

COMPARATIVE EFFICACY OF THREE DIFFERENT MODERN DRUGS AGAINST NEMATODIASIS IN GOAT

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The study aimed to assess the efficacy of three different drugs against nematodiasis in goat. Twenty goats were divided into 4 groups of 5 animals each. Group 'D' served as the control, whereas groups A, B, and C were treated with ivermectin, fenbendazole and albendazole respectively. The therapeutic efficacy was evaluated through determination of eggs per gram (EPG) count, haematological findings and body weight gain or loss. Faecal and blood samples were collected before treatment on day 0, and on post-treatment days 7, 14, 21 and 28 of study. Pre and post-treatment EPG values were recorded and efficacies compared. The results showed that the efficacy about albendazole 87%, ivermectin 85% and fenbendazole 92%. The haematological parameters, TLC, Hb and PCV values were lower on day 0 but turned to increase ($p < 0.01$) on day 28 of the study. On the other hand, ESR and TEC were higher before treatment (day 0) but decreased significantly ($p < 0.01$) on day 28. The body weight of the treated animals were faintly increased which were significant ($p < 0.01$). It was concluded that the farm management practices along with results of the present study revealed the efficacy of multiple anthelmintics against nematodiasis in goats.

Keywords: Anthelmintics, EPG, Hematology, Body weight, Nematodes, Goat.

The domestic goat is a sociable, inquisitive, and intelligent species, which has been used for its meat, milk, skin, and fur since it was first domesticated ca. 10,000 years ago. (Genaro et al, 2010). The gastrointestinal nematodiasis causes great economic losses in the form of mortality, stunted growth,

weight loss, decreased milk and meat production and market value of the living animals (Islam, 1985). The incidence of gastrointestinal nematodes in goats and sheep in Mymensingh was reported by Haq and Shaikh (1968). Modern anthelmintics such as Benzimidazoles like albendazole and fenbendazole are widely used in Bangladesh and very recently ivermectin is being used sporadically. The prevalence of anthelmintics resistance is a serious constraint to goat production globally (Howell *et al.*, 2008; Jackson and Kaplan *et al.*, 2004). Gastrointestinal parasites pose the greatest challenge to goat health and production in humid areas (Perry *et al.*, 2002; Sahlou *et al.*, 2009). The use of sustainable, integrated parasite control systems, using scientifically proven non chemical methods and limited use of drugs is being considered to ensure animal health and food safety (Waller, 2006). The present investigation was designed to evaluate the comparative efficacy of modern anthelmintics Endokil® (Albendazole), Vermic® (Ivermectin) and Peraclear® (Fenbendazole) against nematodiasis in goats on the basis of EPG count, hematological status like TLC, TEC, Hb, PCV, ESR and body weight gain/loss were built-in in this study.

MATERIALS AND METHODS

Study area and time: The present study was undertaken to comparing the efficacy of albendazole, ivermectin and fenbendazole against nematodiasis in goats in Government Goat Development Farm, Sylhet. The research work was performed in the Department of Physiology and Pharmacology, Sylhet Agricultural University, Bangladesh.

Allotment of trail: Twenty goats about 12 months old infected with gastrointestinal nematodes were selected for this research and randomly divided into four equal groups (group A, B, C and D) where each group consisted of 5 goats. Goats of group D were kept as infected control group. Remaining groups (A, B and C) of goats were treated with albendazole (Endokil®), at 7.5 mg/kg b.wt., ivermectin (Vermic®) at 0.2 mg/kg and fenbendazole (Paraclear®) at 7.5 mg kg/b.wt. In this study, the effects of three modern anthelmintics albendazole, ivermectin and fenbendazole on body weight of goats were taken at '0' day and 28th day.

EPG count:

Weekly EPG count was done on day 7,14,21,28 post treatment by McMaster egg counting technique.

Hematological studies:

With sterile syringe and needle maintaining aseptic condition, 5 ml of blood sample was collected from Jugular vein of each goat by and kept in vials containing anticoagulant (sodium-EDTA) and this was done on day of 0,7, 14, 21 and 28 during experimental period. Hematological studies performed following the methods described by Coffin (1961) for TEC, ESR, Hb% and Lamberg and Rothstein (1977) for

TLC and PCV.

Body weight measure:

Live weight gain of each group on recorded on day 1 and 28 using digital weight balance.

Statistical analysis:

Linear correlation was used to analyze differences between body condition scores and EPG counts and EPO of different body scores were analyzed by pair-wise mean comparisons using SPSS v.15 for Windows (SPSS, Tnc., Chicago, IL, USA) to find out the level of significance at 5% and 1% level.

RESULTS AND DISCUSSION

The goats of group A were treated with tablet Endokil® (Albendazole) at the dose rate of 7.5 mg/kg body weight orally and the rate of reduction in EPG on the 28th day was 87% (Table 1). Guha *et al.*, (1996) stated that albendazole at the dose rate of 3.5 mg/kg body weight was 100% effective against gastrointestinal nematodiasis in naturally infected goats. Pomroy *et al.*, (1988) reported that albendazole either at the dose rate of 3.8 mg/kg repeated after 24 hours or as a single dose rate of 7.6 mg/kg body weight was >99% effective in naturally infected Angora- X goats. Guha and Banerjee (1987) indicated that albendazole at the dose rate of 3.5 mg/kg body weights on goats showed 100% effect. Findings of

Table 01. Effects of different modern anthelmintics on egg count (EPG) in goats

Group	Drug with Dose	Pre treatment	Post treatment				
		Day 0	Day 7	Day 14	Day 21	Day 28	Reduction at 28 day
A	Albendazole (Endokil®)	316.60±16.13	43.80±2.13	53.40±2.01	45.20±2.63	41.80±0.86	87%
B	Ivermectin (Vermic®)	287.20±6.54	70.80±0.86	83.80±2.75	65.20±1.32	43.60±2.62	85%
C	Fenbendazole (Paraclear®)	313.40±6.16	82.20±1.20	65.60±2.42	47.40±4.27	22.40±1.33	92%
D	Control	296.00±4.87	298.20±1.28	301.00±1.52	303.20±2.42	305.40±1.29	3%
Level of significance		*	NS	**	**	**	

** = (p<0.01), * = (p<0.05), NS = (p>0.05)

the present study reasonably agreed with the findings of the above mentioned authors. In untreated naturally parasitized control group D the mean EPG was 296.00±4.87 at '0' day and at 7, 14, 21 and 28 days were 298±4.87, 301.20± 1.52, 303.00±2.42 and 305.40±1.29 and the rate of infection was increased.

In this study the goats of group B were treated with Vermic[®] (Ivermectin) at the dose rate of 200µg/kg body weight subcutaneously and the rate of reduction of EPG was 85% on the 28th day. This result is in related with the earlier researchers. Islam *et al.*, (1994) reported the 100% efficacy of ivermectin (pour on formulation) against gastrointestinal nematodes in cattle at the dose rate of 500µg/kg body weight. Ponikarov (1989) reported 100% efficacy of Ivomec-F (ivermectin) at the dose rate of 1mg/kg body weight when given as a subcutaneous injection against gastrointestinal nematodes. Shastri (1989) reported 97.5% and 93.3% efficacy of ivermectin against gastrointestinal nematodes in goats. Baggherwal *et al.*, (1991) observed 100% efficacy of ivermectin against naturally acquired nematodiasis in goats with a single subcutaneous injection of 0.2 mg/kg body weight. Mukherjee *et al.*, (1994) reported 100% efficacy of ivermectin against all types of nematodes (*Trichostrongylus* spp, *Strongylus* spp, *Trichuris* spp and

Nematodirus spp) in goat during a comparative study of 3 anthelmintics in Cashmere. Docastro and Cocuzza (1995) reported that ivermectin was highly effective at the dose rate of 200µg/kg body weight against gastrointestinal nematodiasis in goats. Yadav *et al.*, (1996) observed 99-100% efficacy of ivermectin on nematodes in sheep and goat at the dose rate of 0.2 mg/kg body weight.

The goats of group C were treated with tablet Peraclear[®] (Fenbendazole) at the dose rate of 7.5 mg/kg body weight orally and the rate of reduction on EPG on the 28th day was 92%. This result was found by earlier workers Beck *et al.*, (1971); Sharma and Prodhan *et al.*, (1993); Thejeomooethy *et al.*, (1995); Vesconcelos *et al.*, (1995) and Williams and Broussard (1995). Haq *et al.*, (1984) reported that fenbendazole at the dose rate of 5 mg/kg body weight was 100% effective in goats naturally infected with various gastrointestinal nematodes. Rahmatulla *et al.*, (1985) reported that fenbendazole at the dose rate of 5 mg/kg body weight on goats was 100% effective after 5 days of treatment. The findings of the present study are more or less similar to the earlier researchers.

TEC were decreased significantly ($p<0.01$) in all treated goats and body weight increased significantly ($p<0.05$). These

Table 02: Effects of different modern anthelmintics on hematological parameter in goats

Group	Treatment	Pre-treatment					Post-treatment				
		Day 0					Day 28				
		TEC	Hb%	PCV	ESR	TLC	TEC	Hb%	PCV	ESR	TLC
A	Albendazole(Endokil [®])	8.00± 0.05	7.58± 0.22	27.62± 0.19	0.13± 0.02	7.97± 0.04	8.14± 0.05	8.70± 0.25	29.41± 0.09	0.00± 0.00	7.96± 0.05
B	Ivermectin (Vermic [®])	8.09± 0.05	7.47± 0.21	27.68± 0.10	0.10± 0.01	7.97± 0.06	8.13± 0.05	8.76± 0.19	29.21± 0.13	0.00± 0.00	7.92± 0.04
C	Fenbendazole (Paraclear [®])	8.01± 0.10	7.05± 0.10	27.83± 0.62	0.10± 0.01	8.23± 0.05	8.19± 0.04	8.93± 0.36	29.21± 0.05	0.00± 0.00	8.06± 0.04
D	Control	7.95± 0.08	7.14± 0.12	27.88± 0.27	0.12± 0.01	8.08± 0.03	7.30± 0.11	7.47± 0.21	27.25± 0.06	1.12± 0.0	8.18± 0.04
Level of significance		NS	NS	NS	NS	NS	NS	**	**	NS	**

** = ($p<0.01$), * = ($p<0.05$), NS = ($p>0.05$)

Table 03: Effects of different modern anthelmintics on egg count body weight gain or loss in goats

Group	Drug with dose	Pre-treatment	Post treatment	% of body weight change
		Day 7	Day 28	
A	Albendazole (Endokil [®])	13.68±0.16	14.68±0.14	7
B	Ivermectin (Vermic [®])	13.74±0.14	14.58±0.18	6
C	Fenbendazole (Paraclear [®])	13.64±0.09	15.32±0.40	11
D	Control	13.60±0.05	13.54±0.04	-0.5
Level of significance		**	**	

** = (p<0.01)

findings are in agreement with the other researchers. It was seen that TLC, Hb and PCV were increased and on the other hand, ESR and TEC values were decreased on post treatment days.

The live weight gain of goats in group A, group B, group C recorded at '0' day and 28th day and the percentage of improvement of body weight in kilogram were about 7%, 6% and 11% respectively and in control group it was reduced by 0.5% (Table 3). The body weight was increased significantly (p<0.05) after Vermic, Peraclear and Almix-Vet treatment in group A, B and C respectively. These findings are more or less similar to the findings of Pandit *et al.*, (2009). Thedford *et al.*, (1990) studied the increased PCV of treated animals on days 28 and post treatment compared to treated animals on day '0' and control on day 28. The result is in conformity with the earlier researchers. Pomroy *et al.* (1988) reported that Aldazole at either 3.8 mg kg⁻¹ repeated after 24 hours or single dose rate 7.6 mg/kg body weight was > 99% effective in naturally infected Angora-X goats. Guha and Banerjee (1987) indicated that albendazole at the dose rate of 3.5 mg/kg body weight on goats showed 100% effective. Findings of the present study reasonably agreed with the findings of the above mentioned authors. The weight gains in the vermic[®] treated goat are supported by previous reports (Pandit *et al.*, 2009).

CONCLUSION

To sum up, Albendazole (Endokil[®]), Ivermectin (Vermic[®]) and Fenbendazole

(Peraclear[®]) are effective for reduction of EPG of gastro-intestinal (G/I) nematodiasis in goats. Among these three modern anthelmintics, Fenbendazole (Peraclear[®]) is highly effective on EPG, TEC, Hb, ESR and PCV. The findings of the present study may help the future researchers to explore the details pharmacokinetic and toxic effects, for wide therapeutic uses in Bangladesh for the treatment and control of parasitic infection in goat.

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