Evaluation the effect of albendazole against nematodes in sheep in Mosul, Iraq

E. K. Mohamed and M. I. Al-Farwachi

Department of Internal and Preventive Medicine, College of Veterinary Medicine, University of Mosul, Mosul, Iraq

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Abstract

Six sheep farms in Mosul city, Iraq randomly selected, were surveyed for gastrointestinal nematodes resistant to Albendazole. On each of 6 sheep farms, 20 lambs were randomly distributed into two equal groups untreated control group, and albendazole (benzimidazole) group (10 mg/kg BW). Faecal egg counts and larval cultures were done at 7, 14, and 21 days after anthelmintic treatment. Resistance was apparent for albendazole on 4 farms out of 6 (66.7%). Post-treatment larval cultures indicated: Strongyloides papillosus, Marshalligia marshalli, Nematodirus spathiger and Haemonchus contortus.

Keywords: Albendazole; Nematodes; Sheep

Introduction

Parasitism, and gastrointestinal nematode parasitism in particular, is arguably the most serious constraint affecting small ruminant production worldwide. Economic losses are caused by decreased production, cost of prevention, cost of treatment, and the death of infected animals (1). Intensification of animal production has led to an increasing reliance on effective anthelmintic drugs to control helminth diseases. Regular suppressive dosing of susceptible animals has been shown to result in the development of resistance in sheep nematodes (1,2). Resistance to anthelmintics is usually first recognized by a clinical failure in response to anthelmintic therapy and by the persistence of positive faecal egg counts, or the presence of worms following treatment (3). Resistance to anthelmintics in a range of sheep gastrointestinal helminths has been reported from several countries (4). Resistance has been reported most frequently in Haemonchus contortus and it can involve benzimidazole, salicynilides, levamizole, morantel and ivermectin. In Europe, resistance in sheep nematodes has been reported from several countries including France (5). Ivermectin resistant Haemonchus contortus in Louisiana lambs in U.S.A. (6), and benzimidazole resistant to
strongly of sheep in Nigeria (7) have been reported. In Iraq, there are few reports of anthelmintic resistance in gastrointestinal nematodes of small ruminants. The current study was designed to examine resistance of nematodes to albendazole in a sample of randomly selected sheep farms in Mosul city (Iraq).

Materials and Methods

Six sheep farms located in Mosul city (Iraq) were randomly selected for this study. Most of the sheep originated from the northern part of Mosul city. No history of anthelmintic usage and other management procedures could be ascertained from the owners.

The general procedure to detect anthelmintic resistance in nematodes was that recommended by the World Association for the Advancement of the Veterinary Parasitology (WAAVP) (8). None the tested animals had received any anthelmintic treatment for at least 6 weeks prior to the start of the study. ON each of the six sheep farms, 20 lambs from both sexes, 2 to 6 months old, were selected, individually identified, and randomly distributed into 2 equal groups. The untreated control group and Albendazole group (Albendazole 2.5% suspension, Al-Salam Factory for drug production, Baghdad, Iraq) given orally at 10 mg/ kg BW.

Seven, 14 and 21 days after anthelmintic treatment, individual faecal samples were taken once from all the animals and processed for faecal egg counting by a modified McMaster technique in which one counted egg equated to 50 eggs per gram of faeces (epg) (9). The mean faecal egg count reduction (FECR) was determined using the formula (8):

\[
\text{FECR} = \left[1 - \frac{\text{epg}_t}{\text{epg}_c}\right] \times 100.
\]

According to WAAVP recommendations (8,10) resistance is present if:
1- The percentage reduction in egg count is less than 95% and,
2- The lower limit of the 95 % confidence intervals is less than 90 %.

On farms where anthelmintic resistance was detected, a group larval culture was performed to assess the percentage of nematode genera Strongyloides papillosus, Marshalligia marshalli, Nematodirus spathiger and Haemonchus contortus by counting at least 100 third-stage larva (L3).

Table 1: Number (mean ± SE) for fecal egg count (egg per gram), percentage of fecal egg count reduction (FECR) after treatment with albendazole (10 mg/kg,orally) in sheep farms.

<table>
<thead>
<tr>
<th>Days</th>
<th>Control (epg)</th>
<th>Albendazole (epg)</th>
<th>FECR %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3100 ± 14</td>
<td>2800 ± 17</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>4700 ± 12</td>
<td>1300 ± 12</td>
<td>72.3</td>
</tr>
<tr>
<td>14</td>
<td>4870 ± 15</td>
<td>3000 ± 17</td>
<td>38.4</td>
</tr>
<tr>
<td>21</td>
<td>5200 ± 13</td>
<td>4100 ± 12</td>
<td>21.0</td>
</tr>
</tbody>
</table>

Significantly different from day 0 value at p < 0.05.

Table 2: Post treatment larval cultures (in %) in sheep farms after seven days

<table>
<thead>
<tr>
<th>Farms</th>
<th>S. papillosus</th>
<th>H. contortus</th>
<th>M. marshalli</th>
<th>N. spathiger</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>90</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>67</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>83</td>
<td>4</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>78</td>
<td>17</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

Discussion

The results of this study indicate that low levels of albendazole are effective against nematodes of sheep in the 4 farms out of 6 sheep farms examined. Anthelmintic resistance is suspected in these farms. However, benzimidazole resistance has been described earlier in sheep farms in the many countries (11-13). The control of nematode parasites traditionally relies on grazing.
management, anthelmintic treatment, or both. However, grazing management schemes are often impractical due to expense or to the hardiness of infective larvae on pasture. In addition, the evolution of anthelmintic resistance in nematode populations threatens the success of drug treatment programs (1). Benzimidazole were thought to bind to parasite tubulin and the loss of this binding in benzimidazole resistant isolates of sheep parasites with alterations in the β tubulin isotype distribution in these compared with susceptible worms were decisive in confirming the mechanism of action of the benzimidazole drugs as well as their mechanism of resistance (14). There are two main reasons for the very high prevalence of albendazole resistance in sheep nematodes in this survey. First albendazole drugs were used very frequently (> 5 annual treatments) when compared with control practices in neighbouring Germany with only 2 or 3 treatments per year (15), secondly albendazole compounds were by far the most frequently used anthelmintic due to, it is a very cheap than other anthel-mintic families. The repeated and exclusive use of albendazole products obviously led to the development of resistant nematode strains (16,17) whereas the impact of a continuous suboptimal dosage is more controversial (12,18). Post-treatment larval cultures indicated Strongyloides papillosus was the predominant larval type in 3 farms, where as Haemonchus contortus was the dominant genus in one farm. Albendazole resistance was mostly multispecific i.e developing on one farm in several species of nematodes with the resistant nematode genera involved being Teladorsagia, Trichostrongylus, Haemonchus, Cooperia. In other European countries benzimidazole resistance in sheep was more often related to Haemonchus contortus in Belgium (19) and to Teladorsagia circumcincta in Great-Britain (8).

Acknowledgments

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References

17. Margo H. Manging internal parasite in sheep and goats. NCAT Agriculture Specialist 2006: 289-293.