

## Effects of neem, betel leaf, devil's tree, jute and turmeric against gastrointestinal nematodes in sheep

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### Abstract

Effects of neem, betel leaf, devil's tree, jute and turmeric against natural gastrointestinal nematodes in sheep and on some hematological parameters (TEC, Hb and PCV) and body weight were studied. Thirty (30) naturally parasitized sheep were randomly divided into six groups (A, B, C, D, E and F), each consisting of five sheep. Ten percent water extract of leaves of neem, betel leaf, devil's tree and jute were administered orally to the sheep of group A, B, C and D, respectively. Sheep of group E was treated orally with 10% water extract of rhizome of turmeric. Sheep of group F was kept as infected control group. Fecal samples, hematological parameters and body weight were examined before treatment and on 7<sup>th</sup>, 14<sup>th</sup>, 21<sup>st</sup> and 28<sup>th</sup> day. A significant ( $p < 0.01$ ) reduction of EPG count was found following administration of neem (37.60-47.03%), betel leaf (6.43-14.00%), devil's tree (3.04-11.04%), jute (0.50-5.26%) and turmeric (0.46-8.30) in sheep. The EPG count of the control group (F) were significantly ( $p < 0.01$ ) increased up to the last day of experimental period. After treatment with neem, betel leaf, devil's tree, jute and turmeric total erythrocyte count (TEC), hemoglobin (Hb) content and packed cell volume (PCV) were increased significantly ( $p < 0.01$  and  $p < 0.05$ ) in sheep. The body weight was increased significantly ( $p < 0.01$  and  $p < 0.05$ ) in neem, betel leaf, devil's tree, jute and turmeric treated sheep. On the other hand, body weight was decreased in untreated control group. The present study reveal that 10% water extract of neem was moderately effective and betel leaf, devil's tree, jute and turmeric were relatively less effective against gastrointestinal nematodes in sheep.

**Keywords:** Neem, Betel leaf, Devil's tree, Jute, Turmeric, Gastrointestinal nematode

### Introduction

Parasitism is an important limiting factor responsible for deteriorating the health and productivity of livestock. The agro-ecological and geo-climatic conditions of Bangladesh are highly favorable for the growth and multiplication of parasites. The greatest losses associated with nematode infections are sub-clinical and economic assessments have showed that financial costs of internal parasitism are enormous (Preston and Allonby, 1979; McLeod, 1995). Control of parasitic diseases has been mainly based on regular anthelmintic treatment in Bangladesh. However, as these are very expensive and unavailable to farmers in rural areas, livestock producers are not interested to use these anthelmintics. Furthermore, some serious disadvantages of using those anthelmintics, notably the development of resistance to helminth parasites (Waller and Prichard, 1985; Lans and Brown, 1998) against various anthelmintic compounds and classes, as well as their residues and toxicity problems (Kaemmerer and Butenkotter, 1973). Medicinal plants are one of the most important natural resources of a country. World Health Organization (WHO, 1993) has recognized the necessity for investigation and mobilization of ancient medicinal practices to fulfill the primary health care systems of the man and animals, and realizes that the traditional system of medicine may play an important role in the development of livestock of the third world countries. Plant remedies were also extensively used as anthelmintics in the developed world before the era of broad-spectrum synthetic drugs (British Veterinary Codex, 1953). Many currently available therapeutic compounds are plant derived and/or synthetic analogues derived from those compounds (Farnsworth *et al.*, 1985). For these reasons, interest in the screening of medicinal plants for their anthelmintic activity has remained of great scientific interest despite extensive use of synthetic chemicals in modern clinical practices all over the world (Akhtar *et al.*, 2000). The present study was undertaken to evaluate the efficacy of neem (*Azadirachta indica*), betel leaf (*Piper betle*), devil's tree (*Alstonia scholaris*), jute (*Corchorus capsularis*) and turmeric (*Curcuma longa*) against gastrointestinal nematodes in sheep. The effects of neem, betel leaf, devil's tree, jute and turmeric on hematological parameters (TEC, Hb and PCV) and body weight were also determined in this study.

## Materials and Methods

The experiment was performed in the Department of Pharmacology, Faculty of Veterinary Science, Bangladesh Agricultural University (BAU), Mymensingh during the period between 1<sup>st</sup> March, 2004 to 28<sup>th</sup> March, 2004. Sixty sheep (approximately 2-3 years old) were selected for this study which were suspected to be suffering from natural gastrointestinal nematodes infection and they were marked at the ears by the numbered tag. Examination of fecal samples for gastrointestinal nematodes egg counts by floatation method (Rahman *et al.*, 1996) were carried out over a week prior to commencement of treatment. On the basis of fecal sample examination results, 30 sheep of both sexes infected with gastrointestinal nematodes were selected for this study and randomly divided into six groups (A, B, C, D, E and F), each group consisting of five sheep. Ten Percent water extract of leaves of neem (*Azadirachta indica*), betel leaf (*Piper betle*), devil's tree (*Alstonia scholaris*), jute (*Corchorus capsularis*) and turmeric (*Curcuma longa*) were administered orally to the sheep of group A, B, C and D, respectively. Sheep of group E was treated orally with 10% water extract of rhizome of turmeric. Sheep of group F were kept as infected control without giving any treatment.

The fecal sample from all groups were examined by egg counting McMaster method as described by Soulsby (1986) before treatment (day 0) and at 7<sup>th</sup>, 14<sup>th</sup>, 21<sup>st</sup> and 28<sup>th</sup> day of post-treatment. Egg per gram (EPG) of feces were recorded. Blood samples were collected from the jugular vein of each sheep at different time intervals mentioned above. Various hematological parameters (TEC, Hb and PCV) were measured following the method of Coffin (1953). To determine the body weight gain or loss of treated and untreated control groups, body weight was taken on day 0 (pretreatment) and on 7<sup>th</sup>, 14<sup>th</sup>, 21<sup>st</sup>, and 28<sup>th</sup> day of experimental period. Collected data were statistically analyzed by the computer using statistical package programme MSTAT-C developed by Russel (1996).

## Results and Discussion

The results of the effect of neem, betel leaf, devil's tree, jute and turmeric against gastrointestinal nematodes in sheep were shown in Table 1. A significant ( $p < 0.01$ ) reduction of EPG counts were found on 7<sup>th</sup>, 14<sup>th</sup>, 21<sup>st</sup> and 28<sup>th</sup> day following neem, betel leaf, devil's tree, jute and turmeric treated sheep of group A, B, C, D and E, respectively. Whereas, the EPG count of untreated control group (F) were significantly ( $p < 0.01$ ) increased up to last day of experimental period. In conformity to the present findings, Rob *et al.* (2004) observed that water extracts of neem was 53.72% effective against gastrointestinal nematodes (*Haemonchus contortus*) in sheep. Brelin (2002) found that fresh neem leaves significantly reduced *H. contortus* in the abomasum of the treated sheep. Arunachal *et al.* (2002) noted that neem leaves, seeds and bark were 53%, 49% and 38% infective against gastrointestinal helminths in sheep, respectively. Amin *et al.* (2008) reported that neem (10% water extract of leaves) reduced significantly ( $p < 0.01$ ) EPG count 62.23%, 65.77%, 56.70% and 48.05% on 3<sup>rd</sup>, 10<sup>th</sup>, 17<sup>th</sup> and 28<sup>th</sup> day, respectively in cattle. Rahman (2002) found the effects of water extract of neem, betel leaf and jute leaves were 62%, 58% and 42%, respectively in goat on 21<sup>st</sup> day post-treatment.

The results of the effect of neem, betel leaf, devil's tree, jute and turmeric on hematological parameters (TEC, Hb and PCV) in sheep are shown in Table 2, 3 and 4. After treatment with neem, total erythrocyte count (TEC), hemoglobin (Hb) content and packed cell volume (PCV) were increased significantly ( $p < 0.01$  and  $p < 0.05$ ) at 7<sup>th</sup>, 14<sup>th</sup>, 21<sup>st</sup>, and 28<sup>th</sup> day post-treatment in sheep. Conversely, TEC, Hb and PCV were decreased significantly ( $p < 0.01$  and  $p < 0.05$ ) up to the last day of experimental period in untreated infected group. Rob *et al.* (2004) stated that water extracts of neem leaves increased TEC, Hb content, PCV in sheep on 28 day post-treatment. Likewise, Rahman (2002) observed water extract of neem, betel leaf and jute leaves increased TEC, Hb content on 21<sup>st</sup> day of post-treatment in goat. Similarly, Amin *et al.* (2008) reported that neem (10% water extract of leaves) increased TEC, Hb content, PCV in cattle on 28 day post-treatment. Hossain *et al.* (1996) also reported that neem leaves increased Hb content in cattle.

**Table 1. Effects of Neem, Betel leaf, Devil's tree, Jute and Turmeric against gastrointestinal nematodes in sheep**

Group	Treatment	Pretreatment	Post-treatment							
		'0' day	7 <sup>th</sup> day		14 <sup>th</sup> day		21 <sup>st</sup> day		28 <sup>th</sup> day	
		EPG Mean±SD	EPG mean± SD	EPG increase/decrease (%)	EPG mean± SD	EPG increase/decrease (%)	EPG mean± SD	EPG increase/decrease (%)	EPG mean± SD	EPG increase/decrease (%)
A	Neem	289.60± 7.07	153.40 ± 7.07**	47.03 (-)	155.60 ± 7.07**	46.27 (-)	168.50 ± 7.07**	41.82 (-)	180.70 ± 7.07**	37.60 (-)
B	Betel leaf	265.80 ± 3.54	228.60 ± 7.07**	14.00 (-)	229.80 ± 7.07**	13.54 (-)	242.30 ± 1.41**	8.84 (-)	248.70 ± 8.37**	6.43 (-)
C	Devil's tree	262.80 ± 7.13	233.80 ± 2.12**	11.04 (-)	236.80 ± 4.24**	9.89 (-)	245.60 ± 3.54**	6.54 (-)	254.80 ± 4.47**	3.04 (-)
D	Jute	342.40 ± 1.41	324.40 ± 7.07**	5.26 (-)	328.80 ± 0.00**	3.97 (-)	334.20 ± 0.00**	2.39 (-)	340.70 ± 7.07**	0.50 (-)
E	Turmeric	282.00 ± 7.07	258.60 ± 5.66**	8.30 (-)	264.40 ± 0.00**	6.24 (-)	272.20 ± 0.00**	3.48 (-)	280.70 ± 0.00**	0.46 (-)
F	Control	246.20 ± 19.29	265.60 ± 22.08**	7.88 (+)	274.40 ± 11.31**	11.45 (+)	295.80 ± 16.20**	20.15 (+)	320.70 ± 24.49**	30.26 (+)

The above values represent the mean ± standard deviation (SD) of 5 sheep  
 \*\* = Significant at 1 per cent level (p<0.01)  
 \* = Significant at 5 per cent level (p<0.05)

'+' = Increase

'-' = Decrease

**Table 2. Effects of Neem, Betel leaf, Devil's tree, Jute and Turmeric on TEC (million/cu.mm) in sheep**

Group	Treatment	Pretreatment	Post-treatment				
		'0' day	7 <sup>th</sup> day	14 <sup>th</sup> day	21 <sup>st</sup> day	28 <sup>th</sup> day	
A	Neem	8.26 ± 0.14	8.97 ± 0.64*	8.84 ± 0.57**	8.70 ± 0.70**	8.53 ± 0.35*	
B	Betel leaf	8.46 ± 0.28	8.72 ± 0.00*	8.70 ± 0.00**	8.65 ± 0.42**	8.54 ± 0.35*	
C	Devil's tree	8.12 ± 0.01	8.38 ± 0.00*	8.32 ± 0.21**	8.26 ± 0.71**	8.18 ± 0.71*	
D	Jute	8.65 ± 0.00	8.75 ± 0.49*	8.75 ± 0.00**	8.70 ± 0.00**	8.68 ± 0.42*	
E	Turmeric	8.32 ± 0.21	8.65 ± 0.42*	8.64 ± 0.52**	8.50 ± 0.00**	8.48 ± 0.00*	
F	Control	8.60 ± 0.42	8.10 ± 0.07*	7.97 ± 0.71**	7.54 ± 0.35**	7.22 ± 0.14*	

The above values represent the mean ± standard deviation (SD) of 5 sheep

\*\* = Significant at 1 per cent level (p<0.01)

\* = Significant at 5 per cent level (p<0.05)

**Table 3. Effects of Neem, Betel leaf, Devil's tree, Jute and Turmeric on Hb (gm %) in sheep**

Group	Treatment	Pretreatment	Post-treatment				
		'0' day	7 <sup>th</sup> day	14 <sup>th</sup> day	21 <sup>st</sup> day	28 <sup>th</sup> day	
A	Neem	7.40 ± 0.14	7.90 ± 0.64	7.80 ± 0.14*	7.60 ± 0.14	7.50 ± 0.35*	
B	Betel leaf	7.60 ± 0.12	7.90 ± 0.14	7.90 ± 0.07	7.80 ± 0.14	7.70 ± 1.41*	
C	Devil's tree	7.50 ± 0.35	7.70 ± 0.49	7.70 ± 0.14	7.60 ± 0.42	7.60 ± 0.00*	
D	Jute	7.30 ± 0.21	7.60 ± .07	7.90 ± 0.89*	7.40 ± 1.41	7.40 ± 0.28*	
E	Turmeric	7.44 ± 0.22	7.80 ± 0.00	7.70 ± 0.89*	7.70 ± 0.00	7.50 ± 0.00*	
F	Control	7.90 ± 0.14	7.70 ± 0.71	7.40 ± 0.28*	7.20 ± 0.42	7.00 ± 0.35*	

The above values represent the mean ± standard deviation (SD) of 5 sheep

\*\* = Significant at 1 per cent level (p<0.01)

\* = Significant at 5 per cent level (p<0.05)

**Table 4. Effects of Neem, Betel leaf, Devil's tree, Jute and Turmeric on PCV (%) in sheep**

Group	Treatment	Pretreatment	Post-treatment			
		'0' day	7 <sup>th</sup> day	14 <sup>th</sup> day	21 <sup>st</sup> day	28 <sup>th</sup> day
A	Neem	29.00 ± 0.71	31.50 ± 2.12**	31.50 ± 0.71**	31.00 ± 0.71**	30.50 ± 1.41**
B	Betel leaf	29.50 ± 1.41	31.50 ± 0.79**	31.00 ± 0.00**	31.00 ± 0.71**	30.00 ± 1.41**
C	Devil's tree	28.00 ± 2.12	30.00 ± 2.83**	29.00 ± 0.00**	28.50 ± 2.12**	28.50 ± 0.00**
D	Jute	28.50 ± 0.00	29.50 ± 0.00**	29.00 ± 1.41**	29.00 ± 0.00**	28.50 ± 0.00**
E	Turmeric	30.50 ± 3.54	31.50 ± 0.71**	31.50 ± 0.71**	31.00 ± 0.71**	30.00 ± 2.12**
F	Control	30.50 ± 1.41	29.00 ± 0.71**	29.00 ± 0.71**	28.50 ± 1.41**	27.00 ± 1.41**

The above values represent the mean ± standard deviation (SD) of 5 sheep

\*\* = Significant at 1 per cent level (p<0.01)

\* = Significant at 5 per cent level (p<0.05)

The results of neem, betel leaf, devil's tree, jute and turmeric on body weight in sheep are shown in Table 5. Neem, betel leaf, devil's tree, jute and turmeric significantly (p<0.01 and p<0.05) increased body weight in group A, B, C, D and E, respectively. On the other hand, body weight was decreased significantly (p<0.01 and p<0.05) in untreated controlled sheep of group F. These results were agreeable with the findings of Ahmed *et al.* (1994) in sheep. They observed body weight of neem seeds treated sheep was increased (6.74%) and decreased live weight value in untreated sheep. Similarly, Amin *et al.* (2008) reported that body weight was increased significantly in neem treated cattle and decreased in untreated cattle. Hossain *et al.* (1996) also observed neem leaves and neem seed kernels increased body weight of cattle. The body weight was increased might be due to removal of parasitic load which facilitate the weight regain through proper digestion, absorption and metabolism of feed nutrients.

**Table 5. Effects of Neem, Betel leaf, Devil's tree, Jute and Turmeric on body weight (kg) in sheep**

Group	Treatment	Pretreatment	Post-treatment			
		'0' day	7 <sup>th</sup> day	14 <sup>th</sup> day	21 <sup>st</sup> day	28 <sup>th</sup> day
A	Neem	15.92 ± 0.71	16.00 ± 0.00**	16.26 ± 0.71*	16.05 ± 0.89*	16.02 ± 0.00**
B	Betel leaf	15.58 ± 0.35	15.96 ± 0.71**	16.10 ± 0.11*	16.35 ± 2.12*	16.15 ± 0.07
C	Devil's tree	15.86 ± 0.00	16.20 ± 0.71**	16.44 ± 0.31*	16.35 ± 1.41*	16.10 ± 0.00
D	Jute	16.24 ± 0.00	16.37 ± 0.21**	16.40 ± 0.28*	16.40 ± 0.00*	16.30 ± 0.71
E	Turmeric	15.48 ± 0.00	15.60 ± 0.00**	15.72 ± 0.00*	15.80 ± 0.00*	15.65 ± 0.71
F	Control	16.46 ± 1.22	15.95 ± 1.48**	15.83 ± 2.12*	15.21 ± 0.71*	15.10 ± 1.41**

The above values represent the mean ± standard deviation (SD) of 5 sheep

\*\* = Significant at 1 per cent level (p<0.01)

\* = Significant at 5 per cent level (p<0.05)

It may be concluded that watery extracts of neem leaves was moderately effective against gastrointestinal nematodes in sheep and may be used as an alternative drugs in field condition of Bangladesh. The present study is a preliminary work on the medicinal plants in sheep in Bangladesh. However, further studies on its pharmacokinetic and toxic effects is needed before carrying out extensive field use in Bangladesh.

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