

Effect of praziquantel on *Dicrocoelium dendriticum* in naturally infected sheep

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Summary

Dicrocoeliosis is poorly known and often underestimated by studies and practitioners in many countries. The prophylaxis of *Dicrocoelium* has been difficult and unsatisfactory to date due to the complexity of its biological life cycle and epidemiology (Otranto and Traversa, 2002). This study was performed to evaluate the efficacy of praziquantel at 50 mg/kg b.w. against *D. dendriticum*. Thirty-four sheep (11 male + 13 female), naturally infected with *D. dendriticum*, were allocated to two groups as follows: Treatment group 50.0 mg/kg b.w., n=14; Control group, n=10. Sheep were around 8-12-months-old. Sheep were randomized with equal groups based on mean weight and sex. Feces were collected two times before treatment and 2-7 days after treatment and just before slaughter. During the study feces were examined for parasite eggs microscopically. Equal numbers of animals (3 from each group) were slaughtered 9, 10, 11 and 12 days after treatment and livers with the bile sack and small intestine contents examined for the presence of parasites. It was concluded that praziquantel at the dose rates used in the study was 95.9% effective against *D. dendriticum*.

Keywords: praziquantel, *D. dendriticum*, sheep

Dicrocoeliosis is poorly known and often underestimated by researches and practitioners in many countries. The prophylaxis of *Dicrocoelium* has been difficult and unsatisfactory to date due to the complexity of its biological life cycle and epidemiology. Many anti-helminthic drugs are practically ineffective against *dicrocoeliosis* if used at the dosage recommended against other gastrointestinal helminths and lungworms. This is important due to the multiple parasitic infections which affect ruminant livestock and mask the pathology of *dicrocoeliosis*, to the difficulties in diagnosing it with coprological techniques and, finally, to the few effective drugs found (4). Praziquantel is a pyrazinoisoquinoline derivative with well-known activity anticestodal and antitrepatodal in humans and animals. The mode of action of praziquantel makes the drug different, such as shrinking phenomena were observed in both trematodes and cestodes to praziquantel: tetanic contraction of the parasite musculature and rapid vacuolisation of the syncytial tegument (2). It is effective at different dose levels according to the target parasite species. The efficacy of praziquantel on *Dicrocoelium dendriticum* in sheep was reported by quite few scientists (3, 6, 7).

Mansonil Forte® is a tablet formulation of praziquantel (containing 300 mg active ingredient) and it is used for the treatment of sheep. In this study, the effect of praziquantel on *D. dendriticum* at a dosage of 50 mg/kg was studied in naturally infected sheep in order to evaluate the efficacy respecting the results of previous studies.

Material and methods

For this study, the faeces of 70 Kivircik sheep, a very popular sheep breed specific to Turkey in the Bolu and Çankırı provinces (North-West Anatolia/Turkey) were examined for the presence of *Dicrocoelium dendriticum* microscopically by a flotation and McMaster egg counting method (1). None of the sheep had been previously treated with anthelmintics. Twenty-eight (40%) sheep were positive for *D. dendriticum* based on the findings of eggs in the faeces. Twenty-four animals were selected and housed indoors. One of the 24 infested sheep was slaughtered in order to assure that the animals were infected with flukes. That sheep had ninety *D. dendriticum* in the liver and bile duct, which have had one egg in the faeces control before.

The rest of the sheep were allocated into two groups (treatment and control groups) with respect to sex and body weight as described: treatment group, 50 mg praziquantel/kg b.w., n: 14 sheep, 7 male, 7 female and approx. 32 kg, control group, n: 10 sheep, 4 male, 6 female and approx. 33,2 kg. Tablets were weighed according to the animals weight. In order to ensure the intake, the tablets were given with plenty of water.

Microscopic faecal examination by light microscope after faecal flotation (in zinc sulphate solution (sp.g. 1.3 and 1.45) (5) from every faecal sample before and during the study. Faeces were collected two times before treatment and 2-7. days after treatment and just before slaughter. Faeces during the study were examined for parasite eggs microscopically. The count of fluke's eggs was performed before the start of the study, right after the treatment and just before the slaugh-

ter according to the modified McMaster egg counting method (1). Equal numbers of animals (3 from each group) were slaughtered 9, 10, 11 and 12 days after treatment and livers with bile ducts and small intestine contents were examined for the presence of parasites. Liver of each sheep was cut in 1 cm³ pieces and put into 2 liters 0.9% tepid NaCl solution for 60 minutes, and then these liver pieces were squeezed to enable parasites come out from bile ducts into the solution. Liver pieces were removed and the solution was filtered using a 100 mesh sieve. *D. dendriticum* on the sieve surface were counted (8).

The statistical analysis of this study was done by using the Chi-square and independent samples t-test of the SPSS 11 package (SPSS, Chicago, IL).

Results and discussion

All sheep in the control group had various numbers (6-2269) of *D. dendriticum* in the liver and bile ducts at necropsy. In the treatment group, no parasite were present except three sheep, these sheep had 1-310 *D. dendriticum* in the liver and bile ducts at necropsy (tab. 1). No increase in *D. dendriticum* egg release on days after the treatment were observed, and the difference among the two groups was not significant.

Statistic analysis of the results showed that a single treatment with praziquantel at a dose of 50 mg/kg body weight resulted in a 95.9% reduction of the worm-burdens. The difference the number of animals with between the groups was significant by Chi-square test ($\chi^2 = 14.505$, $p < 0.001$). The post-treatment differences in the mean of parasite numbers between the groups was significant by the independent samples t-test (parasite number $t = 2.645$, $p < 0.05$; logarithmic parasite number $t = 6.724$, $p < 0.001$).

The results of this study match to the results of Güralp et al. (3) (92,3%), (6) (95%) and Wolff et al. (7) (98%). The results of the present study showed that praziquantel (50 mg/kg bw) can be applied to the sheep infested with *D. dendriticum* without having an important side-effect.

Conclusion

Control of *D. dendriticum* is particularly difficult, as it is not often observed, nor is its effects. For a number of reasons dicrocoeliosis is a parasitic disease that is not well known to researchers and veterinary practitioners in many countries. Firstly, the multiple parasitic infections of ruminant livestock often mask the pathological effects and economic losses related to dicrocoeliosis, thus causing veterinarians and farmers to underestimate this disease; secondly dicrocoeliosis is often difficult to diagnose using the current coprological techniques; and, finally, few effective drugs have been found (4). *D. dendriticum* infestation in sheep is a chronic infestation. The number of parasites increases in the liver depends on the infestation rate in the field. The clinical symptoms of the infestation appear when the number of parasites increases at around 10 000. Therefore the periodical treatment is necessary for the decrease of the number of parasites in the liver of sheep. Then, the elimination of thousands of *D. dendriticum* from the liver may not be possible at one treatment.

Tab. 1. Necropsy findings in groups

Ear no.	Sex	Kg	Groups	Number of <i>D. dendriticum</i> at necropsy	Average of <i>D. dendriticum</i> of groups
262	E	31.5	Control	250	589
263	D	49.0	"	2269	
264	D	37.0	"	177	
273	D	36.0	"	51	
283	D	26.5	"	244	
285	E	24.0	"	90	
287	E	30.0	"	580	
289	D	46.0	"	1855	
290	D	17.5	"	6	
295	E	35.0	"	363	
Total	10/10 sheep %100			5885	
268	D	29.0	Treatment	1	24
279	D	51.0	"	310	
280	D	30.5	"	23	
Total	3/14 sheep %21.4			334	

Tab. 2. Efficacy of praziquantel (50 mg/kg bw) against *D. dendriticum* in natural infected sheep

Group	Dose (mg/kg bw)	EE (%)	IE (%)	χ^2 14.505	t	
					par. no	log par. no
Control	-	78.6	95.9	$p < 0.001$	2.645	6.724
Treatm.	50				$p < 0.05$	$p < 0.001$

Explanations: EE – extense efficacy, IE – intense efficacy

The results of this present study indicated that praziquantel can be an alternative for the treatment of dicrocoeliosis in sheep before and after the grazing season providing a parasite free food animal population and healthy generation.

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