

The Effect of Ivermectin Pour-On Administration Against Natural Cooperia Oncophora Infestation and its Prevalence in Cattle

¹Khayatnouri Mirhadi, ²Garedaghi Yagoob and ³Safarmashaei Saeid

¹Department of Pharmacology, Tabriz Branch, Islamic Azad University, Tabriz, Iran

²Department of Parasitology, Tabriz Branch, Islamic Azad University, Tabriz, Iran

³Tabriz Branch, Islamic Azad University, Tabriz, Iran

Abstract: One of the real problems that cause the economic prejudice in animal farms yearly is parasitic diseases. To overcome these problems the use of antiparasitic drugs is necessary. Ivermectin is a broad spectrum antiparasitic agent and different routes of its administration such as injection, oral and pour-on were used. The aims of the current study were evaluation of the efficacy of ivermectin pour-on administration against natural cooperia oncophora infection in cattle and also determination the prevalence rate of this parasite in Tabriz area. In the present study, 120 male and female hybrid cattle were investigated by LPG (larvae per gram of feces) feces test. Willis method was applied for feces test and Stoll method was used for counting nematode larvae. After confirming the infection with worms and larvae, Ivermectin (0.5 mg/kg) pour-on was administrated to infected animals. Fecal examination was repeated in 1, 7, 21 and 28 days post treatment. Results showed that total prevalence of Cooperia oncophora infection was 10% in cattle of Tabriz area. Ivermectin pour-on was 25.52, 39.16, 84.96 and 98.25% in 1, 7, 21 and 28 days respectively. In conclusion, the effect of this drug against Cooperia oncophora resulted in reduction in larval count exceeded 98% ($p < 0.05$), so this drug can be used in antiparasitic program in cattle. Further investigations are necessary to evaluate the drug effect on other nematodes and parasitic infections.

Key words: Ivermectin • Pour-on Administration • Cooperia oncophora • Cattle

INTRODUCTION

Infections with gastrointestinal nematodes are very common on cattle farms in Iran and all over the world [1]. Parasitic infections of cattle are major factors responsible for economic losses through reduction in productivity and increased mortality [2]. Parasites cause the animals to be unthrifty which may include the loss of weight, low birth weights and difficulty in kidding. Due to parasitism, the animals become susceptible to other health problems which can lead to death. However, there is substantial evidence that they can also exert important negative effects on the productivity of adult dairy cows [3]. Many researches for prevalence rate of gastrointestinal parasites all over the world have been reported but researches for effect of anti parasitic drugs by different administration ways is low and in Iran the study on present subject has not been done [4-7]. Ivermectin is a member of the macrocyclic lactone class of endectocides, commonly

referred to as ivermectins. It is labeled for the treatment of internal and external parasites in dogs, cats, horses, pigs, sheep and cattle. Subcutaneous (SC) and topical (TOP) formulations are available for use in nonlactating dairy cattle, at a dose of 0.2 and 0.5 mg/kg bodyweight (BW), respectively. Ivermectin is a highly potent broad-spectrum anthelmintic that is widely used in cattle. It is available in injectable, oral and topical formulations for use in cattle [8, 9]. The most important GI nematode responsible for considerable production losses in cattle is Cooperia oncophora [10]. Cooperia oncophora is one of the target species for ivermectin, though the topical and injectable formulations have been shown to have lower than expected efficacy against [11, 12, 13] this species. Cooperia oncophora is the dose-limiting species for ivermectin and the lower efficacy against this species may exert a high selection pressure for resistance [14]. The objective of the present study is the evaluation of the effect of ivermectin pour-on administration against natural

Cooperia oncophora nematode infections and determination of its prevalence rate in cattle. This study is the first report in Iran.

MATERIAL AND METHODS

In present study a total number of 120 dubious cattle to Cooperia oncophora infestation, from 20 different farms in Tabriz area were subjected for fecal examination and LPG. Ivermectin was administrated to treat infected animals at a dose of 0.5 mg/kg. Also pour-on form of 0.5 % Ivermectin powder in Isopropyl alcohol (weight/ volum) was made. In this study, identification of Cooperia oncophora third stage larvae was performed [15]. Before and after cattle treatment, 3 fecal samples of each animal were taken for fecal examination and larval count was recorded. Fecal examination in days 1, 7, 21 and 28 after treatment were repeated. In the present study, Willis method for fecal examination and stool method for larvae examination (LPG) were used [16, 17]. Ivermectin efficacy was calculated according to the following equation:

$$\% \text{ of drug efficacy} = P-R/P \times 100$$

R = Average number of parasite larvae in gm of fecal sample after treatment.

P = Average number of parasite larvae in gm of fecal sample before treatment.

Data were analyzed by non-parametric crosscal-walis and $P < 0.05$ was considered significant.

RESULTS

The results of present study indicated that 12 animals from a total of 120 were infected with Cooperia oncophora with a prevalence rate of 10%. Average number of enumerated larvae in infected non treated animals was 286. The average number of enumerated larvae in fecal samples after treatment with pour on Ivermectin has been shown in Table 1. Reduction percentages in larval count after 1,7,14 and 21 days of treatment with Ivermectin were 25.52, 39.16, 84.96 and 98.25 respectively (Table 1).

DISCUSSION

According to results of crosscal-walis test it is possible to determine which pour on administration of Ivermectin decreases the natural infestation of cattle with Cooperia oncophora. The efficacy rate of Ivermectin on this parasite is more than 98%. Recently, Ivermectin has different drug shapes. Half time of intra venal administration of Ivermectin with dose of 300µg/Kg in cattle is 2.8day, but in subcutaneous administration with dose of 200µg/Kg is 8day and also has been shown that the effect of sustained-release administration of this drug in cattle is more than to oral and subcutaneous administration [14]. The important base in use of antiparasitic drug is the increase of contact time of drugs with parasites rather than increase the dose of these drugs [4, 5, 7, 14, 18]. This subject has been demonstrated that Ivermectin with dose of 1mg/Kg (oral or injection) have effective antiparasitic role in veterinary. The dose of this drug in cattle for oral and subcutaneous administration is 0.2mg/Kg and for pour on administration is 0.5mg/Kg; these doses of Ivermectin have potent anthelmintic effect between 97-100% on adult form and forth stage larvae of Haemonchus, Ostertagia, Cooperia, Trichostrongylus, Strongyloides, Bonostomum, Nematodirus, Trichuris, Oesophagostomum, Dictyocaulus and Chabertia ovina and some arthropods [4, 5, 7, 14, 18]. According to findings of previous researches, tablet form of Ivermectin with dose of 0.4mg/Kg causes reduce in eggs in feces during 10 week after treatment but has not protective role for reinfection of cattle [14, 19, 20]. Subcutaneous administration of Ivermectin with dose of 0.2mg/Kg and pour on of that with 0.5mg/Kg dose, have high effective role for control of parasites, also have important protective role for reinfection in cattle. Also according to findings of researchers, administration of Ivermectin with dose of 0.5mg/Kg has high effect between 95-100% on Haemonchus, Oesophagostomum and Bunostomum [14, 19, 20] and also on Boophilus, Damalina and others arthropods [14, 17, 21-24]. Doramectin, a related drug to Ivermectin, controls natural infestation of cattle with Ostertagia and Cooperia 19 and 22 days post treatment respectively [14]. The effect of drug on most parasites is observed 14 days post

Table 1: Average number of larvae in fecal samples before and after treatment with pours on Ivermectin and percentages of larval count reduction

Before treatment	1 day after treatment	7 days after treatment	21 days after treatment	28 days after treatment
286	213 (25.52%)	174 (39.16%)	43 (84.96%)	5 (98.25%)

treatment [14]. In present study, the drug effect was observed 28 days after treatment by pour on Ivermectin administration on *Cooperia oncophora* 98.25% determined. In study by Eysker et al. indicated which drug has protective effect on cattle infected with *Cooperia oncophora* [25]. In other study by Williams et al. on comparison the effect of pour on administration of Ivermectin, Doramectin, Eprinomectin and Moxidectin, they observed that maximum and minimum effect was with Eprinomectin and Ivermectin respectively [26]. In one study on comparison the effect of suspension Albendazole, Oxfendazole and Fenbendazole with pour on Ivermectin on gastrointestinal and respiratory nematods indicated that maximum effect was with pour on administration of Ivermectin with 99.2, 98.3 and 98.1% on *Ostertagia*, *Cooperia* and *Dictyocaulus* respectively and minimum rate was with Fenbendazole (63.6, 17.7 and 39.7) and Oxfendazole (78.5, 42.1 and 32%) [27]. Gayrard *et al.*, (1999) proved that Ivermectin and Doramectin could be successfully used for control of gastrointestinal parasites in cattle [28]. Whang *et al.* reported which pour on and injection administration of Moxidectin has positive effect more than 90% on *Ostertagia* and *Cooperia* and significant different between these two types of administration were not reported [29]. In two studies by Williams et al indicated that Moxidectin has very important role for control of parasitic diseases [30, 31]. Skogerboe *et al.* and Rehbein *et al.* reported that pour on administration of Ivermectin during rain has antiparasitic effect more than 90% and rain has not specific effect on reduction the role of Ivermectin [15, 32, 33]. In fact our on administration of Ivermectin is very easy for farmers and so far, any specific side effects of Ivermectin administration have not been reported [14, 34]. Collectively, Ivermectin is very effective drug for control of gastrointestinal parasites in ruminant and its use is very easy and has not need specific tools. Effect of pour on administration of Ivermectin on other helminths and arthropods needs more studies.

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