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Effects of Indigenous Medicinal Plants (Neem and Pineapple) Against Gastro-intestinal Nematodiasis in Sheep

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Abstract: The experiment was conducted in the Department of Pharmacology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh, for a period of 28 days to study the effects of indigenous medicinal plants (neem and pineapple) against gastro-intestinal nematodiasis in sheep. The sheep is the source of animal protein, hide, meat and milk. Parasitism is a serious problem of livestock where nutrition and sanitation are poor. In Bangladesh, gastro-intestinal nematodiasis causing a significant economic loss as a result of animal diarrhoea, stunted growth, decreased milk production, emaciation, loss of working ability and even death. Fifteen sheep were selected from fifty five sheep for this study which was heavily infected with gastro-intestinal nematodes marked by McMaster method. Sheep were treated with neem and pineapple (10% water extract of leaves). A significant ($p<0.01$) reduction of EPG count was found on 7th, 14th, 21st and 28th day of neem (47.03, 46.27, 41.82 and 37.60%) and pineapple (41.13, 39.27, 36.32 and 32.18%) treated sheep. The EPG count of untreated control group were significantly ($p<0.01$) increased about 7.88, 11.45, 20.15 and 30.26% on 7th, 14th, 21st and 28th day, respectively. After treatment with neem and pineapple, Total Erythrocyte Count (TEC), Hemoglobin (Hb) content and Packed Cell Volume (PCV) were increased significantly ($p<0.01$ and $p<0.05$) in sheep. On the other hand Total Leukocyte Count (TLC) was decreased significantly ($p<0.01$ and $p<0.05$) in all treated sheep. The body weight was increased significantly ($p<0.01$ and $p<0.05$) in neem and pineapple treated sheep. On the other hand body weight was decreased in untreated control group. Neem and pineapple (10% water extract of leaves) may be used as moderate anthelmintics against gastro-intestinal nematodiasis in sheep.

Key words: Neem, pineapple, gastro-intestinal nematodiasis, haematological, body weight

INTRODUCTION

Medicinal plants are one of the most important natural resource of a country. Bangladesh is also enriched by this resource. World Health Organization[1] has recognized the necessity for investigation and mobilization of ancient medicinal practice to fulfil the primary health care of the animals and realizes that the traditional system of medicine may play an important role in the development of livestock of the third world countries. Traditional system of medicine includes "unani, folk, eastern or indigenous" medicine[2]. Primitive people learned the medicinal values of plants form intuition and observation of the behaviors of the animals through trial and error, they discovered the efficacy of certain pants for certain ailments and they passed this knowledge on to its neighbors and descendents[3]. A variety of indigenous herbal preparations are manufactured by various pharmaceutical companies in India, Indonesia and Thailand. However, in Bangladesh, these resources are still now very little explored and as such our farmers and animal owners are depriving from the benefits of using these herbal preparations.

The livestock population is the source of animal protein, hide, meat and milk. The livestock subsector generates 13% of the total foreign currency in Bangladesh[4]. Among all the problems hampering the livestock development, parasitic diseases occupy prime position in Bangladesh. The agro-ecological and geo-climatic condition of Bangladesh favors high prevalence of parasitic infestation. Gastrointestinal nematodiasis (Haemonchosis, Cooperiasis, Trichostrongylosis, Oesophagostomiasis and Trichuriasis) and paramphistomiasis are common parasitic problem in sheep like other ruminants. The economic losses are mainly associated with retarded growth, ill health, decrease production of milk and meat and mortality[5-7]. The average loss of blood about 0.05 mL per day with rapid fall in Packed Cell Volume (PCV) value and decreased absorption of iron from the intestine resulting in severe

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anaemia and sudden death from acute blood loss due to gastrointestinal nematodiasis[8].

Control of parasitic diseases is mainly based on regular anthelmintic treatment in Bangladesh. Imported manufactured anthelmintics have long been considered the only effective way of controlling parasitic infection. However, as these are very expensive and unavailable to farmers in rural areas, livestock producers are not interested to these anthelmintics. Furthermore, some serious disadvantages of using those anthelmintics, notably the development of resistance to helminth parasites[9] to various anthelmintic compounds and classes, as well as chemical residue and toxicity problems[10]. For this various reasons, interest in the screening of medicinal plants for their anthelmintic activity remains of great scientific interest despite extensive use of synthetic chemicals in modern clinical practices all over the world[11]. On the other hand, herbal medicine which are equally active but compatible to the economic status of our people as they are produced from the plants grown in our country by native technology very cheaply. The present study was undertaken to evaluate the efficacy of this neem and pineapple against gastrointestinal nematodiasis. The effects of neem and pineapple on haematological parameters (TEC, Hb, PCV and TLC) and live body weight were also determined in this study.

MATERIALS AND METHODS

The experiment was performed at the animal house of the Veterinary Clinic, Bangladesh Agricultural University, Mymensingh. Fifty five sheep of both sexes aged between 3 to 4 years were primarily selected in this study. Out of 55 sheep, 15 heavily gastro-intestinal nematodiasis infected sheep were selected for the research. The 15 sheep were divided into three groups.

Group A: 10% water extract of neem leaves was administered orally

Group B: 10% water extract of pineapple leaves was administered orally

Group C: No drug was administered used as untreated control group.

The faecal sample from all groups were examined by egg counting McMaster method[8] before treatment (day 0) and at 7th, 14th, 21st and 28th day of post-treatment. Egg Per Gram (EPG) of faeces were recorded.

Blood samples were collected from the jugular vein of each sheep in vial containing EDTA at different time intervals mentioned above. Various haematological parameters (TEC, Hb, PCV and TLC) were measured following the method of Coffin[12]. To determine the body weight gain or loss of treated and untreated control groups, the main body weight was taken on day 0 (pretreatment) and on 7th, 14th, 21st and 28th day of experimental period. Collected data were statistically analyzed by the computer using statistical package programme MSTAT-C developed by Russel[13].

RESULTS AND DISCUSSION

The effects of neem and pineapple (10% water extract of leaves) on faecal egg count in the infested sheep are shown in Table 1. A significant ($p<0.01$) reduction of EPG count was found on 7th, 14th, 21st and 28th day of neem and pineapple treated sheep of group A and B, respectively. The EPG count of untreated control group (group C) were significantly ($p<0.01$) increased 7 day onwards up to experimental period. The mean EPG of untreated control group on pre-treatment (day 0) was 246.20±19.29. The mean EPG on the 7th, 14th, 21st and 28th day were 265.60±22.08, 274.40±11.31, 295.80±16.20 and 320.70±24.49, respectively. The mean EPG were increased 7.88, 11.45, 20.15 and 30.26% on 7th, 14th, 21st and 28th day, respectively (Table 1). Whereas, in the group A, Mean EPG count before treatment was 289.60±7.07 and after treatment with neem mean EPG on 7th, 14th, 21st and 28th day were 153.40±7.07, 155.60±7.07, 168.50±7.07 and 180.70±7.07, respectively. Reduction of mean EPG on 7th, 14th, 21st and 28th day after treatment were 47.03, 46.27, 41.82 and 37.60%, respectively. Similar findings also observed by Ahmed *et al.*[7] and Arunachal *et al.*[14] in sheep. This findings support the earlier works of Mostofa *et al.*[15] and Rahman[16] in goat. The present finding was also in agreement with the work of Hossain *et al.*[17] in cattle. On the other hand, Mean EPG count before treatment was 280.60±7.07 and after treatment with pineapple mean EPG on 7th, 14th, 21st and 28th day were 165.20±3.54, 170.40±7.07, 178.70±0.00 and 190.30±7.07, respectively. Reduction of mean EPG on 7th, 14th, 21st and 28th day after treatment were 41.13, 39.27, 36.32 and 32.18%, respectively in group B (Table 1). Similar findings were also reported by Mostofa *et al.*[18] and Khatun *et al.*[19] in cattle and goat, respectively.

Mean body weight of untreated control group on pre-treatment (day 0) was 16.46±1.22 (Table 2). Mean body weight on the 7th, 14th, 21st and 28th day were 15.95±1.48, 15.83±2.12, 15.21±0.71 and 15.10±1.41 in group C, respectively. Mean body weight before treatment was 15.92±0.71 and after treatment with neem mean body weight on 7th, 14th, 21st and 28th day were 16.00±0.00, 16.26±0.71, 16.05±0.89 and 16.02±0.00 in

Table 1: Changes in faecal egg count of GI nematodes in sheep at different intervals after treatment with neem and pineapple

Days after treatment	Neem treatment (Group A)	Pineapple treatment (Group B)	Untreated infected control (Group C)
Day 0			
Eggs per gram faeces	289.60±7.07	280.60±7.07	246.20±19.29
Day 7			
Eggs per gram faeces	153.40±7.07**	165.20±3.54**	265.60±22.08**
EPG increased/ reduced	47.03 (-)	41.13 (-)	7.88 (+)
Day 14			
Eggs per gram faeces	155.60±7.07**	170.40±7.07**	274.40±11.31**
EPG increased/ reduced	46.27 (-)	39.27 (-)	11.45 (+)
Day 21			
Eggs per gram faeces	168.50±7.07**	178.70±0.00**	295.80±16.20**
EPG increased/ reduced	41.82 (-)	36.32 (-)	20.15 (+)
Day 28			
Eggs per gram faeces	180.70±7.07**	190.30±7.07**	320.70±24.49**
EPG increased/ reduced	37.60 (-)	32.18 (-)	30.26 (+)

Mean±standard deviation, + = % increased, - = % reduced ** = Significant at 1 % level (p<0.01)

Table 2: Effects of neem and pineapple on body weight (kg) in sheep

			Post-treatment			
Groups	Treatments	Pre-treatment '0' day	7th day	14th day	21st day	28th day
A	Neem	15.92±0.71	16.00±0.00**	16.26±0.71*	16.05±0.89*	16.02±0.00**
B	Pineapple	16.10±0.71	16.48±0.28**	16.62±0.42*	17.30±0.89*	16.60±0.42**
C	Untreated infected control	16.46±1.22	15.95±1.48**	15.83±2.12*	15.21±0.71*	15.10±1.41**

Mean±standard deviation ** = Significant at 1% level (p<0.01) * = Significant at 5% level (p<0.05)

Table 3: Changes in haematological parameters in sheep at different intervals after treatment with neem and pineapple

Days after treatment	Neem treatment (Group A)	Pineapple treatment (Group B)	Untreated infected control (Group C)
Day 0			
TEC (million/cu.mm.)	8.26±0.14	8.16±0.07	8.60±0.42
Hb content (g %)	7.40±0.14	7.30±0.21	7.90±0.14
PCV (%)	29.00±0.71	28.47±1.42	30.50±1.41
TLC (thousand/cu.mm.)	8.18±0.71	8.18±0.07	7.92±0.42
Day 7			
TEC (million/cu.mm.)	8.97±0.64*	8.79±0.49*	8.10±0.07*
Hb content (g %)	7.90±0.64	7.80±0.57	7.70±0.71
PCV (%)	31.50±2.12**	31.50±0.00**	29.00±0.71**
TLC (thousand/cu.mm.)	7.54±0.35	7.74±0.21	8.00±0.35
Day 14			
TEC (million/cu.mm.)	8.84±0.57**	8.73±0.70**	7.97±0.71**
Hb content (g %)	7.80±0.14*	7.70±0.43*	7.40±0.28*
PCV (%)	31.50±0.71**	31.00±3.54**	29.00±0.71**
TLC (thousand/cu.mm.)	7.60±0.00*	7.76±0.00*	8.24±0.71*
Day 21			
TEC (million/cu.mm.)	8.70±0.70**	8.56±0.35**	7.54±0.35**
Hb content (g %)	7.60±0.14	7.50±0.35	7.20±0.42
PCV (%)	31.00±0.71**	30.50±2.12**	28.50±1.41**
TLC (thousand/cu.mm.)	7.76±0.21**	7.85±0.04**	8.47±0.42**
Day 28			
TEC (million/cu.mm.)	8.53±0.35*	8.42±0.28*	7.22±0.14*
Hb content (g %)	7.50±0.35*	7.50±0.00*	7.00±0.35*
PCV (%)	30.50±1.41**	30.00±2.83**	27.00±1.41**
TLC (thousand/cu.mm.)	7.80±0.57	7.90±0.64	8.63±1.41

Mean±standard deviation ** = Significant at 1% level (p<0.01) * = Significant at 5% level (p<0.05)

group A, respectively. Similar response has been reported by Ahmed *et al.*[7] due to neem in sheep. Hossain *et al.* [17] also noted similar findings in cattle. Mean body weight before treatment was 16.10±0.71 and after treatment with pineapple mean body weight on 7th, 14th, 21st and 28th day were 16.48±0.28, 16.62±0.42, 17.30±0.89 and 16.60±0.42 in group B, respectively. These results were agreeable with the findings of Khatun *et al.*[19] for pineapple in goat. The parasitic infection might be responsible to arrest the growth. The body weight was increased may be due to removal of parasitic load might have had facilitate the weight regain through proper digestion, absorption and metabolism of feed nutrient in the parasite free gastro-intestinal tract.

The effects of neem and pineapple (10% water extract of leaves) on various haematological parameters are presented in Table 3. The TEC was increased significantly (p<0.01 and p<0.05) after neem and pineapple treatment in

group A and B, respectively. Mean TEC before treatment was 8.26±0.14 and after treatment with neem mean TEC on 7th, 14th, 21st and 28th day were 8.97±0.64, 8.84±0.57, 8.70±0.70 and 8.53±0.35 in group A, respectively. Rahman[16] found similar effects of neem on TEC in goat. Mean TEC before treatment was 8.16±0.07 and after treatment with pineapple mean TEC on 7th, 14th, 21st and 28th day were 8.79±0.49, 8.73±0.70, 8.56±0.35 and 8.42±0.28 in group B, respectively. Likewise, Khatun *et al.*[19] reported that pineapple elevated TEC in goat. Mean TEC of untreated control group on pre-treatment (day 0) was 8.60±0.42. Mean TEC of untreated control group on pre-treatment (day 0) was 8.60±0.42. Mean TEC on the 7th, 14th, 21st and 28th day were 8.10±0.07, 7.97±0.71, 7.54±0.35 and 7.22±0.14 in group C, respectively (Table 3). The improved level of TEC content of blood in treated sheep might be due to elimination of blood sucking gastro-intestinal nematodes.

The haemoglobin content was also increased significantly ($p<0.05$) after neem and pineapple treatment in group A and B, respectively. Mean Hb content before treatment was 7.40±0.14 and after treatment with neem mean Hb content on 7th, 14th, 21st and 28th day were 7.90±0.64, 7.80±0.14, 7.60±0.14 and 7.50±0.35 in group A, respectively (Table 3). Hossain *et al.*[17] also reported that neem increased Hb content in cattle. So the result of the present study is similar to the report of Hossain *et al.*[17]. Rahman[16] also observed similar response due to neem in goat. Mean Hb content before treatment was 7.30±0.21 and after treatment with pineapple mean Hb content on 7th, 14th, 21st and 28th day were 7.80±0.57, 7.70±0.43, 7.50±0.35 and 7.50±0.00 in group B, respectively (Table 3). Likewise, Khatun *et al.*[19] reported pineapple increased Hb content in goat which supported the present findings. Mean Hb content of untreated control group on pre-treatment (day 0) was 7.90±0.14. Mean Hb content on the 7th, 14th, 21st and 28th day were 7.70±0.71, 7.40±0.28, 7.20±0.42 and 7.00±0.35 in group C, respectively (Table 3). The increase in haemoglobin content may be due to the increase of total erythrocyte count (TEC).

The PCV was increased significantly ($p<0.01$) after neem and pineapple treatment in group A and B, respectively. Mean PCV before treatment was 29.00±0.71 and after treatment with neem mean PCV on 7th, 14th, 21st and 28th day were 31.50±2.12, 31.50±0.71, 31.00±0.71 and 30.50±1.41 in group A, respectively (Table 3). Rahman[16] also observed similar result due to neem in goat. Mean PCV before treatment was 28.47±1.42 and after treatment with pineapple mean PCV on 7th, 14th, 21st and 28th day were 31.50±0.00, 31.00±3.54, 30.50±2.12 and 30.00±2.83 in group B, respectively. Mean PCV of untreated control group on pre-treatment (day 0) was 30.50±1.41. The Mean PCV on the 7th, 14th, 21st and 28th day were 29.00±0.71, 29.00±0.71, 28.50±1.41 and 27.00±1.41 in group C, respectively (Table 3).

On the other hand, the TLC was decreased significantly ($p<0.01$ and $p<0.05$) after neem and pineapple treatment in group A and B, respectively. Mean TLC before treatment was 8.18±0.71 and after treatment with neem mean TEC on 7th, 14th, 21st and 28th day were 7.54±0.35, 7.60±0.00, 7.76±0.21 and 7.80±0.57 in group A, respectively (Table 3). Rahman[16] reported that neem decreased total leukocyte count in goat. So the result of the present study is similar to the reports of Rahman[16].Mean TLC before treatment was 8.18±0.07 and after treatment with pineapple mean TLC on 7th, 14th, 21st and 28th day were 7.74±0.21, 7.76±0.00, 7.85±0.04 and 7.90±0.64 in group B, respectively. Mean TLC of untreated control group on pre-treatment (day 0) was 7.92±0.42. Mean TLC on the 7th, 14th, 21st and 28th day were 8.00±0.35, 8.24±0.71, 8.47±0.42 and 8.63±1.41 in group C, respectively (Table 3).

It may concluded that the effects of neem and pineapple were found moderate effective against gastro-intestinal nematodiasis in sheep. However, further studies on its pharmacokinetic and toxic effects if any should be carried out before extensive field use in Bangladesh.

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