HAEMATOBIOCHEMICAL STUDIES IN DOGS AFFECTED WITH BACTERIAL DERMATITIS

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Abstract

Infected group of dogs had significantly lower mean values of haemoglobin content, volume of packed red cells, total erythrocyte count and total leucocyte count. Hyperglobulinaemea, hyperglycaemia and a mild increase in blood cholesterol was observed in affected dogs. Serum mineral examination of infected animals in the present study revealed an increase in zinc and iron.

Keywords: *Bacterial dermatitis, minerals, haematological, biochemical.*

Cutaneous bacterial infections or bacterial pyoderma are one of the most common canine skin diseases presented to a veterinary dermatologist. Diagnosis of cutaneous bacterial infections are often confusing because the condition can be secondary to a number of other integumentary conditions such as atopy, flea bite, mange or hormonal and nutritional imbalances and other systemic diseases. The haematological, serum biochemical and serum mineral estimation can be used for identifying an underlying problem, which might be a contributing factor in the development of the disease.

Materials and Methods

The present study was carried out in the Department of Veterinary Epidemiology and Preventive Medicine, College of Veterinary and Animal Sciences, Mannuthy for a period of one year from February 2009 to January 2010. Dogs presented to Veterinary teaching Hospitals of Mannuthy and Kokkalai with clinical signs suggestive of bacterial dermatitis were included in the study.

Three milliliters of blood was collected from cephalic vein of affected dogs in sterile syringes with EDTA as anticoagulant at the rate of 1 mg/ml of blood and the specimen examined on the same day. A drop of blood was collected on clean grease free slide to prepare a blood smear (Benjamin, 1985). Five millilitres of blood was collected in a test tube for separating serum. Sera separated were stored at -20°C till further analysis.

Capillary blood from the ear tip was used for blood glucose estimation of affected dogs with glucometer (Ez -Smart -168 Blood glucose monitoring system) as per the manufacturer's instruction.

Haematological examination of the blood samples (Hb, VPRC, Total erythrocyte count, total leucocyte count, differential leucocyte count) was carried out as per the method described in Benjamin (1985).

Biochemical estimations of serum total protein, albumin, globulin, albumin globulin ratio, cholesterol were carried out on stored serum samples by spectrophotometry in Merck 200 spectrophotometer using commercially available kits (Agappe Diagnostics).

Serum calcium, zinc, iron and copper were estimated using Atomic Absorption Spectrometer (Perkin-Elmer 3110).

Blood and serum samples were collected from six healthy dogs for control study.

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Table 1. Mean values of haematological parameters of infected and control group

Haematological parameters	Mean values ± SD		t values
	Control (n=6)	Infected (n=42)	
Haemoglbin (g/dl)	13.36 ± 0.64	11.74 ± 0.32	1.408^{NS}
Volume packed red cell (per cent)	36.89 ± 1.27	33.75 ± 1.77	1.115
Total erythrocyte count ($10^6/mm^3$)	6.24 ± 0.46	4.63 ± 0.32	2.166
Total leukocyte count ($10^3/mm^3$)	14.37 ± 0.46	11.31 ± 1.69	2.123^{NS}
Neutrophils (per cent)	62.33 ± 1.87	69.33 ± 1.84	2.182
Lymphocytes (per cent)	28.33 ± 3.74	27.833 ± 2.29	0.087^{NS}
Eosinophils (per cent)	5.78 ± 1.56	1.75 ± 0.74	2.178
Monocytes (per cent)	3.33 ± 2.12	0.42 ± 0.34	2.505^{NS}

P<0.05 - Non significant variation

Table 2. Mean values of biochemical parameters of infected and control group

Biochemical parameters	Mean values ± SD		t values
	Control (n=6)	Infected (n=42)	
Blood glucose (mg/dl)	105.22±11.03	89.8 ± 2.91	2.5605^{NS}
Cholesterol (mg/dl)	78.00 ± 8.22	90 ± 8.90	0.6455^{NS}
Total protein (g/dl)	6.63 ± 0.57	7.72 ± 0.51	0.922^{NS}
Albumin (g/dl)	3.17 ± 0.25	2.26 ± 0.15	2.4442
Globulin (g/dl)	3.47 ± 0.44	5.36 ±0.54	1.7441^{NS}
A/G ratio	0.93 ± 0.13	0.93 ± 0.13	0.767^{NS}

P<0.05 -Non significant variation

Results and Discussion

Haematological Parameters

Infected group of dogs had significantly lower mean values of haemoglobin content, volume of packed cells, total erythrocyte count, total leucocyte count (11.74 ± 0.32 g/dl, 33.75 ± 1.76 per cent, 4.63 ± 0.32 $X10^6/mm^3$) respectively when compared to respective mean values of control animals (13.36 ± 0.64 g/dl, 36.89 ± 1.27 per cent, 6.24 ± 0.46 $X10^6/mm^3$) as furnished in table 1. This indicated anaemia in diseased dogs and could be explained with significantly lower copper values in infected animals obtained in serum mineral estimation since lowering of the copper content in blood was a constant finding in anaemia (Maynard *et al.*, 1979). Differential leucocyte count in infected animals indicated neutrophila (69 per cent) and reduced levels of eosinophils and monocytes (1.75 per cent and 0.42 per cent respectively). Neutrophilia in infected animals was reported by Mason (1991), Medleau (1991) and Kumar *et al.* (2006).

Biochemical Parameters

In the present study, as depicted in table 2, the mean values of total protein, albumin, globulin, A/G in diseased animals were as follows *ie,* 7.72 ± 0.52 , 2.26 ± 0.15 g/dl, 5.36± 0.54 g/dl, 0.93 ± 0.13. The values of albumin were significantly lower than the mean values of control animals and that of total protein and globulin was higher than those of control animals. This finding is in agreement with Mason (1991) who reported hypergammaglobulinaemia and hypoalbumin aemia in dogs affected with bacterial dermatitis. Krick and Scott (1989) reported mildly increased levels of globulin (4.1 to 5.2 g/dl) in affected dogs. A mild increase in total protein values in present study might be due to increased inflammatory response assorted with infection.

Table 3. Serum mineral status of infected and control group

Minerals	Mean values ± SD		t values
	Control (n=6)	Infected (n=42)	
Calcium (mg/dl)	10.15 ± 1.78	11.95 ± 1.99	0.438^{NS}
Iron (µg/ dl)	105 ±15.93	354.96 ± 45.33	2.24
Copper (µg/ dl)	115 ± 20.08	49.5 ± 3.49	1.9237^{NS}
Zinc (µg/ dl)	51 ± 1.52	240.6 ± 27.63	3.0326

P<0.05 - Non significant variation

Blood glucose level and cholesterol level of infected dogs of present study were 89.80 ± 2.91 mg/dl and 90 ± 8.90 mg/dl) respectively. This finding was in agreement with Gowda *et al.* (1982) who reported hypercholesterolemia and hypoglycaemia in experimentally infected dogs.

Serum Mineral Status

Mean values of serum calcium of infected dogs obtained in the present study was 11.95 ± 1.99 mg/dl as against the control value of 10.15 ± 1.78 mg/dl. There is no statistical difference between the values of infected and control group (Table 3).

Mean value of iron in infected animals was 354.96 ± 45.33 µg/dl and it was significantly higher (P<0.05) than that of control animals.

Mean values of copper in infected and control group were 49.5 ± 3.49 µg/ dl and 115 ± 20.08 µg/ dl respectively. This finding was in accordance with Pal *et al.* (1995), Mathews (1999) and Udayasree (2004) who reported a decrease in level of copper in cases of bacterial dermatitis.

Mean value of zinc in the infected group (240.6 ± 27.63 µg/dl) was significantly higher than the normal control value (51 ± 1.52 µg/dl).

Serum mineral examination of infected animals, revealed an increase in zinc and iron levels. The presence of these minerals would have limited the absorption of copper (Underwood, 1981) and hence the lower level of copper in the present study.

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