

The Efficacy of Ricobendazole and Ivermectin on Naturally Infected Sheep with *Trichostrongylidae* sp. in the Region of Van

¹Ali Sahin, ²Abdurrahma Gul, ³Mehmet Karaca, ³Hasan Altan Akkan and ³Ihsan Keles

¹Department of Pharmacology and Toxicology, ²Department of Parasitology,

³Department of Internal Medicine, Faculty of Veterinary, Yuzuncu Yil University, Van, Turkey

Abstract: The efficacy of two broad spectrum antelmintics (Ricobendazole and Ivermectin) against gastrointestinal nematode infection was compared in sheep. Naturally infected thirty sheep with *Trichostrongylidae* sp., which were diagnosed by McMaster technique and their coprocultures were performed. Sheep were randomly assigned to two treatment groups (Ricobendazole and Ivermectin) and one control group of 10. Fecal samples for determining nematode egg counts were collected pre- and post-treatment. All treatments resulted in decrease in the number of Eggs per Gram (EPG) in the post-treatment samples compared to the pre-treatment samples. Mean egg counts reduced 100% for both ricobendazole and ivermectin on trial 14 days. Furthermore, no significant differences were found among treatment groups. The data demonstrate a similar efficacy obtained from both ricobendazole and ivermectin. They were effective and convenient to apply. Either ricobendazole or ivermectin believed to be suggestible to treat gastrointestinal nematodes in sheep.

Key words: Sheep, *Trichostrongylidae*, ricobendazole, ivermectin, efficacy, Van

INTRODUCTION

Gastrointestinal nematode infections in domestic animals cause reduction in meat, milk, wool and pregnancy rate. They can also cause death (Soulsby, 1986). There are several anthelmintic drugs used against these parasites. Ivermectin (Gogolewski *et al.*, 1995), moxidectin (Ayaz and Sahin, 2003), Doramectin (Dorchies *et al.*, 2001), oxfendazol (Yildirim *et al.*, 2008), levamisole (Mohammed *et al.*, 2007), selamectin (Wang *et al.*, 2008) and ricobendazole are all being used for this purpose.

Benzimidazole and probenzimidazole antelmintics are widely used in veterinary and human antelmintic therapy (Cristofol *et al.*, 2001). Ricobendazole, benzimidazole carbamate derivatives, which called albendazole sulfoxid is a wide spectrum anthelmintic. This drug inhibits polymerisation of β -Tubulin of parasites, therefore damages energy metabolism of them so, kill the parasites (Formentini *et al.*, 2005). This drug have been used at 3.75 mg kg⁻¹ dose subcutaneously against gastrointestinal parasites (Formentini *et al.*, 2001). After SC injection, ricobendazole is widely distributed from blood to other tissues, especially to the gastrointestinal tract (Lonusse *et al.*, 1998).

Ivermectin is the 22,23-dihydro derivative of avermectin B1, a macrocyclic lactone produced by an actinomycete,

Streptomyces avermitilis. It is active at extremely low dosage against a wide variety of nematode and arthropod parasites, apparently by virtue of its action on the mediation of neurotransmission by gamma-aminobutyric acid (Campbell *et al.*, 1983).

Therefore, in the present study, anthelmintic efficacy of ivermectin at 0.2 mg kg⁻¹ dose and ricobendazole at 3.75 mg kg⁻¹ dose on the sheep naturally infected with *Ostertagia*, *Haemonchus*, *Nematodirus* and *Mashallagia* genus parasites were investigated in the region of Van.

MATERIALS AND METHODS

In the present study, 30 sheep kept at the University of Yuzuncu Yil farm, aged between 2-5 years old and weighing 30-50 kg body weight were used. After recording ear numbers; faeces samples were taken from each animal's rectum. At the same day, faeces samples examined for the presence of parasite eggs using McMaster flotation technique at saturated Zinc sulphate solution (Ministry of Agriculture, Fisheries and Food, 1986). Then coprocultures of the faeces sample were prepared and larval diagnoses were made according to their morphological characters described at the literature (Ministry of Agriculture, Fisheries and Food, 1986). Arithmetic means of the determined eggs were taken.

Infected 30 sheep were divided into 3 equal groups as A, B and C. Sheep in group A received ivermectin (Mectiver inj. Vetas, Turkey) at 0.2 mg kg⁻¹ dose, sheep in group B received ricobendazole (Rizal inj. Sanovel, Turkey) at 3.75 mg kg⁻¹ dose. Sheep in group C did not receive any treatment and used as control group.

Faeces samples were collected 7 days before drug application, on the day of the drug application and 7 and 14 days after drugs application for coprologic analysis. During the study the animals used in this study were kept indoor and dry hay and commercial concentrated feed given to the animals.

RESULTS AND DISCUSSION

Seven days before treatment, the day of the treatment and 7 and 14 day after treatment, coprological analysis results with concern to *Trichostrongylidae* sp. in naturally infected sheep are given in Table 1.

Before treatment, in the coprocultures, *Ostertagia* sp., *Haemonchus* sp., *Nematodirus* sp. and *Mashallagia* sp. larvae of genus *Trichostrongylidae* family were diagnosed.

Fourteen days after treatment, no parasite eggs in their faeces were observed in the group A and B. It was determined that both drugs used against *Trichostrongylidae* family had 100% effectiveness. On the other hand, parasite eggs in the control group were observed during whole sampling periods.

Trichostrongylosis is an important parasite infestation, which cause important economical loses and death (Soulsby, 1986; Umur, 1997). In the country, several researchers investigated Trichostrongyloidae family in sheep and in this family; *Ostertagia* sp., *Haemonchus* sp., *Nematodirus* sp., *Cooperia* sp., *Strongyloides papillosus*, *Bunostomum* sp. and *Oesophagostomum* sp. subdivisions have been diagnosed widespreadly (Altas *et al.*, 2006; Guclu *et al.*, 1996; Koroglu *et al.*, 2001;

Table 1: The efficacy of ricobendazole and ivermectin on naturally infected sheep with *Trichostrongylidae* sp.

Groups	No	Egg counts in per Gram faeces (EPG)						Efficacy (%)
		Before treatment	Treatment day	Arithmetic mean	After treatment		Arithmetic mean	
					7th day	14th day		
Ivermectin								
	1	300	300	300	0	0	0	100
	2	200	300	250	0	0	0	
	3	200	200	200	0	0	0	
	4	300	300	300	0	0	0	
	5	300	400	350	300	0	150	
	6	200	300	250	0	0	0	
	7	600	500	550	0	0	0	
	8	300	400	350	0	0	0	
	9	300	300	300	0	0	0	
	10	400	300	350	100	0	50	
Arithmetic mean		310	330	320	40	0	20	
Rikobendazole (Rizal)								
	11	300	400	350	200	0	100	100
	12	200	300	250	0	0	0	
	13	200	200	200	0	0	0	
	14	300	200	250	0	0	0	
	15	400	500	450	0	0	0	
	16	400	300	350	0	0	0	
	17	500	300	400	0	0	0	
	18	400	400	400	0	0	0	
	19	200	300	250	200	0	100	
	20	600	500	550	0	0	0	
Arithmetic mean		350	340	345	40	0	20	
Control								
	21	300	200	250	300	300	300	
	22	200	300	250	200	200	200	
	23	400	300	350	300	400	350	
	24	400	500	450	400	300	350	
	25	500	400	450	500	400	450	
	26	200	300	250	300	200	250	
	27	300	300	300	300	400	350	
	28	300	400	350	300	300	300	
	29	400	400	400	300	400	350	
	30	500	500	500	500	400	450	
Arithmetic mean		350	360	355	340	330	335	

Umur, 1997). In the present study, as mentioned above; *Ostertagia* sp., *Haemonchus* sp., *Nematodirus* sp. and *Marshallagia subdivision* of *Trichostrongylidae* family were diagnosed in the faeces of the sheep investigated.

Parasitic diseases cause important decrease in the productivity of animals, therefore drug developments against these parasites take important place. In addition, animal owners use these drugs casually from time to time, therefore, resistance may develop against these drugs (Leathwick *et al.*, 2001).

Ivermectins have been used against gastrointestinal nematodes. For instance; Nasreen *et al.* (2007) used orally in sheep and found 93.21% success, Khalid *et al.* (2004) 89.85% success, Sarkar *et al.* (2005) 100% in calves, Park *et al.* (1998) 94.9% success in goat reported to obtained.

Coronado *et al.* (1997) investigated the effect of ricobendazole against gastrointestinal nematodes in cattle and found 100% success. Furthermore, Munoz *et al.* (2008) investigated the efficacy of ricobendazole against gastrointestinal nematodes in sheep and found 50-95% success.

CONCLUSION

In the present study, both ivermectine and ricobendazole had 100% success rate 14 days after treatment against gastrointestinal nematodes, which were used subcutaneously. Therefore, both drugs can be used in the challenge against gastrointestinal nematodes in sheep safely and successfully.

ACKNOWLEDGEMENTS

We would like to thank to Serkan Sekmen from Sanovel drug firm and to Erkan Berberodlu from Vetas drug firm for their support to the present study.

REFERENCES

- Altas, M., M. Sevgili, A. Gokcen and H.C. Bayburs, 2006. Prevalence of gastrointestinal nematodes in sheep in the sanliurfa region. *Turkiye Parazitoloji Dergisi*, 30: 317-321. http://www.tparazitolog.org/pdf/pdf_TPD_216.pdf.
- Ayaz, E. and A. Sahin, 2003. The efficacy of moxidectin and doramectin against gastrointestinal nematode infection in cattle. *Turk. J. Vet. Anim. Sci.*, 27: 307-310. <http://journals.tubitak.gov.tr/veterinary/issues/vet-03-27-2/vet-27-2-4-0104-15.pdf>.
- Campbell, W.C., M.H. Fisher, E.O. Stapley, G. Albers-Schonberg and T.A. Jacob, 1983. Ivermectin: A potent new antiparasitic agent. *Science*, 221 (4613): 823-828. DOI: 10.1126/science.6308762.
- Coronado, A., F. Mujica and H. Barreto, 1997. Efficacy of ricabendazole on gastrointestinal helminths control. *Arch. Latinoam. Prod. Anim.*, 5 (1): 586-588. <http://avpa.ula.ve/congresos/ALPA97/SA01.pdf>.
- Cristofol, C., G. Virkel, L. Alvarez, S. Sanchez, M. Arboix and C. Lanusse, 2001. Albendazole sulphoxide enantiomeric ratios in plasma and target tissues after intravenous administration of ricobendazole to cattle. *J. Vet. Pharmacol. Therap.*, 24: 117-124. DOI: 10.1046/j.1365-2885.2001.00320.x. <http://www.ingentaconnect.com/content/bsc/jvpt/2001/00000024/00000002/art00007>.
- Dorchies, P.H., P.H. Jacquiet, J.P. Bergeaud, C. Duranton, F. Prevot, J.P. Alzieu and J. Gosselin, 2001. Efficacy of doramectin injectable against *Oestrus ovis* and gastrointestinal nematodes in sheep in the southwestern region of France. *Vet. Parasitol.*, 96: 147-154. DOI: 10.1016/S0304-4017(00)00429-5.
- Gogolewski, R.P., G.R. Allerton, W.K. Langholff, L.G. Cramer and J.S. Eagleson, 1995. An ivermectin tablets for sheep: Efficacy against gastrointestinal nematodes and bioavailability comparison with a liquid ivermectin formulation. *Vet. Parasitol.*, 60 (3-4): 297-302. DOI: 10.1016/0304-4017(95)00862-4.
- Formentini, E.A., O.N. Mestorino, E.L. Marino and J.O. Errecalde, 2001. Pharmacokinetics of ricobendazole in calves. *J. Vet. Pharmacol. Therap.*, 24: 199-202. PMID: 11442798.
- Formentini, E.A., N. Mestorino and J.O. Errecalde, 2005. Pharmacokinetics of ricobendazole after its intravenous, intraruminal and subcutaneous administration in sheep. *Vet. Res. Com.*, 29: 595-608. <http://cat.inist.fr/?aModele=afficheN&cpsid=17129510>.
- Guclu, F., B. Dik, K. Kamburgil, F. Sevinc, H. Aytekin and M. Aydenizoz, 1996. Konya yoresi koyunlarinda mide-bagirsak nematodlarinin yayilisi ve mevsimsel dagilimlari. *Veterinarium*, 7: 50-55. http://www.tparazitolog.org/pdf/pdf_TPD_342.pdf.
- Khalid, S.M.A., M.R. Amin, M. Mostofa, M.J. Hossain and M.A.K. Azad, 2004. Effects of Vermic® against gastrointestinal nematodiasis in sheep. *J. Biol. Sci.*, 4 (6): 720-724. <http://scialert.net/qredirect.php?doi=jbs.2004.720.724&linkid=pdf>.
- Koroglu, E., S. Simsek, N. Dilgin, I. Gultekin and M. Altas, 2001. Prevalence of Gastro-intestinal Nematodes of Sheep in Elazig. *F.U. Sag. Bil. Derg.*, 15: 145-154. http://www.fusabil.org/summary_en.php3?id=187.

- Leathwick, D.M., I.C. Moen, C.M. Miller and I.A. Sutherland, 2001. Ivermectin-resistant *Oestertagia circumcincta* from sheep in the lower North Island and their susceptibility to other macrocyclic lactone antelmintics. *New Zealand Vet. J.*, 49 (3): 123-124. PMID: 16032143. http://www.ncbi.nlm.nih.gov/pubmed/16032143?ordinalpos=2&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DefaultReportPanel.Pubmed_RVDocSum.
- Lonusse, C., G. Virkel, S. Sanchez, A. Alvarez, A. Lifschitz, F. Imperiale and A. Monfrinotti, 1998. Ricobendazole kinetics and availability following subcutaneous administration of a novel injectable formulation to calves. *Res. Vet. Sci.*, 65: 5-10. DOI: 10.1016/S0034-5288(98)90019-4.
- Ministry of Agriculture, Fisheries and Food, 1986. Manual of Veterinary Parasitological Laboratory Techniques. 3rd Edn. Great Britain, pp: 37-40. ISBN: 0-11-242724-3.
- Mohammed, O.B., S.A. Omer and M.A. Sandouka, 2007. The efficacy of ivermectin and levamisole against natural *Nematodirus* spathiger infection in the Arabian sand gazelle (*Gazelle subgutturosa marica*) and the Arabian mountain gazelle (*Gazelle gazelle*) in Saudi Arabia. *Vet. Parasitol.*, 150: 170-173. DOI: 10.1016/j.vetpar.2007.09.009.
- Munoz, J.A., F.A. Cubillan, R. Ramirez, O. Oswaldo Vale, E. Chacin D. Simoes and A. Atencio, 2008. Antelmintic efficacy of doramectin 1%, Ivermectin 1% and ricobendazol 15% against gastrointestinal nematodes in hair ovines. *Revista Cientifica*, 18 (1): 12-16. <http://redalyc.uaemex.mx/redalyc/html/959/95918103/95918103.html>.
- Nasreen, S., G. Jeelani and F.D. Sheikh, 2007. Efficacy of different antelmintics against gastrointestinal nematodes of sheep in Khasmir Valley. *Vet. Scan.*, 2 (1): 8-10. <http://vetscan.co.in/pdf/VetScan%202007%20Vol%202%20No%201.pdf>.
- Park, N.C., J.C. Do, S.W. Kim and H.B. Song, 1998. Studies on the efficacy of antelmintics to goats infected with internal parasites. *Korean J. Vet. Serv.*, 21 (4): 439-449. http://www.kosves.re.kr/data/Korean_Ref/1998_21_4_439.pdf.
- Sarkar, A.K., M. Ali and A. Rahman, 2005. Efficacy of ivermectin against gastrointestinal nematodes in calves. *J. Anim. Vet. Adv.*, 4 (2): 163-166. <http://medwelljournals.com/fulltext/java/2005/163-166.pdf>.
- Soulsby, E.L.B., 1986. *Helmints, Arthropods and Protozoa of Domesticated Animals*. 7th Edn. Bailliere Tindall, London. ISBN: 9780112427247.
- Umur, S., 1997. Kars yoresi koyunlarinda mide-bagirsak nematodlari ve mevsimsel dagilimlari. *Turk. J. Vet. Anim. Sci.*, 21: 57-65. <http://mistug.tubitak.gov.tr/bdyim/abs.php?dergi=v&rak=95124>.
- Wang, T., G. Yang, H. Yan, S. Wang, Y. Bian, A. Chen and F. Bi, 2008. Comparison of efficacy of selamectin, ivermectin and mebendazole for the control of gastrointestinal nematodes in rhesus macaques, China. *Vet. Parasitol.*, 153: 121-125. DOI: 10.1016/j.vetpar.2008.01.012. http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TD7-4RM1M08-B&_user=736695&_rdoc=1&_fmt=&_orig=search&_sort=d&_docanchor=&view=c&_searchStrId=987293930&_rerunOrigin=google&_acct=C000040898&_version=1&_urlVersion=0&_userid=736695&md5=c3636b9e91e9a11b524c531f5bb2a986.
- Yildirim, A., V. Gunes, A. Ica, S. Sariozkan, O. Duzlu, A. Inci and H. Albasan, 2008. Koyunlarda mide bagirsak nematodlarina karsi oxfendazole + oxyclozanide'nin tablet ve pasta formulasyonlarinin kisa sureli etkinliginin arastirilmesi. *Turkiye Parazitoloji Dergisi*, 32 (2): 134-138. http://www.tparazitolderg.org/pdf/pdf_TPD_342.pdf.