatment. Our results regarding the efficacy of Fenbendazole against strongyle worms are in agreement with those reported by Geerts *et al.* [19] in Flanders; Williams and Broussard [20] in USA, Bushra [15] in central Kashmir and Maqbool *et al.* [16] in south Kashmir.

Ivermectin was found to be 100 percent effective against Strongyle worms on 8th and 14th day post treatment. Our observation is in agreement with Kumar *et al.* [21] who also found Ivermectin to be 100 percent effective in controlling natural gastrointestinal Nematodosis in cattle after 7 days post treatment and upto 20 days in Ranchi. Bushra [15] and Maqbool *et al.* [16] also observed 100 percent efficacy of Ivermectin against Strongyle worms of cattle on 7th and 14th day post treatment in central and south Kashmir, respectively. Oxyclozanide was found to be 100 percent effective against Trematodal infection (*Fasciola* spp. and Paramphistomes) on 8th, 14th and 28th day post treatment. Our findings are in close proximity with the study of Arias *et al.* [22] who observed faecal egg count reduction value of 97-99 percent against Paramphistomes in dairy cattle of Spain when treated with Oxyclozanide. Similar findings were made by Shokier *et al.* [23] who found 100 percent reduction in faecal egg count on 14th day post-treatment of Oxyclozanide against *Fasciola* spp. Maqbool *et al.* [16] also observed 100 percent efficacy of Oxyclozanide against trematode parasites of cattle in south Kashmir.

5. Conclusion

On the basis of the present study, it may be concluded that all the three drugs i.e. Fenbendazole, Ivermectin and Oxyclozanide are having efficacy of 100% and there is no indication of development of resistance by helminth parasites of cattle against these three drugs, which indicates that they may still be used scientifically in worm control programmes against these parasites of cattle in north Kashmir.

6. Acknowledgment

The authors are highly thankful to the people of north Kashmir especially tehsil Rafiabad of Baramulla district for cooperating in the smooth conduct of the drug trial. The authors are highly thankful to Dr. Azmat Alam Khan, Associate Professor, SKUAST-K for statistical analysis of the data. The help rendered by the officials of Department of Animal Husbandry and Division of Veterinary Parasitology SKUAST-K is gratefully acknowledged.

7. References

- Pandit BA, Shahardar RA, Banday MMA, Darzi MM, Matoo FA. Gastrointestinal helminth parasites of cattle in Kashmir valley. *Journal of Veterinary Parasitology*. 2004; 18(1):63-65.
- Yadav A, Khajuria JK, Raina AK. Gastrointestinal parasitic infection profile of bovines at R.S.Pura, Jammu and Kashmir. *Journal of Veterinary Parasitology*. 2005; 19(2):115-117.
- Bushra M, Shahardar RA, Maria A. Prevalence of gastrointestinal helminth parasites of cattle in central zone of Kashmir valley. *Journal of Veterinary Parasitology*. 2013; 27(1):33-36.
- Aiman A, Shahardar RA, Wani ZA, Allaie IM. Prevalence of gastro-intestinal helminths in cattle at north Kashmir. *Indian Journal of Animal Sciences*. 2017; 87(2):147-152.
- Maqbool I, Shahardar RA, Wani ZA, Allaie IM, Shah MM. Prevalence of gastrointestinal helminth of cattle in south Kashmir. *Indian Journal of Animal Sciences*. 2018; 88(8):910-914.
- Van Wyk JA. Refugia - overlooked as perhaps the most potent factor concerning the development of anthelmintic resistance. *Onderstepoort Journal of Veterinary Research*. 2001; 68(1):55-67.
- Mortensen LL, Williamson LH, Terrill TH, Kircher RA, Larsen M, Kaplan RM. Evaluation of prevalence and clinical implications of anthelmintic resistance in gastrointestinal nematodes in goats. *Journal of American Veterinary Medical Association*. 2003; 223(4):495-500.
- Gill BS. Anthelmintic resistance in India. *Veterinary Parasitology*. 1996; 63(1-2):173-176.
- Sutherland IA, Leathwick DM. Anthelmintic resistance in nematode parasites of cattle. A global issue? *Trends Parasitology*. 2011; 27(4):176-181.
- Jaiswal AK, Sudan V, Shanker D, Kumar P. Emergence of Ivermectin resistance in gastrointestinal nematodes of goats in a semi-organised farm of Mathura district-India. *Veterinary Archive*. 2013; 83(3):275-280.
- Chandra S, Prasad A, Latchumikanthan A, Rakesh RL, Praveen K, Khobra V, *et al.* Status of benzimidazole resistance in *Haemonchus contortus* of goats from different geographic regions of Uttar Pradesh, India. *Veterinary Parasitology*. 2015; 208:263-267.
- Sanyal PK. Therapeutic and prophylactic use of in-feed formulation of albendazole against bovine and bubaline parasitic gastroenteritis. *Journal of Veterinary Parasitology*. 1998; 12:103-108.
- Bihaqi SJ. Prevalence and Therapeutic Studies on Gastrointestinal Helminth Parasites of Goats in Kashmir Valley. M.V.Sc. Thesis. Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar, J&K. 2013.
- Allaie IM. Studies on Benzimidazole resistance in Gastro-Intestinal Nematodes of small ruminants of Kashmir Valley. Ph.D., Thesis. Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar, J&K. 2018.
- Bushra M. Prevalence and Therapeutic Studies on Gastrointestinal Helminth Parasites of Cattle in central zone of Kashmir Valley. M.V.Sc thesis submitted to Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar, J&K, 2010.
- Maqbool I, Shahardar RA, Wani ZA, Allaie IM, Shah MM. Efficacy of anthelmintics against GI helminths of cattle in Pulwama district of South Kashmir. *Journal of Pharmacognosy and Phytochemistry*. 2018; 7(5):1214-1217.
- Coles GC, Jackson F, Pomroy WE, Prichard RK, Samson-Himmelstjerna G, Silvestre A, *et al.* The detection of anthelmintic resistance in nematodes of veterinary importance. *Veterinary Parasitology*. 2006; 136:167-185.
- Coles GC, Bauer C, Borgsteede FHM, Geerts S. World association for the advancement of Veterinary Parasitology (WAAVP) methods for the detection of anthelmintic resistance in nematode of veterinary importance. *Veterinary Parasitology*. 1992; 44:35-44.
- Geerts S, Brandt J, Kumar, V. Suspected resistance of *Ostertagia ostertagi* in cattle to levamisole. *Veterinary Parasitology*. 1987; 23(1-2):77-82.

20. Williams JC, Broussard SD. Comparative efficacy of levamisole, thiabendazole and Fenbendazole against cattle gastrointestinal nematodes. *Veterinary Parasitology*. 1995; 58(1-2):83-90.
21. Kumar A, Prasad KD, Kumar RR. Efficacy of Ivermectin and Tetramisole control packages against gastrointestinal nematodosis in cattle and buffaloes. *Journal of Veterinary Parasitology*. 2004; 18:31-33.
22. Arias MS, Sanchis J, Francisco I, Francisco R, Pineiro P, Cazapal-Monteiro C, *et al.* The efficacy of four Anthelmintics against *Calicophoron Daubneyi* in naturally infected dairy cattle. *Veterinary Parasitology*. 2013; 197(1-2):126-129
23. Shokier KM, Aboelhadid SM, Waleed MA. Efficacy of five anthelmintics against a natural *Fasciola* species infection in cattle. *Beni-Suef University Journal of Basic and Applied Sciences*. 2013; 2(1):41-45.