

TREATMENT OF *Ancylo-discoides vistulensis* MONOGENEAN INFESTATIONS OF THE EUROPEAN CATFISH (*Silurus glanis*)

BY SZÉKELY, C. AND MOLNÁR, K.

Introduction

Monogenean infestation caused by *Ancylo-discoides vistulensis* is the most important parasitic disease of cultured catfish, *Silurus glanis*, (Molnár, 1968). For a long time, short exposure to a solution containing NH_4OH and $\text{K}_2\text{Cr}_2\text{O}_7$ has been used for treating the disease in Hungary (Antalfi, 1958). Since the excellent efficacy of organophosphates against monogeneans was recognized (Sárgi et al., 1965), trichlorfon treatment in farm ponds has become a common practice. However, organophosphate treatment of ancylo-discoidosis has fallen short of expectations, and ammonium hydroxide - potassium bichromate combination has not provided complete freedom from these parasites. Therefore, the aim of the present study was to test some other anthelmintics for efficacy against *Ancylo-discoides*.

Goven and Amend (1982) successfully used the combination of mebendazole and trichlorfon against *Dactylogyrus vastator* and *Gyrodactylus elegans*. Székely and Molnár (1987) as well as Buchmann and Bjerregaard (1989) reported complete efficacy of mebendazole against eel pseudodactylogyrosis. An exposure to mebendazole solution gave good efficacy against *Dactylogyrus* of common carp and *Gyrodactylus* of eel (Székely and Molnár, 1988).

With praziquantel, Schmahl and Mehlhorn (1985) achieved success against *Dactylogyrus* and *Diplozoon* spp., while Schlotfeldt et al. (1988) found this drug effective against monogenean infestation of the European catfish.

Schmahl and Tarachewski (1987) reported the efficacy of levamisole hydrochloride against the species *Gyrodactylus aculeati* and *Diplozoon paradoxum*.

Although albendazole sulfoxide is widely used against helminthoses of

warm-blooded animals in Hungary, its efficacy against monogeneans has not yet been tested.

Schmahl and Mehlhorn (1988) found toltrazuril efficacious against *Gyrodactylus*, *Dactylogyrus*, *Diplozoon*, and *Pseudodactylogyrus* species.

The purpose of the experiments presented here was to obtain data on the efficacy of mebendazole, praziquantel, levamisole, albendazole sulfoxide, toltrazuril and the two components of Jaczó's solution, given separately, against ancylo-discoidosis.

Material and Methods

Catfish fingerlings (3-4 cm), experimentally infected with *A. vistulensis* oncomiracidia, were used. The oncomiracidia were obtained as follows. Eggs produced by monogeneans of catfish from farm ponds in a 5-day period were incubated in aquaria. Subsequently, 350 catfish fingerlings were placed in the aquaria for 2 hours. As a result, several hundred oncomiracidia parasitized each fish. Three days after the experimental infection this uniformly infected stock was divided into 3 groups of 20 fish each. The groups were bathed in different doses of the compounds for different times (see Table 1) in 10 aquaria. Treatments were evaluated 3-4 days later, after killing the fish, by stereomicroscopic examination of entire gill filaments. Deaths during and after the treatments were recorded.

Results

Before treatment the prevalence of infection was 100%. Both the 4-hour and the 26-hour exposure to mebendazole solution of 10 mg/l^{-1} concentration markedly reduced the intensity of infestation (to 8-20 and 5-20 parasites per fish, respectively) but failed to completely erad-

Table 1: Efficacy tests with different anthelmintics against *Ancylodiscoides vistulensis* monogenean infestation of the European catfish.

Drug	Dose (mg/l ⁻¹)	Exposure time	Efficacy		Time between treatment and evaluation (days)	Remark
			prevalence (fish infested/ fish treated)	intensity (parasites/fish)		
Albendazole sulfoxide	1	26 h	20/20	several hundred	3-4	—
Albendazole sulfoxide	10	26 h	20/20	>100	3-4	—
Albendazole sulfoxide	100	5 h	20/20	several hundred	3-4	—
Albendazole sulfoxide	500	4.5 h	20/20	100	3-4	—
Levamisole	20	18 min	—	—	0	Fish died during the treatment
Levamisole	50	10 min	18/18	several hundred	3-4	Two fish died after treatment
Mebendazole	10	4 h	10/10	8-20	3-4	—
Mebendazole	10	26 h	10/10	5-20	3-4	Skin lesions
Mebendazole	100	1.5 h	18/18	80-100	3-4	Two fish died after treatment
Praziquantel	10	5 h	17/20	8-10	3-4	—
Praziquantel	100	18 min	20/20	15-60	3-4	Exposure interrupted because of signs of stress
Toltrazuril	10	5 h	20/20	several hundred	3-4	—
Jaczó's solution (K ₂ Cr ₂ O ₇ +NH ₄ OH)	100	1 min	4/20	2-5	0	—
K ₂ Cr ₂ O ₇	62.5	—	—	—	—	—
K ₂ Cr ₂ O ₇	100	1 h	20/20	several hundred	0	—
K ₂ Cr ₂ O ₇	1000	1 h	20/20	several hundred	0	—
NH ₄ OH	62.5	1 min	3/20	2-6	0	—
Untreated control	0	—	20/20	several hundred	3-4	—

icate the parasites. The fish poorly tolerated the 26-hour exposure, which resulted in some degeneration (loosening and whitening) of the skin epithelium. A 1.5-hour treatment in mebendazole solution of 100 mg/l⁻¹ was less effective. Two fish died after this treatment.

Exposure to praziquantel at 10 mg/l⁻¹ for 5 hours eradicated all parasites from some fish (3 out of 20) and markedly reduced the intensity of infestation (8-10 parasites per fish) in those remaining infested. Exposure to praziquantel at 100 mg/l⁻¹ markedly stressed the fish without improving treatment.

Levamisole was toxic to fish and had little effect on the parasites.

Albendazole sulfoxide and toltrazuril were ineffective.

One-minute exposure of Jaczó's solution (100 mg/l K₂Cr₂O₇ + 62.5 mg/l⁻¹ NH₄OH) markedly reduced both the prevalence and the intensity of infestation. However, K₂Cr₂O₇, when used alone was without effect. On the other hand, NH₄OH solution gave high effica-

cy similar to that shown by Jaczó's solution.

Untreated control fish specimens were infested by several hundred parasites at the time of evaluation.

Discussion

Only three of the drugs tested in this study proved suitable for controlling gill-parasitic monogeneans of catfish. None of the drugs exerted complete parasitocidal effect.

The experiments reported here show that a 26-hour exposure to a mebendazole solution of 10 mg/l⁻¹ concentration is effective against ancylostidiosis, but this efficacy is inferior to the complete efficacy it shows against gill-parasitic monogeneans in eel and common carp (Székely and Molnár, 1987, 1988). Catfish fingerlings poorly tolerated even short exposure (1.5 h) to a mebendazole solution of 100 mg/l⁻¹ concentration, and the intensity of infestation only slightly decreased following that treatment.

A 5-hour exposure to praziquantel so-

lution of 10 mg/l⁻¹ concentration markedly reduced the intensity of infestation. This finding is consistent with the results reported by Schlotfeldt et al. (1988). Exposure to praziquantel solution of 100 mg/l⁻¹ concentration, however, was not tolerated by catfish fingerlings even for a short time (18 minutes).

Schmahl and Taraschewski (1987) reported that levamisole hydrochloride in a concentration of 20-50 mg/l⁻¹ for 120 minutes was efficacious against *Gyrodactylus aculeati* infestation of *Gasterosteus aculeatus* and *Diplozoon paradoxum* infestation of *Abramis brama*, and that at the above concentration it was not toxic to the host fish. In contrast, in this experiment we found that levamisole solution of 20 mg/l⁻¹ concentration killed all the 20 catfish fingerlings exposed to it in 18 minutes, and that after a 10-min exposure to levamisole solution of 50 mg/l⁻¹ concentration 2 fish died and the surviving 18 remained infested by several hundred parasites per fish.

The efficacy of albendazole sulfoxide against monogeneans has fallen short of our expectations. Several variations of dose and duration were tested but none of them reduced the intensity of infestation appreciably.

Schmahl and Mehlhorn (1988) suggested that toltrazuril in a concentration of 10 µg ml⁻¹ for 4 hours was effective against *Gyrodactylus* spp., *Dactylogyrus vastator*, *D. extensus*, *D. cornu* and *Pseudodactylogyrus bini*. Their results were, however, obtained by electronmicroscopic study of drug action on the parasites' tegument, and they failed to state whether the treatment actually reduced the number of monogeneans infesting the fish. The results of our trials against *A. vistulensis* do not support Schmahl and Mehlhorn's (1988) data, as we found no improvement whatsoever in the intensity of infestation. In our experiment the actual parasitological status of the fish was evaluated after the treatment.

The components of Jaczó's solution, a preparation used in Hungary against an-

cylo-discoidosis, were tested separately. K₂Cr₂O₇ had no parasitocidal effect whatsoever even in a concentration as high as 1000 mg/l⁻¹ for 1 hour. At the same time, NH₄OH (62.5 mg/l⁻¹, 1 min), when used alone, showed good efficacy. However, complete eradication of the parasites could not be achieved with this treatment either, and the risk of reinfestation was not eliminated.

To sum up: one-min exposure to NH₄OH solution of 62.5 mg/l⁻¹ concentration was the most efficacious treatment. Due to the toxicity of the drug, strict observance of the specified exposure time is essential.

Mebendazole and praziquantel markedly reduced the intensity of infestation but as they are much more expensive than NH₄OH, their use cannot be justified. Therefore, further investigations are needed to find an effective alternative treatment.

Summary

Of the compounds tested for efficacy against *Ancylo-discoides vistulensis* monogenean infestation of the European catfish (*Silurus glanis*), exposure to NH₄OH in the form of water bath treatment proved to be the most efficacious. Exposure to solutions of mebendazole and praziquantel decreased the intensity of infestation, while water bath treatment with solutions of albendazole sulfoxide, levamisole, toltrazuril and potassium bichromate was without effect.

References

- Antalfi, A. (1958). On the sheatfish culture (in Hungarian). Halászat 5, 98.
- Buchmann, K. and Bjerregaard, J. (1989). Mebendazole treatment of pseudodactylogyrosis in an intensive eel-culture system. Aquaculture, (in press).
- Goven, A. and Amend, F. (1982). Mebendazole/trichlorophon combination: A new anthelmintic for removing monogenetic trematodes from fish. J. Fish Biol. 20, 373-378.
- Molnár, K. (1968). Die Wurmkrankheit (Ancylo-discoidose) des Welses (*Silurus glanis*). Z. Fischerei 16, 21-41.
- Sarig, S., Lahav, M. and Child, M. (1965). Control of *Dactylogyrus vastator* on carp fingerlings with dipterex. Bamidgeh. 14, 47-52.
- Schlotfeldt, H.J., Alvarado, V., Pfortmüller, K., Kooops, U. and Schmahl, G. (1988). Praziquantel als wirksame Behandlungsalternative des Kiemenwurmbefalles (Dactylogyrose) in der (Wels) Warmwasser-Aquakultur. Tierärztliche Umschau 43, 782-785.
- Schmahl, G. and Mehlhorn, H. (1985). Treatment

of fish parasites 1. Praziquantel effective against Monogenea (*Dactylogyus vastator*, *Dactylogyus extensus*, *Diplozoon paradoxum*). Zeitschrift für Parasitenkunde (Par. Res.) 71, 727-737.

Schmahl, G. and Taraschewski, H. (1987). Treatment of fish parasites 2. Effects of Praziquantel, Niclosamide, Levamisole-HCl, and Metrifonate on Monogenea (*Gyrodactylus aculeati*, *Diplozoon paradoxum*). Parasitology Research 73, 341-351.

Schmahl, G. and Mehlhorn, H. (1988). Treatment of fish parasites 4. Effects of sym. triazinone (toltrazuril) on Monogenea. Parasitology Research 75, 132-143.

Székely, Cs. and Molnár, K. (1987). Mebendazole is an efficacious drug against pseudodactylogyrosis in the European eel (*Anguilla anguilla*). Journal of Applied Ichthyology 3, 183-186.

Székely, Cs. and Molnár, K. (1988). Efficacy of the anthelmintic mebendazole against monogeneans of different fish species. Abstracts of Papers, International Symposium on Monogenea, 7-14 August 1988, České Budějovice, 58.

Author's address

Veterinary Medical Research Institute of the Hungarian Academy of Sciences 1143, Budapest, Hungária krt. 21, Hungary.