HAEMATO-BIOCHEMICAL CHANGES IN CANINE DEMODICOSIS ON TREATMENT

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Abstract

Twenty four positive cases of canine demodicosis divided into four treatment groups 1) Ivermectin 200µg/kg/s/c fortnightly, 2)Amitraz 0.05% topically weekly, 3) combination of Ivermectin and Amitraz at the same dose rate and schedule and 4) Ivermectin, Amitraz, Levamisole-2.5mg/kg/s/c weekly, analyzed for hematological and biochemical parameters revealed significantly lower values for haemoglobin and PCV in affected groups compared to the controls with PCV being significantly different in before and after treatment values of groups in 1, 3 and 4. Eosinophil count was significantly higher for the affected groups compared to the control, with all treatment groups except group 1 returning to normal values after treatment. Biochemically significant lowering of albumin and A:G ratio and increase in globulin was observed between the affected groups and control group with all treatments effective in bringing the values towards normal, though the difference being statistically significant only in group 4.

Key words: *Demodicosis, hemoglobin, PCV, total leucocyte count, total protein, albumin, globulin, A:G ratio*

Demodicosis is one of the major skin ailments among dogs. Generalized demodicosis along with secondary bacterial infection causes septicemia and toxemia leading to deteriorated condition in affected dogs. Hematological changes in demodectic dogs were reported by Aujla et al. (2000) and Roy et al. (1991). Alteration in the level of plasma proteins especially albumin in affected dogs were reported by Reddy et al. (1992). Consistent elevation of globulin fraction, in dogs with generalized demodicosis were noted (Muller et al., 1989). Present paper studies the effect of various treatments on the hematological and biochemical indices of demodicosis affected dogs.

Materials and Methods

Twenty four positive cases of canine demodicosis reported at University Veterinary Hospitals, Mannuthy and Kokkalai were randomly grouped into four each comprising of a minimum of six cases. Treatment was given as per Table 1 and treatment trials were undertaken for a period of minimum eight weeks irrespective of the prognosis or until the skin scrapings were negative. Blood samples collected before and

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after the treatment trials, were analyzed for hemoglobin, packed cell volume, total leucocyte count, differential leucocyte count and absolute leucocyte count (Benjamin, 1985). Serum samples were subjected to the estimation of total protein by direct biuret method (Gormall *et al.,*1949) and albumin (Bromocresol green method by Doumas *et al.,*1971), and globulin concentrations were derived from these values and A:G ratio is calculated. A control group of six healthy dogs were also analysed for the same haematological and biochemical parameters and statically anlysed with the affected group.

Results and Discussion

The hematological and biochemical indices, of affected dogs, before and after the four treatment trials and their comparison with that of the control dogs is summarized in Table 2. The mean value of hemoglobin and PCV in affected group was significantly different from those of control group. The difference in the mean value of PCV before and after treatment was significant (P<0.05) in group resorted to ivermectin treatment and combination therapy (Group III & Group IV). Mean PCV values before and after treatment showed nonsignificant variation (P≥0.05) in amitraz treated group. Though the difference was significant in the ivermectin treated group, the after treatment values were significantly (P<0.05) lower than the control group value. Total leucocyte count, absolute neutrophil count, absolute lymphocyte count and absolute monocyte count revealed nonsignificant variation, while the absolute eosinophil count was significantly (P<0.05) higher in affected dogs compared to control group which reduced to normal with all the three treatment trials except ivermectin alone.

Biochemical parameters revealed significant (P<0.05) difference in A:G ratio and globulin value in demodicosis affected dogs compared to control. Mean value of albumin was lower in all treatment groups before treatment compared to after treatment value and control group value. Total serum protein before treatment was higher compared to control although statistical difference was observed only in group I and group IV. All the treatments were effective in increasing the A:G ratio, albumin and reducing the globulin towards the control group value but significant difference in mean value of A:G ratio before and after treatment was observed in group treated with a combination of ivermectin, amitraz and levamisole.

Decreased hemoglobin content and PCV may be due to the deteriorated condition of affected dogs as a result of reduced food intake, systemic illness, toxemia and septicemia caused by the mites as well as by secondary bacterial infection as indicated by Pathak and Bhatia (1986) and Dimri *et al.* (2000). Significant difference (P<0.05) in the mean values of PCV before and after treatment in groups III and IV indicates higher efficacy of combination therapy in improving the general health status of affected dogs in agreement with Uysal (2001). Although the difference between the before and after treatment values of PCV were significant (P<0.05) in the ivermectin treated group, the after treatment values were still significantly lower than the control group value.

According to Muller *et al.* (1989) no neutrophil deficiency or abnormality was detected in demodicosis affected dogs as also is the case with humoral immunity. In terms of cellular immunity the T-cell defect appeared to be suppression rather than deficiency. The defect is seen in lymphocytic blastogenesis to the mitogens. This may be the reason for the

Table 1. Schedule of treatment.

Group	Drugs	Dose	Route of administration	Treatment interval
I	Inj. Ivermectin	200 mcg/kg	S/c	14 days
II	Amitraz	0.05%	Topical	7 days
III	Inj. Ivermectin + Amitraz	200 mcg/kg 0.05%	S/c Topical	14 days 7 days
IV	Inj. Ivermectin + Amitraz + Levamisole	200 mcg/kg 0.05% 2.5 mg/kg	S/c Topical S/c	14 days 7 days 7 days

Table2. Hematological and biochemical parameters before and after treatment in comparison to the control. Each treament group values are statistically anlysed against the control grooup only and not compared between the groups.

(Mean ±SD)

Parameters	Control	Group I		Group II		Group III		Group IV	
		Before	After	Before	After	Before	After	Before	After
Haemoglobin (g/dl)	14.63 ± 1.14^{ab}	11.27 ± 2.54^{a}	12.5 ± 1.93^{b}	11.37 ± 0.94^{a}	12.95 ± 1.68	11.61 ± 0.87^{a}	13.23 ± 0.71^{a}	11.75 ± 0.87^{a}	13.20 ± 1.17
Packed cell volume (%)	47.00 ± 5.55^{a}	34.7 ± 4.29^{a}	40.8 ± 3.91^{a}	34.17 ± 5.19^{a}	41.33 ± 6.62	36.67 ± 3.33^{ab}	43.50 ± 2.17^{a}	34.33 ± 7.74^{ab}	39.67 ± 5.89^{a}
Total leucocyte count (10^3/mm^3)	13.13 ± 1.88	12.84 ± 1.57	12.54 ± 1.97	13.11 ± 0.99	13.20 ± 1.44	12.83 ± 2.75	12.66 ± 2.51	12.47 ± 2.99	13.89 ± 2.79
Neutrophils (10^3/mm^3)	8.52 ± 1.73	8.96 ± 1.99	8.85 ± 1.24	8.96 ± 1.99	8.85 ± 1.24	8.49 ± 2.00	8.65 ± 1.49	8.99 ± 2.18	8.73 ± 1.69
Lymphocytes (10^3/mm^3)	4.25 ± 0.89	3.36 ± 0.64	3.15 ± 0.85	3.52 ± 0.70	3.71 ± 0.97	3.36 ± 0.64	3.15 ± 0.85	3.25 ± 1.49	3.42 ± 1.21
Monocytes (10^3/mm^3)	0.22 ± 0.16	0.19 ± 0.18	0.17 ± 0.19	0.18 ± 0.18	0.25 ± 0.16	0.11 ± 0.13	0.13 ± 0.09	0.23 ± 0.17	0.12 ± 0.09
Eosinophils (10^3/mm^3)	0.13 ± 0.12^{a}	0.33 ± 0.12^{a}	0.37 ± 0.40	0.53 ± 0.22^{ab}	0.16 ± 0.07^{a}	0.86 ± 0.24^{ab}	0.15 ± 0.07^{a}	0.67 ± 0.39^{ab}	0.16 ± 0.16^{a}
Basophils	--	--	--	--	--	--	--	--	--
Albumin (g/dl)	2.69 ± 0.12	2.35 ± 0.80^{a}	2.58 ± 0.86^{a}	2.30 ± 0.70	2.56 ± 0.25	1.56 ± 0.56^{a}	2.16 ± 0.69	2.68 ± 0.68	3.44 ± 0.86
Globulin (g/dl)	3.81 ± 0.73^{ab}	5.87 ± 1.64^{a}	5.65 ± 1.79^{b}	5.23 ± 0.66^{a}	4.89 ± 0.28^{b}	6.66 ± 2.47^{a}	5.77 ± 2.08	5.80 ± 1.20^{ab}	4.28 ± 1.42^{a}
A:G ratio	0.72 ± 0.11^{a}	0.45 ± 0.24^{a}	0.52 ± 0.27	0.45 ± 0.21^{a}	0.52 ± 0.25^{b}	0.28 ± 0.17^{a}	0.47 ± 0.37	0.50 ± 0.16^{ab}	0.88 ± 0.35^{a}
Total protein (g/dl)	6.50 ± 0.85^{ab}	8.23 ± 1.25^{a}	8.24 ± 1.29^{b}	7.36 ± 0.83	7.43 ± 0.50	8.23 ± 2.29	7.93 ± 1.76	8.59 ± 1.31^{a}	7.71 ± 1.58

Values bearing the same superscripts in a row within each treament group and the control group are statistically significant (P<0.05)

normal leucocyte count and lymphocyte count observed in the present study in agreement with Chhabra *et al.* (2000), while Pathak and Bhatia (1986) reported leucocytosis and Dimri *et al.* (2000) reported leucocytosis and lymphopaenia in affected dogs.

The high eosinophil count as observed in the present study might be due to allergic reaction towards mites and their products which represented a highly significant antigen concentration in agreement with Dimri *et al.* (2000) and Aujla *et al.* (2000). The restoration of the values towards control group indicated the efficacy of treatment in clearing the mites. The inefficacy of ivermectin may be due to worsening of the generalized cases.

Significant (P<0.05) higher value of globulin and hypoalbuminemia observed in the present study is in agreement with Reddy *et al.* (1992) and Shakir *et al.* (1998). Consistent elevation of α2 and β globulin fraction in generalized demodicosis were noted while elevation of γ globulin was inconsistent but elevation of γ globulin usually accompanied pyoderma which is a common sequel of generalized canine demodicosis (Muller *et al.*, 1989). Hypoalbuminemia observed in the present study may be due to reduced feed intake and deteriorated condition in demodicosis affected dogs. The increased globulin and decreased albumin contributed towards the decreased A:G ratio. Significant difference between A:G ratio was observed in the group treated with a combination of ivermectin, amitraz and levamisole before and after treatment. This may be due to the immunostimulatory effect of both levamisole (Roberson, 1982) and ivermectin (Blackley and Rosseux, 1991 and Charach, 1995) on T-lymphocyte which aided in a faster response and caused reduction in B-cell hyperactivity.

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