Prevalence of helminths and efficacy of anthelmintics against nematodes in naturally infected sheep in Jeldu district, Oromia Regional State, Ethiopia

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SUMMARY

A study was conducted to determine the prevalence of helminths in sheep and to evaluate the efficacy of one brand of albendazole, two brands of tetramisole and one brand of tetraclozan against nematodes of sheep in Jeldu district, west Showa Zone of Oromia Regional State, Ethiopia. Coprological investigation revealed that sheep in the district were infested by a variety of helminth parasites; 67.4% with Strongyle, 20.2% with Moniezia, 11.63% with Fasciola, 8.5% with paramhistomum and 0.8% with Trichuris parasites. Based on their initial fecal egg count, animals were allocated into four treatment groups: albendazole (Albendazole 300mg, Chengdu Qiankun Vet. pharmaceuticals Co. Ltd, China), tetraclozan (Rangtetra-600, Cipla Ltd. Mumbai Central, India), tetramisole (Chengdu Qiankun Vet. pharmaceuticals Co. Ltd, China), tetraclozan. (Tetracozash-900, Ashish Life Science Pvt. Ltd., India) and untreated control group of 15-16 animals per each group with a uniform mean fecal egg count (FEC) and treated with the respective drugs according to the manufacturers recommendation. Fecal egg count reduction test (FECRT) was used to determine the efficacy of each anthelmintic drug 10 days post treatment. In spite of complaints of reduced efficacy by some sheep owners, all of the anthelmintics tested in the current study were found to be highly effective and reduction of 98.77-100% FEC of nematode parasites was recorded. Proper dosing, anthelmintic rotation and the selective treatment of those individuals that are most affected is recommended to maintain the long term efficacy of these drugs.

Keywords: Albendazole, efficacy, Ethiopia, helminths, Prevalence, sheep, tetramisole.

Introduction

In Ethiopia, small ruminants represent an important component of the farming system, providing approximately 12% of the value of livestock products consumed at farm level as well as 48% of the cash income generated. Small ruminants provide 46% of the value of national meat production and 58% of the value of hide and skin production and are an integral part of production systems in which they serve various functions [20]. In spite of this huge livestock resource, their productivity is very low [1]. This decreased productivity is the result of a combination of factors including poor nutrition, health and management practices. Disease is an important factor responsible for decreased productivity of sheep and accounts for 30% and 20% mortalities in lambs and adults, respectively [16]. Helminth parasites are one of the most economically important diseases affecting sheep productivity in the country [4]. Sheep are host to a multiple species of parasitic helminths that cause varying degrees of disease, ranging from chronic forms associated with diarrhea, anemia and weight loss to highly acute infections resulting in sudden death [3]. Infection with helminth parasites results in clinical and sub-clinical diseases causing low productivity due to stunted growth, insufficient weight gain, poor feed utilization and mortality [3, 19].
The prevalence of different helminth parasites has been studied in different parts of the country [4; 14]; however, the prevalence and impact of helminth parasites as well as their sensitivity to the commonly used anthelmintics have not been studied in some parts of the country like Jeldu district. The current study was conducted to investigate the prevalence of the major helminth parasites of sheep in Jeldu district, and to evaluate the efficacy of selected anthelmintics commonly available in Ethiopian markets against nematodes in naturally infected sheep in the study area.

Materials and Methods

STUDY AREA

The study was conducted in Jeldu district; West Showa Zone of Oromia Regional State, located 125 km west of Addis Ababa. This is predominantly highland area with a few midland and lowland areas. Farming in the district is mixed and involves both livestock and crop production. According to the information obtained from the Office of Jeldu District Livestock Agency, the population of small ruminants in the district is 67,581 of which 47,235 are sheep and 20,346 are goats. Specific study sites chosen were Chilanko, Edesa Gelan and Kilbe Peasant Associations (PAs) which are located at the radius of 10-15 km from the Gojo town in different directions. The three PAs were purposively selected based on their accessibility, high sheep population and the historical use of anthelmintics depending on information obtained from the district veterinary personnel.

STUDY ANIMALS AND TREATMENT

For the prevalence study, a total of 129 animals of all age groups and both sex (45 from Edesa Gelan; 51 from Kilbe; and 33 from Chilanko PAs) were randomly selected from different flocks owned by different farmers. The animals were then ear-tagged for identification purpose. The criteria for inclusion in the trial were flock size of greater than or equal to 10 sheep, history of anthelmintic usage and farmers' willingness. For anthelmintic efficacy study, animals from the three PAs were selected out of the total animals used in prevalence study. Animals with eggs per gram (EPG) count of greater than or equal to 200 in prevalence study were selected. All animals selected for anthelmintic efficacy trial from the three PAs were allocated into 5 groups of 15-16 animals each by blocking using FEC conducted before treatment so that the mean FEC per each group was nearly uniform. Each group was then randomly allocated into one of the four anthelmintic groups and one untreated control group. Animals in each treatment group were treated by respective drugs according to manufacturers’ recommendation.

The anthelmintics used in the present study were bought from the retail markets and composed of three drug classes. Table 1 summarizes the anthelmintic brands used, the manufacturers and the manufacturers’ recommended doses. The animals were treated with the respective anthelmintics dosage as per the recommendations of the manufacturers according to the weight of each individual animal.

SAMPLE COLLECTION AND LABORATORY INVESTIGATION

Identification of helminth eggs was performed using simple floatation and sedimentation techniques. The quantitative fecal egg count used the McMaster egg count technique [9]. The degree of severity of infection was also estimated according to Hansen and Perry [9].

DATA ANALYSIS

The prevalence of the different genera of helminth parasites was determined by dividing the number of positive animals by number of total animals examined and multiplying by 100. The prevalence rate of parasites in the three localities was compared using chi-square. Efficacy of anthelmintics was calculated using arithmetic mean of FEC of the treated and untreated animals [6]. E = \[1 - (T/C)\] * 100, where E = percentage efficacy; C = mean number of eggs in the control group; T = mean number of eggs in the treated group.

Results

Comparative prevalence of helminth parasites of sheep in the three PAs of Jeldu district and the overall prevalence in the district is presented in Table 2. Strongyle type nematodes

<table>
<thead>
<tr>
<th>Drug class</th>
<th>Generic name</th>
<th>Trade name</th>
<th>manufacturer</th>
<th>Dose (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzimidazole</td>
<td>Albendazole</td>
<td>Albendazole 300mg</td>
<td>Chengdu Qiankun Vet. pharmaceuticals Co. Ltd, China</td>
<td>7.5</td>
</tr>
<tr>
<td>Imidazothiazole</td>
<td>Tetramisole</td>
<td>Rangtetra-600</td>
<td>Cipla Ltd. Mumbai Central, India</td>
<td>15</td>
</tr>
<tr>
<td>Imidazothiazole</td>
<td>Tetramisole</td>
<td>Duxam 600</td>
<td>Chengdu Qiankun Vet. pharmaceuticals Co. Ltd, China</td>
<td>15</td>
</tr>
<tr>
<td>Imidazothiazole +</td>
<td>Tetramisole +</td>
<td>Tetracoosh-900</td>
<td>Ashish Life Science Pvt. Ltd., India</td>
<td>15*</td>
</tr>
<tr>
<td>salicylanilide</td>
<td>Oxyclozanide</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*7.5 mg tetramisole and 7.5 mg oxyclozanide.

Table I: Details of the anthelmintic drugs used in the current study.
were most prevalent in Edesa Galan followed by Kilbe and least prevalent in Chilanko PA. The prevalence of Fasciola spp. is relatively similar in Chilanko and Kilbe PAs while very low prevalence was recorded in Edensa Galan PA. The prevalence rate of all parasites were not significantly different among the 3 PAs except for strongyle type nematodes which was significantly higher \((P<0.05)\) in Edesa Galan compared to the other two PAs.

Table 3 shows the state of severity of nematode parasite infection as reflected by fecal egg count of strongyle type nematodes. The results of the study showed that a majority (60%) of the infected sheep had a mild infection whereas only 32% of the positive sheep had a severe infection with strongyle type nematodes shedding greater than 1200 eggs per gram of faeces.

The mean FECs of groups of sheep before and after treatment with different anthelmintics are shown in Table 4. All drugs except Tetracozash-900 resulted in a 100% reduction in FEC 10 days post treatment. The percentage reduction of FEC for Tetracozash-900 was 98.77%.

**Discussion**

The current work has shown that helminth parasites of sheep especially nematodes are highly prevalent (67.4%) in Jeldu district. Some of the sheep have been observed to shed large number of strongyle eggs (12,300 eggs). More than 32% of the infected sheep were shedding greater than 1200 eggs per gram of faeces which is an indication of heavy infection with nematode parasites; this can cause emaciation and decrease in productivity. Moniezia (20.2%) and Fasciola spp. (11.6%) are the next most prevalent parasites in the area. There is a significant difference in the prevalence of most of the helminths among the three PAs. The most probable reason for this is the difference in microclimates of the localities. For example, Kilbe and Edesa Galan have some marshy focal areas which are environments conducive for the development of intermediate host of Fasciola and Paramphistomum spp. This might account for the high prevalence of Fasciola and Paramphistomum spp. in these areas compared to that of Chilanko PA.
All of the anthelmintics tested in the current study showed FECR ranging from 98.8 to 100%. This finding shows that the drugs used in the current study can be categorized as highly effective against nematode parasites of sheep in the study area [21]. The fact that some of the sheep owners complained lack of production improvement post treatment despite history of frequent deworming led us to suspect the emergence of anthelmintic resistance. However, our finding justified that the parasites are still susceptible to the evaluated anthelmintics. The cause for decreased productivity could be non-helminth factors such as nutritional or other diseases. The reason why anthelmintics are still working in the area in spite of frequent treatment could be farmers are either deworming only severely infected animals from the flock or even when one treats all animals in his flock frequently, the risk of spread of resistance is minimal because frequently treated and untreated animals are usually kept in communal grazing area.

So far, anthelmintic efficacy studies conducted in nematodes of sheep and goat owned by smallholder farmers in different parts of Ethiopia have revealed similar findings [2, 5, 12, 13, 15, 18]. Despite its escalating prevalence in several countries of the world, especially in small ruminants [7, 10], anthelmintic resistance is not yet a serious problem in Ethiopia, and there are only few reports merely from the University farms [8, 11, 17]. Proper dosing, anthelmintic rotation and selective treatment of those individuals that are most affected is recommended to maintain the long term efficacy of these drugs.

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References


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