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Assessment of albendazole efficacy in goats with subclinical gastrointestinal nematode infection

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Abstract

The study was designed to determine the current status of albendazole efficacy in goats belonging to the goat unit of village Chharchhed, Block Kasdol, District Balodabazar-Bhatapara, Chhattisgarh. A group of 15 adult goats was selected and subjected to fecal egg count (FEC) estimation in terms of EPG (eggs per gram), followed by hematological examination. The mean EPG value of the animals was 356.7 ± 15.33 , which did not indicate severe infection but showed an alarming status and could be considered a subclinical form of infection. Following the initial EPG and hematological assessment, the animals were treated with albendazole at a dose of 7.5 mg/kg body weight. After a specified time interval, EPG and hematological examinations were performed again. The results revealed a significant reduction ($p < 0.01$) in the EPG values of the animals after treatment compared to before treatment. Moreover, blood parameters such as hemoglobin (Hb), total erythrocyte count (TEC), and packed cell volume (PCV) also showed significant differences ($p < 0.01$) between the pre- and post-treatment values. The findings indicate that albendazole can still be effectively used as a drug of choice against nematode infections in goats.

Keywords: Goats, GIT nematodes, EPG, hematology, albendazole

Introduction

The domestic goat is among the earliest animals domesticated by humans and is distributed worldwide, with higher concentrations in tropical regions and dry zones. Goats are excellent meat producers for human consumption due to their short generation intervals and the absence of religious taboos associated with their meat. Moreover, goat meat is a rich source of protein and can help bridge the gap of protein malnutrition among consumers (Di Cerbo *et al.*, 2010; Maingi *et al.*, 1993) [3, 9].

Goat production occupies an important niche in sustainable agriculture in developing countries and supports a wide range of socioeconomic functions globally. Gastrointestinal parasitism is often classified as a production disease, as it results in reduced feed intake and altered gastrointestinal motility, leading to diarrhea. Gastrointestinal parasites compete for nutrients and alter host metabolism, accounting for reduced protein and energy retention, as well as disturbed mineral and water balance. These effects lead to poor performance and increased mortality, particularly in young, aged, and immunosuppressed animals. Consequently, economic losses are attributed to reduced productivity and the high costs of prevention and treatment (Solaiman, 2010; Blackburn *et al.*, 1991) [12, 1].

Gastrointestinal nematodosis is known to have a serious impact on major hematological parameters such as hemoglobin concentration, packed cell volume, and total erythrocyte count, ultimately resulting in anemia (Jas *et al.*, 2008) [7]. Among helminths, nematodes are of the greatest importance in terms of prevalence and adverse effects on animal health (Gupta *et al.*, 2016) [5]. To reduce parasite burden, various synthetic and herbal anthelmintic drugs are commonly used.

Albendazole is a well-known antiparasitic agent considered a safe drug with activity against all three major groups of helminths, namely trematodes, cestodes, and nematodes. To assess the

current efficacy of albendazole against gastrointestinal nematodes and to evaluate the parasitic infection status in the aforementioned goat farm, the present study was designed.

Materials and Methods

A total of 15 adult goats from the goat unit of village Chharchhed, Block Kasdol, District Balodabazar-Bhatapara, Chhattisgarh, were selected for the study. Fecal samples were collected per rectum from each animal in labeled polythene bags. Fecal nematode egg counts (FEC) in terms of eggs per gram (EPG) were determined using the modified McMaster technique (Skerman and Hillard, 1966) [11]. Hematological parameters, including hemoglobin concentration, total erythrocyte count, and packed cell volume, were assessed simultaneously to evaluate the hematological status of the animals. Blood samples were collected by jugular venipuncture into heparinized vials. Hemoglobin levels (g%), total erythrocyte count (million/ μ l), and packed cell volume (%) were determined using Hellige-Sahli's hemoglobinometer, hemocytometer, and microhematocrit centrifuge method, respectively (Jain, 2002) [6].

After the initial EPG and hematological examinations, all animals were treated orally with albendazole at a dose of 7.5 mg/kg body weight. Ten days post-treatment, the same animals were again subjected to EPG and hematological examinations. The obtained data were statistically analyzed to determine whether the drug produced significant changes in EPG values and hematological parameters. For statistical analysis, a paired *t*-test was applied.

Results and Discussion

The results revealed that all 15 animals showed the presence of nematode eggs before treatment. The highest fecal egg count (EPG) recorded was 450, while the lowest was 250 EPG. Although the EPG values did not exceed the threshold level for severe infection, they indicated an alarming parasitic burden. Based on these findings, the animals were categorized as subclinically infected. The observed EPG levels suggest the need for timely intervention to prevent the progression of subclinical infection into a severe or clinical form and to minimize the risk of further transmission within the flock. Mean values of Egg per gram (EPG) in a group of goats before and after treatment are shown in Table 1.

Table 1: Mean Egg per gram (EPG) of pre and post treatment in group of goats (Mean $\pm$ SE)

Animals	N	Egg per gram (EPG) (Mean $\pm$ SE)
Before treatment	15	356.7 $\pm$ 15.33
After treatment	15	130.0 $\pm$ 15.28**

** Highly significant at $p < 0.01$

Following the initial EPG and hematological examinations, the same animals were treated orally with albendazole as an antiparasitic drug at a dose of 7.5 mg/kg body weight. The animals were observed for 10 days post-treatment to allow adequate drug action. After 10 days, fecal samples were again collected, and EPG estimation was performed. A statistically significant difference was observed in the EPG values of the animals before and after treatment (Table 1).

These findings indicate that albendazole is still a safe and effective drug for the treatment of nematode infections in goats.

Hematology

As discussed earlier along with fecal samples, blood samples were also collected from all animals, and major hematological

parameters, namely hemoglobin (Hb), total erythrocyte count (TEC), and packed cell volume (PCV), were analyzed. The differences in hematological parameters before and after treatment are presented in Table 2.

Table 2: Mean hemoglobin (Hb), Total erythrocyte count (TEC) and packed cell volume (PCV) of pre and post treatment in group of goats (Mean $\pm$ SE)

Animals	N	Blood profile		
		Hb (g/dl)	TEC (millions/ μ l)	PCV (%)
Before treatment	15	6.640 $\pm$ 0.180	5.320 $\pm$ 0.141	21.73 $\pm$ 1.40
After treatment	15	7.287 $\pm$ 0.206**	5.793 $\pm$ 0.139**	24.67 $\pm$ 1.03**

** Highly significant at $p < 0.01$

Hematological results revealed a statistically significant increase ($p < 0.01$) in hemoglobin, total erythrocyte count, and packed cell volume values following albendazole treatment. These findings indicate an improvement in the hematological status of the animals after treatment.

The present findings are in agreement with earlier reports. Sanyal *et al.* (2014) [10] observed a significant reduction in hemoglobin and PCV values in animals with higher EPG levels compared to those with lower egg counts. Kumar *et al.* (2015) [2] reported a decline in Hb, TEC, and PCV values in animals suffering from heavy nematode infection. Similarly, Jas *et al.* (2008) [7] reported that gastrointestinal nematode infections have a serious impact on hematological parameters such as hemoglobin concentration, packed cell volume, and total erythrocyte count, ultimately leading to anemia. Keyyu *et al.* (2002) [8] studied the effect of albendazole in sheep and reported a 59.4% reduction in fecal egg count following treatment. Egualle *et al.* (2009) [4], in an experimental study on albendazole resistance in *Haemonchus* spp. and *Oesophagostomum* spp. in goats, reported slight resistance in *Haemonchus* spp., while other nematodes remained susceptible.

Conclusion

The presence of subclinical parasitic infection was evident in the studied animals. Statistically significant changes in EPG and hematological parameters before and after treatment indicated that albendazole remains an effective anthelmintic for the control of gastrointestinal nematodes in goats.

Conflict of Interest

Not available

Financial Support

Not available

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