EFFICACY OF VALBAZEN (ALBENDAZOLE) AGAINST GASTRO-INTESTINAL NEMATODES IN GOATS

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ABSTRACT

Efficacy of Valbazen against gastro-intestinal nematodes was evaluated in 48 naturally infected goats, divided into A and B groups (n=24 each), which were further sub-divided (n=8 each) into A-I and B-I (Pure Haemonchus contortus), A-II and B-II (mixed infection with H. contortus), and A-III and B-III (mixed infection without H. contortus). Group A, was treated with Valbazen, while group-B served as positive control. The eggs per gram (EPG) were determined at day zero, 3, 7, 10 and 14 post-treatment. The EPG counts significantly (P<0.05) decreased from 4787.5 (day zero) to 1425; and 543.8 in A-I, from 1050 to 350 and 125 in A-II and from 856.3 to 375 and 100 in A-III at day 10 and 14, respectively. The study indicated significant increase (P<0.001) in PCV percentage at day 14, i.e., 29.19±1.5; 28.6 ±2.4 and 27.1 ± 2.5, in group, A-I, A-II and A-III, respectively. The Hb concentration increased significantly in treated goats as compared to control group on day 14 post treatment.

Keywords: epg, goat, concentration, nematodes, PCV, Valbazen

INTRODUCTION

There are 1005.80 million goats world-wide producing about 17.84 million tons of milk and 5.30 million tons of meat. The goat population in Pakistan is 64.9 million heads, which produces about 0.78 million tons of milk and over 0.29 million tons of mutton. In addition, goats provide hair, leather and manure (FAO, 2015). Gastro-intestinal helminths cause production losses, weight loss and mortality in small ruminants (Chaudary et al. 2007). Gastro-intestinal nematodes (GINs) such as Haemonchus contortus,, Trichostrongylus spp., Strongyloides papillosus, Oesphagostomum columbainum, Oestertagia spp., Trichurisovis, Bunostomum spp., Chabertiaovina, Nematodirus spp., Cooperia spp., are most common in Pakistan (Raza et al., 2007; Ijaz et al., 2008). The helminths cause adverse
effects on the host like haematological and biochemical disturbances, loss of body weight and huge economic losses (Iqbal et al., 1993). The use of chemicals for the treatment and control of GIT parasites is widely practiced throughout the world (Terrill et al., 2001; Ancheta et al., 2004). The control of GI nematodes through drugs is becoming difficult as a consequence of the development of resistant nematode population to most commonly used anthelmintics (Coles, 2002). The aim of present study was to determine the present day efficacy of Valbazen against naturally occurring GINs of goats.

MATERIALS AND METHODS
Field trials were conducted on small farmer goat farms around Tandojam and Livestock farm, Sindh Agriculture University, Tandojam, Pakistan. Climatically, the study area is sub-tropical humid area with average annual rainfall of about 129 mm. The average maximum temperature reaches 40.8°C in May and minimum 7.9°C in January. The relative humidity is highest (73 %) in the month of August and lowest (50%) in the month of April. Forty eight goats (6 months to one year of age) were selected randomly on the basis off aecal egg count and were divided into 02 groups i.e., A and B with 24 goats in each group. Both groups were further sub-divided into A-I and B-I (Pure Haemonchus contortus), A-II and B-II (Mixed infection with H. contortus), and A-III and B-III (Mixed infection without H. contortus) with 8 animals in each sub-group. Animals in group A, were treated with Valbazen (Pfizer, Pakistan Pvt. Ltd.) orally at the rate of 1 ml/20 kg body weight, while Group-B was kept as positive control to monitor time related changes.

Faecal and blood samples were collected from each animal at 0 day (pre-treatment) and at 3rd, 7th, 10th and 14th day (post-treatment). The EPG were determined by modified McMaster technique, (Urquhart et al., 1996). The gastrointestinal nematode eggs were identified by the culture of positive faecal samples, recovery and identification of L3 Larvae of different species of gastrointestinal nematodes were carried out according to the techniques described by MAFF (1986), Baermann technique (1917), respectively. The estimation of anthelmintic efficacy was carried out according to the field controlled faecal egg count reduction test (Coles et al., 1992; Taylor et al., 2002; Coles et al., 2006). The reduction percentage of faecal egg counts (FECR) was calculated by the following formula:

% FECR =a-b/a×100.

Where, a = EPG pre-treatment, and b = EPG post treatment.

For determination of haematological values (i.e. packed cell volume; PCV %, haemoglobin concentration (Hb g/d) the blood samples were collected in vial with EDTA and analyzed by using the automatic cell counter (A²T diff analyzer, Beckman Counter, Mervue, Galwat, Ireland).

Statistical analysis
Results were expressed as mean ± SD, and were analysed through ANOVA followed by Tukey’s Test. Statistical significance was set at P< 0.05 marginally. GraphPad Instat V3.05 was used for data analysis.
RESULTS AND DISCUSSION
The goat producers are facing increasing problems due to the rapid spread of anthelmintic resistance. Efficacy of the drug is one of the most important steps in establishing and maintaining the effective parasite control of nematode parasites of livestock particularly for small ruminants. The faecal egg count reduction test (FECRT) is the test of choice to detect problems of anthelmintic efficacy, because it uses few resources, is easily performed and is applicable in the evaluation of the performance of any anthelmintic under field conditions. The experiments were conducted to determine the efficacy of Valbazen under field conditions against gastro-intestinal nematodes (GINs) in goats.

The results of FECRT were interpreted according to WAAVP (World Association for the Advancement of Veterinary Parasitology) recommendations (Coles et al., 1992) for efficacy evaluation of the anthelmintics. The mean EPG and reduction percentage in faecal egg counts of goats treated with Valbazen at the rate of 1 ml/ 20kg body weight are presented in the Table 1. A significant ($P<0.05$ and $P<0.001$) reduction in EPG counts was noted at $10^{th}$ and $14^{th}$ days post-treatment. The administration of Valbazen against pure $H. contortus$ infection induced significant ($P<0.05$ and $P<0.001$) EPG reductions on day $10^{th}$ and $14^{th}$ post-treatment. The EPG values decreased from 4787.5 to 1425 and 543.8 on $10^{th}$ and $14^{th}$days i.e., 70.2 and 88.6 percent, respectively. The administration of Valbazen against mixed infection (with $H. contortus$ and without $H. contortus$) induced significant ($P<0.05$, $P<0.001$ and $P<0.0001$) EPG reductions. The EPG values decreased from 1050 to 350 (66.7%) and 125 (88, 1%) and from 856.3 to 375 (56.2%) and 100 (88.3%) on $10^{th}$ and $14^{th}$ days, respectively. It is obvious from the results that pre-treatment EPG counts of untreated infected group (control) did not show a significant ($P>0.05$) change on $3^{rd}$, $7^{th}$, $10^{th}$ and $14^{th}$ days. The efficacy percentages observed during present study are lower than 95%, of WAAVP’s recommendation for suspicion of resistance (Coles et al., 1992). The findings of the present study are not in agreement with the observation of other workers, (Keyyu et al., 2002; Waruiru, 2002; Islam, et al., 2003; Munyua et al., 2004), who have reported 97%, 100%, 90.11% and > 96% reduction in faecal egg count. It can be assumed that the low efficacy of Valbazen may be due to the extensive use of the drug, perhaps alone or in combination for control of gastro-intestinal nematodes. Another possible reason may be the inefficiency of Valbazen in removing the immature population of nematodes (Grimshaw et al., 1996; Waruiru et al., 2003). In addition, this may be due to the fact that the dose recommended for goat may not be sufficient to treat for these parasite species. This study indicates that the gastro-intestinal nematodes may have developed the resistance against Valbazen (Albendazole) mainly due to longer and more frequent use of the drug.

Parasitism invariably affects the health and productivity of animals. The examination of blood can provide significant information (Hafeez, 1996). The main objective of this haematological study was to determine the effect of commercial drug (Valbazen) on some haematological values i.e., PCV and Hb concentration. The mean PCV % of goats treated with Valbazen (1 ml/20 kg, body weight), in field and of untreated positive control group presented are in Table 2. The results revealed that the mean values of PCV of animals treated with Valbazen, remained non-significant from the 0 day to 7th day post treatment. On
the 10th and 14th day, post treatment there was significant \( (P < 0.05) \) increase in PCV in all treated groups compared with untreated group (control). The results of the present study are in agreement with the findings of many workers (Gauly and Erhardt, 2002; Islam et al., 2003; Amarante et al., 2004; Chaudary et al., 2007; Yacob et al., 2008; Pandit et al., 2009; Walkden-Brown et al., 2008; Qamar, 2009; Marshall et al., 2012; Qamar and Maqbool, 2012; Njidda et al; 2013;) who have conducted studies on the effect of drugs on PCV values of goats, naturally infected with gastro-intestinal nematodes and reported that the values of PCV \( (%) \) were significantly different in goats before and after treatment.

### Table 1. Mean ± SD of eggs per gram (EPG) and reduction percentage of different species of gastro-intestinal nematodes in goats before and post-treatment with Valbazen.

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of goats</th>
<th>Nematode species</th>
<th>Pre-treatment</th>
<th>Post-treatment (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>0 days</td>
<td>3rd</td>
</tr>
<tr>
<td>A-I</td>
<td>8</td>
<td>H. contortus (pure)</td>
<td>4787.5</td>
<td>3825±6.5 (20.1)</td>
</tr>
<tr>
<td>B-I</td>
<td>8</td>
<td>Control</td>
<td>4912.5</td>
<td>4975 ± 0 (1.27)</td>
</tr>
<tr>
<td>A-II</td>
<td>8</td>
<td>Mixed infection (with H. contortus)</td>
<td>1050</td>
<td>862.5±3.3 (17.8)</td>
</tr>
<tr>
<td>B-II</td>
<td>8</td>
<td>Control</td>
<td>837.5</td>
<td>837.5±6.7 (0)</td>
</tr>
<tr>
<td>A-III</td>
<td>8</td>
<td>Mixed infection (without H. contortus)</td>
<td>856.25</td>
<td>743.75±4.4 (13.1)</td>
</tr>
<tr>
<td>B-III</td>
<td>8</td>
<td>Control</td>
<td>962.5</td>
<td>937.5±9.54 (-2.60)</td>
</tr>
</tbody>
</table>

\* \( P < 0.05 \), \** \( P < 0.01 \), \*** \( P < 0.001 \)

Note: Figures in parentheses indicate the percentage

The mean Hb concentration of goats treated with Valbazen against the three categories of infection (BI, BII and BIII) are presented in Table 3. The results revealed that the mean haemoglobin (Hb) concentration of goats treated with Valbazen, against BI, BII and BIII remained non-significant on the day 0, 3rd and 7th post treatment. On the 10th and 14th day post treatment there was significant \( (P < 0.05) \) increase in Hb concentration in all treated groups compared with untreated group (control). The findings of the study are in agreement with results of other researchers (Chaudary et al., 2007; Walkden-Brown et al., 2008; Qamar, 2009; Marshall et al., 2012; Qamar and Maqbool, 2012; Njidda et al. 2013). The increases in PCV \( (%) \) and Hb concentration of treated goats may be due to the elimination of worms, particularly, \( H. \ Contortus \) nourishing on the red blood cells of the goats. In heavy infections, an infected goat can bleed to death within hours.
Table 2. Mean and ±SD of PCV (%) of goats before and post- treatment with Valbazen

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of goats</th>
<th>Nematode species</th>
<th>Pre-treatment</th>
<th>Post-treatment (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>0 days</td>
<td>3rd</td>
</tr>
<tr>
<td>A-I</td>
<td>8</td>
<td>H. contortus (pure)</td>
<td>23 ± 1.7</td>
<td>23 ±1.7</td>
</tr>
<tr>
<td>B-I</td>
<td>8</td>
<td>Control</td>
<td>22 ± 2.8</td>
<td>21 ±2.2</td>
</tr>
<tr>
<td>A-II</td>
<td>8</td>
<td>Mixed infection (with H. contortus)</td>
<td>22 ± 2.8</td>
<td>22.1±2.5</td>
</tr>
<tr>
<td>B-II</td>
<td>8</td>
<td>Control</td>
<td>23 ± 1.7</td>
<td>23 ±1.7</td>
</tr>
<tr>
<td>A-III</td>
<td>8</td>
<td>Mixed infection (without H. contortus)</td>
<td>22 ± 2.7</td>
<td>22.2±2.0</td>
</tr>
<tr>
<td>B-III</td>
<td>8</td>
<td>Control</td>
<td>22 ± 2.7</td>
<td>21.6±2.4</td>
</tr>
</tbody>
</table>

* = P< 0.05 , ** = P< 0.01, ***= P< 0.001

Table 3. Mean and ±SD of Hb concentration (g/dl) of goats before and post- treatment with Valbazen

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of goats</th>
<th>Nematode species</th>
<th>Pre-treatment</th>
<th>Post-treatment (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>0 days</td>
<td>3rd</td>
</tr>
<tr>
<td>A-I</td>
<td>8</td>
<td>H. contortus (pure)</td>
<td>9.0 ± 0.8</td>
<td>9.2 ± 0.8</td>
</tr>
<tr>
<td>B-I</td>
<td>8</td>
<td>Control</td>
<td>8.8± 0.6</td>
<td>8.8 ± 0.6</td>
</tr>
<tr>
<td>A-II</td>
<td>8</td>
<td>Mixed infection (with H. contortus)</td>
<td>8.8 ± 0.6</td>
<td>9.0 ±0.7</td>
</tr>
<tr>
<td>B-II</td>
<td>8</td>
<td>Control</td>
<td>8.7± 0.8</td>
<td>8.6± 0.7</td>
</tr>
<tr>
<td>A-III</td>
<td>8</td>
<td>Mixed infection (without H. contortus)</td>
<td>8.5 ± 0.9</td>
<td>8.9 ± 0.8</td>
</tr>
<tr>
<td>B-III</td>
<td>8</td>
<td>Control</td>
<td>8.8 ± 0.6</td>
<td>8.8 ± 0.6</td>
</tr>
</tbody>
</table>

* = P< 0.05 , ** = P< 0.01,

CONCLUSION
The results of the present study show that Valbazen is less efficacious against gastro-intestinal nematodes in goats and the efficacy percentages observed are lower than 95%, of WAAVP’s recommendation for suspicion of resistance. Hence, farmers and veterinary professionals should consider the poor efficacy of anthelmintics as a serious problem and the routine diagnosis of infections by GIT nematodes should be complemented by standardized efficacy evaluation techniques. Further studies, however, are needed to assess the efficacy status of Valbazen in different, animal species, and management systems.

REFERENCES


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