Wayamba Journal of Animal Science - ISSN: 2012-578X; P107-P109, 2011
First Submitted April 20, 2011; Number 1304573729

HAEMATOLOGICAL ALTERATIONS AND THERAPEUTIC EFFICACY OF SELECTED ANTHELMINTICS IN GASTROINTESTINAL NEMATODE INFECTED SPOTTED DEER (CERVUS AXIS)

S. Kanungo,[1] A. Das,[2] M. Das Gupta[3] and A.K.M. Fazlul Huque[1]

1*Department of Medicine, Faculty of Veterinary Science, Bangladesh Agricultural University (BAU), Mymensingh, Bangladesh.*
2*Department of Genetics and Animal Breeding,*
3*Department of Microbiology, Faculty of Veterinary Medicine, Chittagong veterinary and Animal Sciences University, Chittagong, Bangladesh.*

The investigation was undertaken to study the hematological changes and efficacy selected anthelmintics in gastrointestinal nematodiasis affected spotted deer. The hematological picture gave the evidence of anemia in spotted deer affected with gastrointestinal nematodiasis, characterized by a significant reduction ($p<0.01$) in total erythrocyte counts (TEC), haemoglobin (Hb) and alteration in values of MCV, MCH and MCHC. A significant leukocytosis ($P<0.05$) was evident in gastrointestinal nematodiasis affected spotted deer. Albendazole and levamisole were found to be effective in reducing fecal eggs count but the efficacy of albendazole was higher in contrast to levamisole.

Key words: Albendazole, Anemia, Levamisole, Leukocytosis and Spotted deer

Deer (harin) is a ruminant of the family Cervidae, belongs to the order Artiodactyla. The highest concentration of large deer species in the tropics occurs in southern Southeast Asia like the countries of India and Nepal. Of the four species available in Bangladesh, spotted deer chitra harin (Cervus axis) occurs in almost all forests, but now are confined only in the Sundarbans. This is undoubtedly extraordinary situation that such a great diversity still exists in an unusually overpopulated (with more than 880 people per sq km) country with a very limited range of habitats. Indiscriminate hunting, human interference, and habitat destruction have contributed to the decline of this valuable wildlife of the country.

A major health issue in captive and wild deer is infection with helminthes (Goossens et al., 2005). Kanungo et al., (2010) reported that about 76.2% captive deer were affected with gastrointestinal helminthiasis in Bangladesh. The prevalence of gastrointestinal helminthiasis in spotted of Bangladesh was, 75 percent (Kanungo et al., 2010). Anthelmintic efficacies against helminthiasis in captive deer have been reported by number of authors (Castillo-Alcala et al., 2007; Singh et al., 2006; Islam et al., 2003 and Mason, 1994). But such information is very limited in Bangladesh. Recently there are few works on hematological changes caused by gastrointestinal parasites have been reported by Chung et al. (2006); Hu-Rui and Zhang (2003); Vengust et al. (2003) and Vengust and Klinkon (2002). Moreover, there are no published inland reports on comparative haematological changes at clinical and recovery stages brought about by therapeutic treatment in captive deer. Although a number of research have been performed on the parasitism in livestock and poultry in Bangladesh, but rarely any attempt made to study the efficacy of anthelmintics that effectively make clinical recovery from parasitism in the deer. Considering these facts, the present study was undertaken to study the therapeutic efficacy of some selected anthelmintics against the nematodiasis in deer and to study the haematological parameters of the affected spotted deer both pre and post anthelmintic trial.

MATERIALS AND METHODS

Collection of blood

Ten spotted deer diagnosed positive for gastro-intestinal helminthiasis based on fecal examination (Soulsby, 1986) were used for blood collection. Blood samples were collected once before anthelmintic trial and once at 30th days of post treatment. Blood sample also collected from 5 healthy animals (control group). Blood was collected from jugular and radial vein after tranquilization of the deer with Xylazine (Rompun® @ 3 mg/kg BW I/M) by dart gun.

Haematological examinations

Blood smear was prepared from freshly collected blood for differential leukocyte count (DLC). These smears were fixed with methanol and stained with Giema's and examined under microscope. The anticoagulant (potassium oxalate @ 1 mg/ml blood) added to blood samples were used for haematological examination. Total erythrocyte count (TEC), haemoglobin (Hb), packed cell volume (PCV) erythrocyte sedimentation rate (ESR) and total leukocyte count (TLC), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were analyzed as per methods described by Brar et al. (2000).

Anthelmintic trials

Twenty two spotted deer used for anthelmintic trials with albendazole (Helmex®, Renata Limited, Animal Health Division) and levamisole (Levavet®, The Acme laboratories Ltd.). The grouping system and treatment schedule are given below.

(i) Group A: 10 spotted deer treated with albendazole (Helmex®, Renata Limited, Animal Health Division) @ 7.5 mg/kg body weight orally (recommended dose of the manufacturer).
(ii) Group B: 7 spotted deer treated with levamisole (Levavet® The Acme Laboratories Ltd.) @ 8 mg/kg body weight, orally (recommended dose rate by Fowler, 1986).
(iii) Group C (control group): Consisting of 5 Spotted deer designated as untreated infected controls.

The recommended dose of drug administrated according to body weight of the animal. The anthelmintic efficacies of the drugs were evaluated on the basis of egg counts before and after single treatment. Individual faecal sample was collected from the rectum of animal once in pre-treatment and once weekly for four weeks in post treatment period. The egg per gram of faces (epg) was counted by Stoll's dilution technique (Samad, 1996).

Data analysis

Results were analyzed by-'t' test for significance using Statistical Package for Social Science (SPSS).

RESULTS AND DISCUSSION

Haematological findings

The heamotological changes in spotted deer affected by gastrointestinal nematodes and haematological changes due to treatment with albendazole are presented in Table 1.

In the present study, significantly ($P<0.01$) lower level of TEC and Hb was observed in infected as compared to healthy animals (control group). More or less similar finding was found in the earlier report of Chung et al. (2006). PCV also reduced slightly in nematode infected deer. There was no significant difference in neutrophil, lymphocyte monocytes and basophils count between the two groups. The increase MCV and decrease MCHC in gastrointestinal nematodiasis affected spotted deer indicates trend towards macrocytic hypochromic anemia as described by Brar et al. (2000). The probable causes of macrocytic hypochromic anemia are injury and RBC

losses (Brar et al. 2000). There are number of helminths are known to affect spotted deer; the paramphistomum and haemonchus are the most prevalent and the major cause of gastrointestinal nematodiasis in spotted deer (Kanungo et al., 2010). The adult haemonchus are voracious blood sucking worm and thereby cause anemia and damage to the intestinal mucosa of infected animal (Urquhart et al., 1996). Total leukocytes count (TLC) was significantly ($P<0.05$) increased in spotted deer with gastro-intestinal nematodiasis. This finding is supported by the earlier report of Hu-Rui and Zhang (2003). The mean value of lymphocyte was almost similar to normal value. A significant ($P<0.01$) eosinophilia evidenced in infected animals compared to healthy animals (Table 1) might be due to irritation caused by the damage and inflammation of intestinal mucosa by larval migration. The probable cause of eosinophilia is due to parasitism specially hookworms, Strongyles (Brar et al., 2000).The infected deer also showed an apparent increase in ESR (2.31±0.92 mm/hr) as compared to the uninfected group (2.20±0.79 mm/hr). Hayat et al., (1999) reported suppression of erythropoietic activity of bone marrow by parasites cause lowered TEC lead to increase ESR in infected animal.

Table 1: Haematological changes in gastrointestinal nematode infected and uninfected spotted deer

Parameters	Infected animal (n=10)	Uninfected (Control) (n=5)	Post treatment infected animal (n=10)
TEC (10^6/mm^3)	6.94±1.10**	12.34±1.58	10.36±2.58*
Hb (gm %)	10.12±2.23**	13.70±2.53	12.79±3.10
PCV (%)	38.80±3.85	41.60±5.76	40.60±4.40
ESR (mm/hr)	2.31±0.92	2.20±0.79	2.30±1.34
TLC (10^3/mm^3)	4.91±0.79*	4.07±0.70	3.98±0.40
Eosinophil (%)	10.60±3.62**	5.60±2.17	5.10±2.23
Neutrophil (%)	35.60±14.88	33.60±8.55	35.20±10.30
Lymphocyte (%)	45.40±10.24	46.80±6.55	35.10±11.59*
Monocyte (%)	1.90±1.37	3.20±1.23	2.30±1.64
Basophil (%)	0.40±0.69	0.80±0.79	0.80±0.63
MCV (fl)	57.04	34.48	40.99
MCH (pg/dl)	13.50	11.04	12.58
MCHC (g/dl)	26.29	34.06	31.42

** Significant at 1% level of probability ($p<0.01$) and *Significant at 5% level of probability ($p<0.05$)

Efficacy of anthelmintics in nematodiasis

The efficacy of albendazole and levamisole in nematode infected spotted deer are presented in Table 2.

In the present study anthelmintic trial with albendazole (7.5mg/kg BW), had an excellent efficacy interms of reducing fecal egg count against gastrointestinal nematodiasis in spotted deer. Table 2 shows that epg reduced to zero on 28th day of post-treatment in animals treated with albendazole. This finding was more or less similar to the previous reports of Foreyt and Drawe (1978) and Singh et al. (2006). Castillo-Alcala et al. (2007) showed excellent recovery of gastrointestinal nematodiasis due to albendazole treatment in farmed deer. The excellent efficacy of albendazole in reducing faecal egg count was 100% by day three post treatment and no reoccurrence of infection till day 55 post treatment in eliminating the strongyles infection was reported by Singh et al. (2006). Spotted deer treated with albendazole showed improvement of body weight and their anemic condition at 30th day of post treatment. Significant changes ($p<0.05$) observed in the TEC of albendazole treated group (Table 1) could be attributed to reduction in blood loss due to parasite inhibition or clearance, which signifies recovery from helminthiasis and improvement in health status (Lasisi et al., 2001; Onyeyili, 2001). Albendazole treatment prevented the eosinophilia and leukocytosis to some degree, the levels did not decrease compared to the control group levels (Table 1). This finding is in accordance with the reports of Yarsan et al., (2003). In the present study, lymphocyte count in albendazole treated group reduced significantly.

Table 2: Efficacy of albendazole and levamisole against gastrointestinal nematodiasis.

Treatment	No. animals	Pretreatment epg of feces (mean)	Post-treatment epg of feces on days (mean) (%)			
			7th	14th	21st	28th
Albendazole @7.5mg/kg BW	10	1103	580 (47.42)	150 (86.40)	37 (96.65)	0 (100)
Levamisole @8mg/kg BW	7	862	503 (41.65)	167 (80.63)	95 (88.98)	28 (96.80)
Untreated (infected control)	5	860	833	880	973	1033

BW= Body weight; epg= egg per gram

The treatment with Levamisole (8mg/kg BW) against gastrointestinal nematodiasis remarkably reduced the fecal egg count (96.80%) at 28th days of post-treatment in barking deer (Table 1). Fowler (1986) also obtained satisfactory results with levamisole treatment against nematodiasis in deer. Levamisole does not work satisfactory against lung worm but have satisfactory result against gastrointestinal nematodiasis in deer (Mason 1994).

CONCLUSION

Changes in hematological parameters of spotted deer affected with gastrointestinal nematodiasis evidenced by anemia and leukocytosis. Major alterations in haematological parameters brought about by helminthes were significant decrease in TEC and Hb. It can be concluded that treatment with albendazole against gastrointestinal nematodiasis in spotted deer was found to be effective than treatment with levamisol. The finding of this research will be useful to know about the anthelmintic therapy for the veterinarian and zoo keepers.

REFERENCES

1. Brar, R. S., Sandhus, H. S. and Singh, A. (2000). Veterinary clinical diagnosis by laboratory methods, 1st edition, Kalyani publishers, Pp: 8-23, 46, 199-214.
2. Castillo-Alcala, F., Wilson, P. R., Pomroy, W. E. and Hoskin, S. O. (2007). A survey of anthelmintic use and internal parasite control in farmed deer in New Zealand. New Zealand Veterinary Journal.55(2):87-93.
3. Chung, Y. H., Wuk, J. S., Joon, J. I. and Suk, K. J. (2006). Reference values for total RBC, haematocrit, haemoglobin and total WBC in male elk deer (Cervus canadenis) reared in Korea. Journal of Veterinary Clinics. 23(2): 111-113.
4. Foreyt, W. J. and Drawe, D. L. (1978). Anthelmintic activity of albendazole in white-tailed deer. American Journal Veterinary Research. 39(12):1901-3.
5. Fowler, M. E. (1986). Zoo and wild animal medicine. Second edition, W. B. Saunders Company. Philadelphia, London, 981.
6. Goossens, E., Vercruysse, J., Boomker, J., Vercammen, F. and Dorny, P. (2005). A 12-month survey of gastrointestinal helminth infections of cervids kept in two zoos in Belgium. Journal of Zoo and Wildlife Medicine. 36(3): 470-478.
7. Hu-Rui, Wen, T. F. and Zhang, A. W. (2003). Effect of An-ding and Lu-an-ning on blood index and Sika deer under stress. Journal of Economic Animal. 7(2): 31-35.

8. Hayat, C. S., Khalid, M., Iqbal, Z. and Akhtar, M. (1999). Haematological and Biochemical disturbances associated with Toxocara vitulorum infection in buffalo calves. Int J Agri and Bio 1(4), 247-249.
9. Islam, S. K. M. A., Ahmed, S., Hoque, M. A., Alim, M. A. and Hassan, M. M. (2003). Gastrointestinal parasites of captive deer and their response to selected anthelmintics. Bangladesh Veterinary Journal. 37(1-4): 63-66.
10. Kanungo, S. (2007). Prevalence of gastrointestinal helminthiasis and therapeutic efficacy of selected anthelmintics against nematodiasis in captive deer. MS Thesis, Department of Medicine, Bangladesh Agricultural University, Mymensingh,Bangladesh. Pp-29
11. Lasisi, O. T., Oyeyemi, M. O, Otesile, E. B. and Akusu, M. O. (2001). The efficacy of Thiophanate on Caprine Strongyle Worms. In: Proceedings of the 38th NVMA Congress (Eko 2001). Pp. 30–32.
12. Mason, P. (1994). Parasites of deer in New Zealand. New Zealand Journal of Zoology. 21: 39-47.
13. Samad, M. A. (1996). Pashu Palon O Chikitsavidya. 1st Pub., Lyric-Epic prokashoni, BAU Campus, Mymensingh.
14. Onyeyili, P. A. (2000). Anthelmintic efficacy of some plants used in ethno veterinary practices in the arid zone of North Eastern Nigeria. RGA No. 28, Project Report. Pp. 21.
15. Singh, P., Gupta, M. P., Singla, L. D., Sharma, S., Sandhu, B. S. and Sharma, D. R. (2006). Parasitic Infections in Wild Herbivores in the Mahendra Choudhury Zoological Park, Chhatbir, Punjab. Case report Zoos' Print Journal. 21(11): 2459-2461.
16. Urquhart G. M., Armour, J., Duncan J. L., Dunn, A. M. and Jennings, F. W. (1996). Veterinary Parasitology. 2nd ed. Blackwell Sciences Ltd. Pp- 19-21
17. Vengušt, G. (2003). Comparison of the parasitic fauna of fallow deer (Dama dama) from two enclosures in Slovenia. Slovenian Veterinary Research. 40(1): 27-31.
18. Vengušt, G. and Klinkon, M. (2002). Red blood cell count, haemoglobin concentration, packed cell volume and red blood cell constants of fallow deer (Dama dama L.) in Slovenian hunting enclosures. Slovenian Veterinary Research. 39(3/4): 207-213.
19. Yarsan, E., Altinsaat, U., Ayuek, H., Sahündokuyucu, F. and Kalkan, F. (2003). Effects of albendazole treatment on haematological and biochemical parameters in healthy and toxocara canis infected mice. Turk J Vet Anim Sci. 27:1057-1063.

