



The Efficacy of Some Fasciolicides Against Liver Fluke Infection in Cattle

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Abstract

This study aimed to detection of the efficacy of some drugs used in the field for treatment of liver fluke infection in the cattle (*Bos taurus*) in Egypt. Treatment trials used for three groups of naturally infected animals (positive by coprological examination) with some anthelmintic drugs differ in their chemical groups (Ivomec super, Rafoxanide, and Triclabendazole) divided into three groups 10 animals in each one. The dose was repeated twice with 3 weeks in between. Animals were examined clinically and laboratory; also fecal samples were collected and examined microscopically each time for follow-up. Egg counting using (Modified Stoll's dilution technique) was done 3 times in each group (day 1, after 3 weeks post-treatment, 6 weeks post-treatment). The efficacy of the drug is measured by improved clinical state or reduction/ disappearance of Fasciola egg count. In group I (treated by Ivomec super): Egg per gram (EPG) before treatment was 800 egg/ gram and after treatment was 1280 egg/gram, Egg reduction rate (ERR) of Ivomec super was %-60. In group II (treated by Triclabendazole): EPG before treatment was 500 egg/ gram and after treatment was 80 egg/ gram, ERR of Triclabendazole was 84%. In group III (treated by Rafoxanide): EPG before treatment was 480 egg/ gram and after treatment was 160 egg/ gram, ERR of Rafoxanide was 66.6%. The anthelmintic drug wasn't effective in the treatment of Fascioliasis as no progress in the clinical status of the infected animals and the ERR was less than 90%. Our study concluded that the ERR (egg reduction rate) of used anthelmintic drugs (Ivomec super, Triclabendazole, Rafoxanide) was less than the lower limit of the effective fasciolicides drug and the drugs wasn't effective in treatment of fascioliasis.

Keywords: Anthelmintics; Cattle; Fasciola, Ivomec Super; Rafoxanide; Triclabendazole

Introduction

Undoubtedly, livestock plays a crucial role in the economy of Egypt. It improves economic status of the rural poor, and involved in a dynamic role regarding human nutrition and socio-economic evolution. Milk and meat are an important source of protein, energy, calcium and micronutrients, they furnishing 28% of protein and 13% of calories worldwide [1,2], furthermore, anaerobic digestion of animal manure is an established process for waste stabilization and renewable energy (biogas) generation [3], as well as using hide and wool in many industries. Due to improper care, unhygienic environment, climate and close contact with infected animals, they get infected with a variety of parasites. Of the parasitic diseases, helminthes infections are the most common and the most economically significant diseases among the production limiting factors that affecting grazing ruminant's worldwide [4]. Among

these, Fascioliasis (hepatic distomatosis), is one of the most significant and debilitating liver damaging diseases with a global distribution, which is responsible for considerable disease and production losses in a range of food producing species [5,6]. Fascioliasis tops all the zoonotic helminthes worldwide. It is a serious hepatobiliary disease and, therefore, dys-function of liver is the predominant physio-pathological complication that affects the total health status of the animal [7]. *Fasciola (F.) hepatica* and *F. gigantica* are the most commonly species implicated as the etiological agents of Fascioliasis [8]. *F. hepatica* is believed to be of European origin, with the lymnaeid snail *Galba truncatula* as the original intermediate host [9], whereas *F. gigantica* appears to be linked to lymnaeids of the Radix group in Africa and Asia [10]. In Egypt, both *F. gigantica* and *F. hepatica* coexist [11]. Most of mammals are definitive hosts for these parasites such as sheep, goats and cattle are the most impor-

tant animals in human environment [1]. Egypt is one of the Fascioliasis-enzootic areas in the world [12,6]. The problem arose in Egypt for several reasons: the suitability of the climate and canals for *Lymnaea* snails and their egg masses to persist throughout the year; the resistance of metacercariae for dissociation, especially with the presence of shallow water, enough vegetation and/or humidity, continued exposure of the animals to encysted metacercariae from the bank of the canals, especially during the dry season, and no restriction on animal importation, grazing habits, and movement between the infected and treated localities [13]. Medical treatment is the only treatment available for Fascioliasis [9]. Several studies had evaluated. The efficacy of different fasciolicides e.g., rafoxanide efficacy was 68.2% [14], albendazole and triclabendazole in cattle and sheep was 66.6% and 77.7%, respectively. The recovery rate of superzole and clorsulon in sheep was 88.8% and 83.3% while in cattle 66.6% and 83.3%, respectively. On the other hand; Rafoxanide was 100% and 83.3% in sheep and cattle, respectively [15]. The aim of this study to evaluate different therapeutic trials of positive cases for *Fasciola* species by using Ivomec super (Ivermectin, Clorsulon), Rafoxanide and Triclabendazole.

Materials and Methods

Animals

This work was carried out on thirty naturally infected Friesian cows (*Bos taurus*) in different villages of Aswan, Assiut governorates. In a period extended from the beginning of September 2018 to the end of August, 2019.

Inclusion criteria

All animals were positive microscopically and suffered from typical signs of fascioliasis in variable degree: recurrent diarrhea, weight loss, pale to yellow mucous membrane, alopecia, ascites, and bottle jaw.

Sampling

Fecal samples were collected directly from rectum or immediately after defecation, then put in clean plastic cups, preserved by adding formalin 10% until laboratory examination, examined microscopically by Direct smear [16], Sedimentation technique [17], Fecal egg counting technique (Modified stroll' dilution technique), [18] for identifying and counting *Fasciola sp.* egg with each time for follow up.

Drug and treatment program

Thirty naturally infected animals (cows) were distributed randomly into 3 equal groups (10 each), Treatment procedures

were carried out as follows: Group 1 (treated with Ivomec super (clorsulon 100 mg/ml + ivermectin 10 mg/ml) which administered subcutaneously (S.C) at 2 mg/kg/dose, Group 2 treated with Triclabendazole which taken orally at 12 mg/kg/dose, Group3 treated with rafoxanide which injected in different areas S.C at 10 mg/kg/dose. The dose was repeated twice 3 weeks apart, and animals examined clinically and laboratory in which fecal sample was collected and examined microscopically in each time for follow up. Egg counting was done 3 times in each group (day 1, after 3 weeks post treatment, 6 weeks post treatment). The efficacy assessment of the drugs and the result of treatment by: Improved clinical state of treated animals, reduction or disappearance of *Fasciola species* egg.

Egg per gram (EPG)

EPG in each fecal sample was calculated according to (modified stroll' dilution method) [18].

Egg reduction rate (ERR)

$$\frac{\text{mean EPG before treatment} - \text{mean EPG after treatment}}{\text{mean EPG before treatment}} \times 100\%.$$

The drug was considered effective if the result of the FECR exceeded 95% and the lower limit of the 95% confidence interval was greater than 90% as described in the WAAVP guidelines [19].

Statistical analysis

The recorded raw data were entered into Microsoft excel data base system and analyzed using SPSS version 22 statistical software. Descriptive statistics was computed. Pearson's chi-square (χ^2) was used to evaluate the association between variables (prevalence, sex and age). A 95% confidence interval and P-value less than 0.05 (at 5% level of significant P value < 0.01 considered highly significant. Statistical calculated using www.vassarstats.net.

Results

EPG: egg per gram, ERR: egg reduction rate.

In the results detected the characterized fasciola egg in the infected animals as present in the photo 1. In group I, EPG before treatment was 800 EPG and increase after 6 weeks of treatment to 1280 EPG, ERR for Ivomec super was -60%. In group II, EPG before treatment was 500 EPG and increase after 6 weeks of treatment to 80 EPG, ERR for Triclabendazole was 84%. In group III, EPG before treatment was 480 EPG and decrease after 6 weeks of treatment to 160 EPG, ERR for rafoxanide was 66.6%. The showed results present as in table 1 and figure 1

Drug	Rafoxanide	Triclabendazole	Ivomec super
Mean EPG before treatment	480 EPG	500 EPG	800 EPG
Mean EPG after treatment	160 EPG	80 EPG	1280 EPG
Egg reduction rate (ERR)	66.6%	84%	-60%

Table 1: The result of treatment of fascioliasis in ruminants by three types of anti-parasitic drugs in three groups of infected animals after 6 weeks.

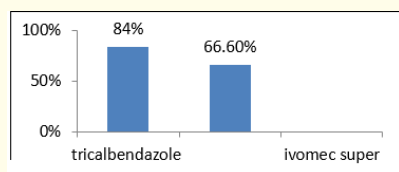


Figure 1: The Egg reduction rate (ERR) of different anti parasitic drugs.



Figure 2: Fasciola species egg in fecal sample of infected animals by 400x under microscope.

Discussion

In the our results the trial of treatment was divided into 3 groups; Group I (treated by Ivomec super), Group II (treated by Triclabendazole) and Group III (treated by Rafoxanide)

A- Group I, treated by Ivomec super (n = 10):

From data reported in table (1) and figure (1), we observed that the mean value of egg counting of Fasciola species before treatment was 800 egg/gram (EPG), after three weeks was elevated to 1520 egg/ gram and slightly decrease to 1280 egg/gram after six weeks. Egg reduction rate (ERR) for Ivomec super after 3 and 6 weeks of treatment were -90% and -60%, respectively. The result was matched with [20] who reported a resistance of Fasciola sp.

to Clorsulon as well as some authors reported that Clorsulon was effective against adult stage only [21]. While the recovery rate of Clorsulon was (66.6% and 83.3%) in sheep & cattle by [15].

B- Group II, treated by Triclabendazole (n = 10):

On parasitological level with regarding to egg counting of Fasciola sp. (Table 1 and Figure 1), improvement was observed rapidly in the group treated with Triclabendazole. The mean EPG for treated animals before treatment was 500 egg/gram then decreased to 120 egg/gram after 3 weeks of treatment and finally dropped to 80 egg/ gram after 6 weeks of treatment. Egg reduction rate (ERR) was 84% after 6 weeks of oral administration of the drug. Triclabendazole wasn't effective in treatment of fascioliasis as ERR was lower than the lowest limit of efficacy (> 90%) according [19]. Our result was matched with [22] and [23] who recorded a resistance of liver fluke in cattle and sheep for some fasciolicides as tricalbendazole. Percentage of recovery of triclabendazole in cattle and sheep was (66.6% and 77.7%) [14]. On the contrary, Triclabendazole was highly effective against Fascioliasis, FECR% was 100% by day 14 post-treatment [24,25].

C- Group III, treated by Rafoxanide (n = 10)

From data in table 1 and figure 1, we found that the mean value of EPG on zero day of treatment was 480 egg/gram then decreased to 200 egg/gram after 3weeks of treatment and 160 egg/gram after 6 weeks of treatment. Egg reduction rate (ERR) after 6 weeks of treatment was 66.6%. Rafoxanide wasn't effective in treatment of fascioliasis as ERR was lower than the lowest limit of efficacy (> 90%) according [19]. Our result was coincided with [14] who mentioned that the efficacy of rafoxanide was 68.2% and [24] who reported a low efficacy of Rafoxanide with faecal egg count reductions between 75% and 80.58%, over a period 7-84 days' post-treatment. While [15] mentioned that the recovery rate of Rafoxanide was 100% and 83.3% in sheep and cattle, respectively. The result of our treatment trials indicated that the egg reduction rate of Triclabendazole, Rafoxanide and Ivomec super were 84%,

66.6%, and -60%, respectively after 6 weeks of treatment (Table 1 and Figure 1). According to [19], the anthelmintic drugs were not effective in treatment of liver flukes, this result may be attributed to the resistance of *Fasciola* sp. to anthelmintic drugs as the drugs are not effective in killing all stages of *Fasciola* sp. (especially with using of Triclabendazole and Rafoxanide, their administration decreased the egg count number but the eggs did not disappear, this may be referred to that Triclabendazole and Rafoxanide affect only the adult stages of *Fasciola* species while the immature stages developed to reach adult stages). The treatment of *Fasciola* sp. may need more doses of drug and long time or low quality of the anthelmintic drugs in the markets or improper administration usage of drugs by the workers. Moreover, the result in the current study was matched with [26] who reported that in sufficient effectiveness of anthelmintic in general, and fasciolicidal compounds in particular which could be due to the development of resistance.

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Competing of Interest

The authors declare that they have no competing of interests.

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