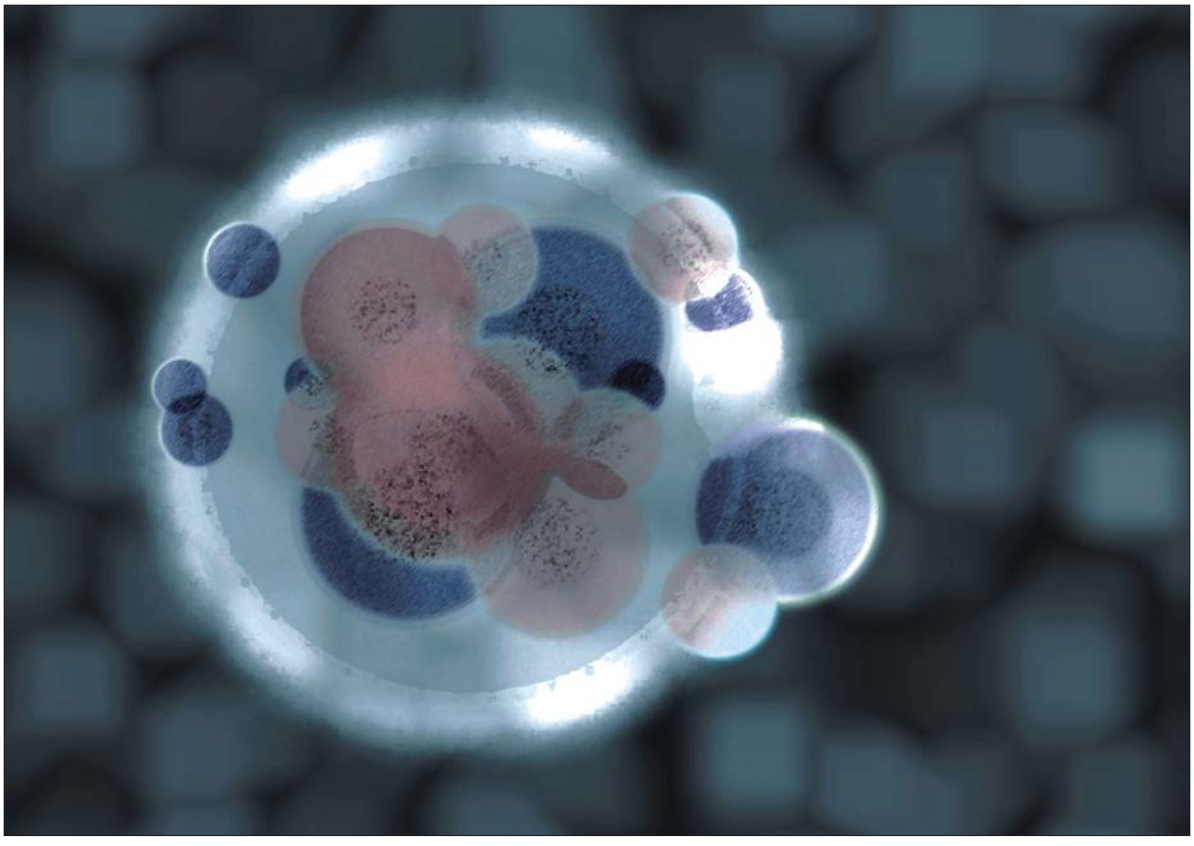

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Effects of Vermic® against Gastro-intestinal Nematodiasis in sheep

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Abstract: The present study shows that the overall prevalence of gastro-intestinal nematodes in sheep was 58.18% in Mymensingh. Sheep were infested with *Strongyloides* spp. (7.7%), *Haemonchus* spp. (18.18%), *Trichuris* spp. (5.45%), *Oesophagostomum* spp. (9.09%) and mixed infection (14.18%). Twenty 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 Vermic® (ivermectin) @ 0.23 mg kg^{-1} body weight. A significant ($p<0.01$) reduction of EPG count was found on 7th, 14th, 21st and 28th day of Vermic® (90.51, 89.85, 87.91 and 86.38%) 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 Vermic®, 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 Vermic® treated group. On the other hand body weight was decreased in untreated control group. Vermic® may be used as a broad spectrum anthelmintic against gastro-intestinal nematodiasis in sheep.

Key words: Vermic®, gastro-intestinal nematodiasis, haematological, body weight

INTRODUCTION

Agriculture is the economic backbone of Bangladesh with approximately 80% people depends on it directly or indirectly for their subsistence. The livestock is an important sub-sector which is considered to be the backbone of agriculture of Bangladesh[1]. Livestock sub-sector contributes to solve the problems of small and marginal farmers and play important role in poverty alleviation. Among livestock, there are 23.38 million cattle, 0.8 million buffaloes, 33 million goat and 1.11 million sheep in Bangladesh[2]. So sheep is very important in Bangladesh. Sheep available in Bangladesh are of indigenous type having small body size and producing hairy and course wool of varied colours. In this country, the sheep are primarily raised for meat and no attention is given for wool production or its improvement. The wool of about 3/4th of sheep population of the country remain unclipped of which if it would have been procured could yield about 0.3 million pounds of wool every year.

It is easy to rear sheep and goats than cattle and buffaloes in Bangladesh because of unavailability of pastureland. In rural areas Bangladesh, most of the families rear sheep or goats for their economic consideration. Sheep and goats are the source of protein in the form of milk and meat. Their dung is used as agrochemical fertilizer. Hide, skin and wool are considered as a source of earning foreign currency. Sheep is much more resistant to rain and other adverse environmental condition than other livestock animal. If farmers can be motivated to rear sheep in large scale it may be helpful to produce wool industry in Bangladesh.

Parasitism is a major cause of hindering the livestock development in Bangladesh[3]. The agro-ecological and geo-climatic condition of Bangladesh favours the high prevalence of parasitic infestation. Gastro-intestinal nematodiasis (Haemonchosis, Cooperiasis, Trichostrongylosis, Oesophagostomiasis and Trichuriasis) are common parasitic problem in sheep like other ruminants. The economic losses are mainly associated with retarded growth, ill health, loss of production and mortality[4,5]. The average loss of blood about 0.05 mL/day with rapid fall in Packed Cell Volume (PCV) value and decreased absorption of iron from the intestine resulting in severe anaemia and sudden death from acute blood loss due to gastro-intestinal nematodiasis[6].

In developed countries the principles of control of parasitic diseases are mainly based on pasture and barn

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management and protective treatment[7]. Whereas in Bangladesh there is no organized method and as such the parasitic infestation is controlled by using a routine prophylactic anthelmintic treatment. A large number of broad spectrum anthelmintics are commercially available in Bangladesh. Vermic® is broad spectrum anthelmintic claimed by its manufacturer. The present study was undertaken to evaluate the effects of this drug against gastro-intestinal nematodiasis. The prevalence of gastro-intestinal nematodiasis was observed in sheep. The effects of Vermic® on haematological parameters (TEC, Hb, PCV and TLC) and live body weight were also determined in this study.

MATERIALS AND METHODS

The experiment was conducted 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, 20 heavily gastro-intestinal nematodiasis infected sheep were selected for the research. The 20 sheep were divided into two groups.

Group A: Vermic® (Techno Drugs Limited, Bangladesh) injected @0.2 mg kg^{-1} body weight subcutaneously used as treated group.

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

The faecal sample from the both groups were examined by egg counting McMaster method as described by Soulsby[6] 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 (5 mL) 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[8]. 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[9].

RESULTS AND DISCUSSION

Faecal samples collected from 55 sheep and were examined to find out the prevalence of different gastro-intestinal nematodes. Out of 55 sheep, 32 were infested with *Strongyloides* spp., *Haemonchus* spp., *Trichuris* spp., *Oesophagostomum* spp. and mixed infection and the prevalence rate of parasites was 7.70, 18.18, 5.45, 3.63 and 14.18%, respectively. The prevalence of different gastro-intestinal nematodes was 58.18% in sheep. More or less similar prevalence of gastro-intestinal parasites has been reported earlier by Arslan and Mohammed[10] in cattle. In this study the dominant nematode species was *Haemonchus* spp. (18.18%). This result is in conformity with earlier reports made by Ahmad and Ansari[11] in sheep and goat, Mostofa *et al.* [12] and Lindqvist *et al.*[13] in sheep. The prevalence of *Strongyloides* spp. (7.7%) is more or less similar with the observation of Pandey *et al.*[14] in goat. The prevalence of *Trichuris* spp. (5.45%) is more or less similar with the reports made by Rahman and Ahmed[15] in cattle, Mostofa *et al.*[12] and Keyyu *et al.*[16] in Zebu cattle. The prevalence of *Oesophagostomum* spp. was 9.09%. Similar findings also observed by Islam[17] in buffaloes. The prevalence of mixed infection 14.18% found in the present study.

A significant ($p<0.01$) reduction of EPG count was found on 7th, 14th, 21st and 28th day of Vermic® treated sheep of group A (Table 1). The EPG count of untreated control group (group B) 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, receptively. The mean EPG were increased 7.88, 11.45, 20.15 and 30.26% on 7th, 14th, 21st and 28th day, respectively. Whereas, in the group A, mean EPG count before treatment was 320.20±7.07 and after treatment with Vermic® mean EPG on 7th, 14th, 21st

Table 1: Changes in faecal egg count of GI nematodes in sheep at different intervals after treatment with Vermic®

Days after treatment	Vermic® treatment (group A) GI nematodes	Untreated infected control (group B) GI nematodes
Day 0		
Eggs per gram faeces	320.20±7.07	246.20±19.29
Day 7		
Eggs per gram faeces	30.40±2.12**	265.60±22.08**
EPG increased/ reduced	90.51 (-)	7.88 (+)
Day 14		
Eggs per gram faeces	32.50±1.41**	274.40±11.31**
EPG increased/ reduced	89.85 (-)	11.45 (+)
Day 21		
Eggs per gram faeces	38.70±5.66**	87.91 (-)
EPG increased/ reduced	295.80±16.20*	20.15 (+)*
Day 28		
Eggs per gram faeces	43.60±2.12**	86.38 (-)
EPG increased/ reduced	320.70±24.49**	30.26

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

Table 2: Effects of Vermic® on body weight (kg) in sheep

Groups	Treatment	Pre-treatment '0' day	Post-treatment 7th day	14th day	21st day	28th day
A	Vermic®	15.88±0.00	16.75±0.00**	17.00±0.00*	17.40±0.00*	17.80±0.00**
B	Untreated infected control	16.46±1.22	15.95±1.48**	15.83±2.12*	15.21±0.71*	15.10±1.41**

Mean±SD, ** = 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 Vermic®

Days after treatment	Vermic® treatment (group A)	Untreated infected (group B) control
Day 0		
TEC (million/cu mm)	8.36±0.71	8.60±0.42
Hb content (g %)	7.44±0.22	7.90±0.14
PCV (%)	27.00±0.00	30.50±1.41
TLC (thousand/cu mm)	8.12±1.41	7.92±.042
Day 7		
TEC (million/cu mm)	9.20±0.71*	8.10±0.07*
Hb content (g %)	8.10±0.71	7.70±0.71
PCV (%)	32.50±1.41**	29.00±0.71**
TLC (thousand/cu mm)	7.42±0.28	8.00±0.35
Day 14		
TEC (million/cu mm)	9.12±0.00**	7.97±0.71**
Hb content (g %)	8.00±0.39*	7.40±0.28*
PCV (%)	32.00±0.00**	29.00±0.71**
TLC (thousand/cu mm)	7.45±0.28*	8.24±0.71*
Day 21		
TEC (million/cu mm)	9.10±0.00**	7.54±0.35**
Hb content (g %)	7.92±0.19	7.20±0.42
PCV (%)	31.00±0.71**	28.50±1.41**
TLC (thousand/cu mm)	7.48±0.00**	8.47±0.42**
Day 28		
TEC (million/cu mm)	9.10±0.00*	7.22±0.14*
Hb content (g %)	7.90±0.00*	7.00±0.35*
PCV (%)	31.00±0.00**	27.00±1.41**
TLC (thousand/cu mm)	7.50±0.35	8.63±1.41

Mean±SD, ** = Significant at 1% level ($p<0.01$)
* = Significant at 5% level ($p<0.05$)

and 28th day were 30.40±2.12, 32.50±1.41, 38.70±5.66 and 43.60±2.12, receptively. Reduction of mean EPG on 7th, 14th, 21st and 28th day after treatment were 90.51, 89.85, 87.91 and 86.38%, respectively. In conformity to the present findings, Praslicka *et al.*[18], Hosseini *et al.* [19], Arslan and Mohammed[10] reported similar findings in sheep. Likewise, Shastri[20], Tada *et al.* [21] and Islam *et al.*[22] observed similar results in goat. Similar results have also been stated by some researchers, Islam *et al.*[23] in cattle, Stevenson *et al.* [24]in cattle, Islam[17] in buffaloes and Sharma[25] in camel.

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 B, receptively. Mean body weight before treatment was 15.88±0.00 and after treatment with Vermic® mean body weight on 7th, 14th, 21st and 28th day were 16.75±0.00, 17.00±0.00, 17.40±0.00 and 17.80±0.00 in group A, receptively. The body weight gains in the ivermectin treated sheep are supported by previous reports[23,26]. 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 TEC was increased significantly ($p<0.01$ and $p<0.05$) after Vermic® treatment in group A (Table 3). Mean TEC before treatment was 8.36±0.71 and after treatment with Vermic® mean TEC on 7th, 14th, 21st and 28th day were 9.20±0.71, 9.12±0.00, 9.10±0.00 and 9.10±0.00 in group B, receptively. Similar findings also reported due to ivermectin by several workers[17,22,26]. 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 B, receptively. 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 ($p<0.05$) in Vermic® treated sheep of group A. 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 B, receptively. Mean Hb content before treatment was 7.44±0.22 and after treatment with Vermic® mean Hb content on 7th, 14th, 21st and 28th day were 8.10±0.71, 8.00±0.39, 7.92±0.19 and 7.90±0.00 in group A, receptively. Similar results have also been stated due to ivermectin treatment by some researchers Islam *et al.*[22] in goat, Yousif *et al.*[27] in sheep, Islam *et al.*[23] in cattle, Islam[26] in goat and Islam[17] in buffaloes. 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 Vermic® treatment in group A. 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 B, receptively. Mean PCV before treatment was 27.00±0.00 and after treatment with Vermic® mean PCV on 7th, 14th, 21st and 28th day were 32.50±1.41, 32.00±0.00, 31.00±0.71 and 31.00±0.00 in group A, receptively. The present findings were in agreement of the works with Yousif *et al.*[27] in sheep, Islam[26] in goat, Islam *et al.*[23] in cattle, Islam *et al.*[22] in goat and Islam[17] in buffaloes.

On the other hand, the TLC was decreased significantly ($p<0.01$ and $p<0.05$) after Vermic® treatment

in group A. Mean TLC before treatment was 8.12±1.41 and after treatment with Vermic® mean TLC on 7th, 14th, 21st and 28th day were 7.42±0.28, 7.45±0.28, 7.48±0.00 and 7.50±0.35 in group A, 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 B, receptively. These findings cannot be compared due to lack of similar published reports.

It may concluded that the effects of Vermic® was found to be 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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