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CHEMPHYLACTIC STUDIES WITH IVERMECTIN ON BOVINE NEMATODE INFECTION

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Twenty one calves were used to confirm efficacy of ivermectin given orally against naturally acquired gastrointestinal nematodes. The calves were divided into three groups : Group I, to which two doses of ivermectin, 0.15 mg/kg and 0.2 mg/kg were given orally; Group II, to which a single dose of 0.3 mg/kg bwt was given and Group III was used as control and kept unmedicated. Faecal examination revealed that ivermectin treated calves showed a marked decrease in faecal egg counts, whereas, no significant change took place in controls. Efficacy of ivermectin at 0.2 mg/kg was 100% against *Strongyloides papillosus* and stronglyles whereas a dose rate of 0.3 mg/kg bwt was required to achieve 100% efficacy against *Neoascaris vitulorum*.

INTRODUCTION

Oral and injectable formulations of ivermectin are effective against various gastrointestinal nematodes as reported by Soll *et al.* (1988) in South Africa, Shastri (1989) in India and Zimmerman *et al.* (1991) in U.S.A. In present endeavour ivermectin is tried on buffalo and cow calves by giving oral doses of different concentrations at different intervals of time to work out the efficacy of this drug against some nematode infections.

MATERIAL AND METHODS

Twenty one calves naturally infected with *Strongyloides,* strongyles and *Neoascaris* with mean EPG (eggs per gram of faeces) 4300, 4000 and 17000 respectively were selected for the treatment. They were divided into three groups (Table I). The effect of treatment was assessed by comparing pre-treatment and post-treatment faecal egg counts for 28 days after treatment. The actual effectiveness of treatment was assessed by the percentage reduction in egg counts. Ivermectin was given orally at a dose of 0.15 mg/kg bwt to Group I, Faecal samples of the treated animals were examined from day 1-28 after treatment. Second treatment of 0.2 mg/kg bwt ivermectin was given to the same group on 28th day. To Group II, a single oral dose of 0.3 mg/kg bwt was given and faecal samples were examined from first to 28th days after treatment. Controls were also examined simultaneously.

To observe the effect of ivermectin on embryonic development of ova, 0.1 mg ivermectin was added to 1 gm faecal matter of infected calf and was put in an incubator at 37° C. The samples were examined at 6 hr intervals for 60 hrs after the treatment.

RESULTS

Regular examination of faecal samples, at 24 hr intervals, showed a drastic decrease in EPG in first 48 hrs and a gradual decrease later on till day 7, where the reduction has revealed the minimum level of EPG *i.e.* 1300 for *Strongyloides,* 1270 for strongyles and 9800 in the case of *Neoascaris*. The percentage reduction was 69.0%, 68.2% and 42.3% respectively (Table II).

After three weeks calves of Group I positive for *Strongyloides* showed the reappearance of infection However the calves infected with strongyles and *Neoascaris* did not show any significant rise in egg count. A second treatment of 0.2 mg/kg bwt of ivermectin was given 28 days after the first treatment. By examining the faecal samples it was found that EPG of *Strongyloides* and strongyles had reduced to zero in 48 hrs. Whereas that of *Neoascaris* infection had reduced to 7000 *i.e.* 58.8% only. The faecal egg counts of control calves which were also examined regularly remained almost static with marginal fluctuations.

Table I. Particulars of infected calves and mean EPG of calves treated with ivermectin.

Infection	No. of calves			Mean EPG
	Treated Group		Control Group	
	Group-I	Group-II	Group-III	
Strongyloides	3	3	2	4300 ± 50
Strongyle	2	2	1	4000 ± 50
Neoascaris	3	3	2	17000 ± 10

Table II. Reduction of EPG after repeat doses of 0.15 and 0.2 mg/kg bwt of ivermectin to Group I.

Infection	Mean EPG before treatment	Mean EPG after Ist treatment with 0.15 mg/kg bwt ivermectin	Reduction %age	Mean EPG after 2nd treatment 0.2 mg/kg bwt of ivermectin	Reduction % age
Strongyloides	4300 ± 50	1300 ± 25	69%	0	100%
Strongyle	4000 ± 50	1270 ± 20	68%	0	100%
Neoascaris	17000 ± 100	9800 ± 70	42.3%	7000 ± 50	58.8%

Table III. Reduction of EPG after single dose of 0.3 mg/kg bwt ivermectin in Group II.

Infection	Mean EPG before treatment	Mean EPG after treatment	Reduction %age
Strongyloides	4300 ± 50	0	100%
Strongyle	4000 ± 50	0	100%
Neoascaris	17000 ± 100	0	100%

To Group II, a single oral dose of 0.3 mg/kg bwt was given (Table III). The samples of treated animals were examined regularly for 20 days and their examination did not reveal the presence of ova from the 4th day onward of the treatment.

Examination of drug added faecal matter revealed that the normal embryonation of eggs was taking place and a morula stage had reached.

DISCUSSION

Recently ivermectin is widely used for eradicating the strongyle infections in cattle in many countries. Mendoza *et al.* (1987) reported that different doses of ivermectin were 100%, effective in a few days after treatment against *Cooperia punctata, Haemonchus similis* and *Trichostrongylus axei*, in Mexico. Similar results were shown against *Haemonchus placei, Oesophagostomum radiatum and Dictyocaulus viviparus* infections by Steffan & Castro (1990) in Argentina and *Ostertagia* and *Trichostrongylus axei* by Zimmerman *et al.* (1991) in U.S.A. According to Tigin *et al.* (1987) the efficacy of ivermectin was almost 100% at 50 and 100 µg/kg against strongyle infections. In South Africa Soll *et al.* (1988) too, reported 100% efficacy of ivermectin against *Bunostomum phlebotomum, Oesophagostomum radiatum, Haemonchus placei, Ostertagia ostertagi, Trichostrongylus axei* and *Cooperia pectinata* when given as a bolus, at 8 mg/day for 120 days. In present studies, ivermectin was used orally against *Strongyloides*, stronglyles and *Neoascaris* infections in cattle of Patiala region. It was found to be 100% effective at oral dose of 0.2 mg/kg bwt for the first two infections whereas a dose of 0.3 mg/kg bwt was required against *Neoascaris* to obtain

100% efficacy. Some heavily infected animals which had diarrhoea, weakness and emaciation showed an improvement in weight gains after treatment. No toxic effects were observed in the treated animals. However, ivermectin has no effect on eggs as such as embryonic development takes place normally in the drug treated faecal matter.

In the case of *Stronglyloides,* reinfection was observed after three weeks of treatment which was probably acquired from the environment. This may be the case for other nematodes also but at different intervals of time in which the new infection can be established and reaches postpatent period. So, it is suggested that repeated 0.3 mg/kg doses of ivermectin at monthly intervals should be given to completely prevent common nematode infections including *Neoascaris.*

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