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Studies on Strongylosis in Equines with Special Emphasis on Hematology and Chemotherapy

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Abstract
The prevalence of strongylosis was found to 31.7 percent being 34.0, 30.0 and 31.0 percent, in stud, tonga and riding horses, respectively. Blood picture of the naturally infected animals showed normocytic and normochromic anaemia. Invermectin at the dose level of 0.4 mg kg^{-1} completely eliminated the egg burden from day 14 post treatment onward. Similar trend is followed at 0.2 mg kg^{-1} dose level with a small variation.

Introduction
The population of equines in Pakistan has been estimated to be 4.9 million heads, comprising of 0.3 million horses, 0.1 million mules and 4.5 million donkey (Anonymous, 1998). Strongylosis is one of the major parasitic problems of equines. Infected animal show anorexia, diarrhoea, loss of weight and moderate anaemia which results in heavy mortality (Soulsby, 1982). More than 40 different species of strongyle have been recorded infecting horses. Mixed infections with different species of strongyle is common in equines of all ages and this parasitism persists throughout the year (Lyons *et al.,* 1991). Strongyle suck blood and cause changes in haematological values like reduced cell survival, eosinophilia, monocytopenia and an increased rate of albumin catabolism. The prevalence of strongylosis and associated hematological changes and efficacy of ivermectin in local conditions have not been reported. This paper describes the results of study in these aspects in horses.

Materials and Methods
Prevalence: Six hundred horses comprising of 200 each stud, tonga and riding horses were randomly examined for strongylosis from different localities in and around Faisalabad. These horses represented three different managemental practices. Fresh faecal samples were collected directly from the rectum of horses in polythene bags and examined in the Department of Veterinary Parasitology, University of Agriculture, Faisalabad for the presence of Strongyle ova/larvae by direct smear and centrifugal floatation methods (Soulsby, 1982).

Haematology and chemotherapy: A total of 72 strongyle infected horses of almost same age were used for haematology and chemotherapeutic trials. The selected horses were divided into group A, B and C (24 each) having sub-groups A_1, A_2 and A_3; B_1, B_2 and B_3; C_1, C_2 and C_3 (8 each), respectively. The animals in sub-groups A_1, A_2, B_1, B_2, C_1. C_2 were treated with ivermectin at dose levels of 0.2 and 0.4 mg kg^{-1} body weight intramuscularly, respectively. Sub-groups A_3, B_3 and C_3 were kept as untreated control. Faecal and blood samples were collected on day 0,7,14,21,28 and 35 post-treatment for eggs per gram (EPG) and different haematological parameters, respectively. The haematological parameters included total erythrocyte count (TEC), total leukocyte count (TLC), differential leukocytic count (DLC), haemoglobin (Hb) estimation and packed cell volume (PCV) were determined according to the method of Benjamin (1978). Efficacy of anthelmintic was determined on the basis of percentage reduction in egg per gram of faeces (Sohail, 1989).

Results and Discussion
An overall prevalence of strongylosis was 31.7 percent (n = 190/600) being 34.0 (68/200), 30.0 (60/200) and 31.0 percent (62/200) in stud, tonga and riding horses, respectively. There was no difference ($p>0.05$) in the prevalence of strongylosis among stud, tonga and riding horses. The prevalence of strongylosis has wide variation. For instance, it has been reported to be 87.7 percent in Yugoslavia (Silobad, 1981); 93.3 percent in Chile (Alcaino *et al.,* 1983); 44.3 percent in Germany (Gothe and Heil, 1984) and 52.7 percent in India (Subbarayudu *et al.,* 1995); 40.0 and 28.0 percent in Pakistan (Sohail, 1989; Mange, 1993). The difference in the prevalence of the disease could be attributed to the seasonal, ecological differences and/or the number examined. Hot and humid climate is more conducive for the proliferation of parasites leading to higher rates of prevalence. The results of the present investigation revealed a relatively higher prevalence of strongylosis in tonga horses compared with stud and riding horses. It was expected at the initiation of the study that toga horses would be more infected as compared with stud or riding horses due to possible difference between the managemental practices and more exposure of animals to infection. However, this supposition did not prove true and indicated that all type of horses were almost equally exposed to infection. For control purposes, all types require equal attention and education of the owners regarding the use of anthelmintic.

Haematology and chemotherapy: It is evident from the results (Table 1) that the values of TEC, Hb and PCV are low in infected untreated (control) animals as compared with those of infected treated. These findings are in agreement with those of Blood *et al.* (1983) who have reported reduction in the blood values in strongylosis which are suggestive of anaemia. TLC in the infected animals was, although lower but a little difference was noted between the infected untreated and infected treated groups. Likewise, Lymphocyte counts, although, lower in infected animals, yet the counts are within the normal range

Table 1: Effect of strongylosis on various blood parameters in equines

Blood parameters	Stud			Tonga			Riding		
	Infected treated mg kg^{-1}		Control	Infected treated mg kg^{-1}		Control	Infected treated mg kg^{-1}		Control
	0.2	0.4		0.2	0.4		0.2	0.4	
Total erythrocyte count (10^6/ml)	3.84	3.92	3.47	3.61	3.75	3.41	3.91	4.03	3.79
Total leukocyte count (10^6/ml)	4.50	4.41	4.78	5.13	5.22	5.79	4.30	4.86	5.17
Neutrophils (%)	35.71	25.88	23.48	26.50	27.02	24.54	27.65	28.15	26.63
Lymphocytes (%)	59.92	60.10	54.21	62.00	61.2.1	60.77	60.00	54.92	59.02
Monocytes (%)	2.79	3.08	2.00	2.40	3.23	0.92	2.21	3.04	1.71
Eosinophil (%)	11.33	10.56	13.88	8.73	8.50	11.88	6.63	6.73	7.94
Basophil (%)	0.96	1.44	0.92	1.15	1.19	0.79	1.08	1.12	1.00
Hemoglobin (g/100 ml)	11.08	13.06	10.94	12.25	13.63	11.10	12.14	13.21	11.50
Packed cell volume (%)	33.17	32.86	31.92	32.94	32.19	31.75	34.40	33.65	32.88
Eggs per gram of faeces	118.75	290.63	744.80	31.25	188.54	679.17	86.46	294.79	1343.75

Table 2: Egg per gram (EPG) in infected treated and infected untreated horses

Days post treatment	Stud			Tonga			Riding		
	Infected treated mg kg^{-1}		Control	Infected treated mg kg^{-1}		Control	Infected treated mg kg^{-1}		Control
	0.2	0.4		0.2	0.4		0.2	0.4	
0	687	1731	737	162	1075	656	493	1718	1337
7	25	12	625	25	25	662	25	50	1350
14	0	0	750	26	0	681	0	0	1343
21	0	0	775	62	31	793	0	0	1331
28	0	0	800	2	0	643	0	0	1356
35	0	0	781	8	0	637	0	0	1343

(Tizzard, 1982). The results of the lymphocyte counts are in agreement with those of Hopper *et al.* (1984) who have reported that super infection with strongyle larvae did not cause any change and the lymphocyte counts remained within the normal range. Significantly higher eosinophil counts in infected untreated animals are according to the findings of Scrutchfied (1978) who has observed 10-15 percent increase in eosinophil counts in verminous arteritis due to migrating *Strongylus vulgaris* larvae. This increase in eosinophil count was due to the extremely elevated levels of IgE in parasitized individuals which mediate mast cell degranulation thereby stimulate release of eosinophil chemotactic factor of anaphylaxis. This material, in turn mobilizes the body's eosinophil pool resulting in the release of large number of eosinophil into the circulation (Tizzard, 1982).This type of blood picture is suggestive of normocytic, normochromic anaemia. Similar changes have been reported by Duncan and Dargie (1975). Although the strongyle are voracious blood suckers, yet blood picture of the animals studied did not extremely differ in blood values compared with the normal ranges. It is believed that the effect of parasites on the blood picture of animals is correlated with the managemental conditions, intensity of infection and immune status of the animals.

It is evident from Table 2 that a significant ($p>0.05$) decrease in EPG of infected treated group by day 7 post treatment. A few number of eggs were passed in the tonga horses treated with 0.2 mg kg^{-1} till day 35. However, decrease in EPG was also observed in all infected treated animals by day 14 to 35 post treatment at the dosage levels of o.4 mg kg^{-1} body weight There was a highly significant ($p<0.05$) effect of ivermectin at both dose levels in treated as compared with untreated control animals with a difference in the dose levels. The results suggested that ivermectin at dose level of 0.4 mg kg^{-1} was more effective compared with that 0.2 mg kg^{-1}. No local or systemic or side effects were observed after injection. The results of the present study are in close agreement with those of DiPietro *et al.* (1982), Asquith and Kulwich (1981), Mirck and Van Meurs (1982), El-Abdin *et al.* (1983), Borgsteede (1985) and Lyons *et al.* (1991) who have reported the similar effects of ivermectin in Strongylosis in horses.

The results of this study indicated that strongylosis is an important health problem of the equines in Faisalabad which is speculated to cause heavy economic losses. Therefore, regular screening of the equines for this disease and its immediate treatment is suggested.

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