

## Haematobiochemical Changes in Canine Demodectosis

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*Thirty five dogs brought to Veterinary Clinical Complex CSKHPKV Palampur suffering from demodectic mange were included in the present study. These were randomly allotted to four groups irrespective of sex, breed and age. Ten apparently healthy dogs were chosen to serve as control. Various haematobiochemical parameters like Hb, PCV, TLC, TEC, DLC, MCV, MCH, blood glucose, total protein, albumin, globulin, A: G ratio, total immunoglobulins and Vitamin A of affected dogs and control were studied. ) In all the four affected groups, the mean values of Hb, PCV and TEC were significantly lower ( $P < 0.01$ ) and MCV and MCH were significantly higher ( $P < 0.01$ ). The mean blood glucose levels, total protein and albumin was significantly lower ( $P < 0.01$ ) with a significant increase ( $P < 0.01$ ) in mean plasma globulin. The mean serum immunoglobulins were significantly higher ( $P < 0.01$ ) and mean plasma vitamin A was significantly lower ( $P < 0.01$ ) in all the dogs suffering from demodectic mange when compared to corresponding values of healthy control group. Leucocytosis, neutrophilia, eosinophilia and lymphopenia was also observed in affected group. A significant decrease ( $P < 0.01$ ) was also observed in albumin: globulin ratio in affected animals in contrast to healthy control group.*

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### KEYWORDS

Mange, dogs, sex, breed, age.

### INTRODUCTION

Demodectic mange is a common skin disease of dogs caused by *Demodex canis*, an acarine parasite of canine hair follicles. It has been observed during clinical assessment of demodectic mange infection in mammalian biosystem that it produces haematobiochemical changes due to the impact of stress caused by mites Dalpati and Bhowmik (1996). The present study was undertaken to find out haematobiochemical changes in canines affected with demodectic mange.

### MATERIALS AND METHODS

Animals attending Veterinary Clinical Complex CSKHPKV Palampur for various skin infections were routinely subjected to skin scrapping examination. Thirty five dogs confirmed for demodectic mange infection were included in present study. In addition, ten apparently healthy dogs were chosen to serve as control. The affected dogs, irrespective of sex, breed and age were allotted randomly to four groups, (Group A, N= 9), (Group B, N= 9), (Group C, N= 9), ( Group D N= 8) and healthy dogs (N=10) were allotted to control group for haemato-biochemical investigations. From each dog under study, approximately 6ml of blood was collected on day 0 through cephalic or recurrent tarsal vein puncture for haematobiochemical estimations. For haematological study approximately 1ml of blood was kept separately. For biochemical analysis, a portion of blood was centrifuged at 1500 rpm for 15 to 20 minutes and plasma was harvested. The plasma was kept in deep freezer (-20°C) till

further use. Haematobiochemical parameters like Hb, PCV, TLC, TEC, DLC, MCV, MCH, blood glucose, total protein, albumin, globulin, A: G ratio, total immunoglobulins and vitamin A of affected and healthy animals were studied. Haemogram and leukogram were studied as per the procedure described by Jain (1986). Blood biochemicals viz. blood glucose, total protein, albumin, globulin were estimated using specific diagnostic kits\* on RA-50\*\*. Total immunoglobulins were extracted and estimated as per the method described by Lowry et al. (1951) and Osmer (1965) and estimation of vitamin A was carried out as per the method given by Baker and Frank (1968).

## RESULTS

The mean values of Hb (g/dl), PCV (%), TLC, TEC, DLC(%), MCV (fl), MCH(pg), blood glucose (mg/dl), total protein (g/dl), albumin (g/dl), globulin (g/dl), A:G ratio, total immunoglobulins (mg/dl) and Vit. A ( $\mu\text{g/dl}$ ) are illustrated in Table 1.

## DISCUSSION

The mean values of Hb, PCV and TEC were significantly lower ( $P < 0.01$ ) and MCV and MCH were significantly higher ( $P < 0.01$ ) in dogs suffering from demodectic mange as compared to control group indicating macrocytic anaemia in affected groups. This anaemia might be due to the stress arising from the disease. Similar findings were reported by Gupta and Prasad (2001) and Soodan et al. (2005). The demodectic dogs in general had significantly higher ( $P < 0.01$ ) TLC, neutrophils and eosinophilic count than healthy control. Leukocytosis along with neutrophilia and eosinophilia concurred with the findings of Sharma et al. (2005). The generalized inflammation and response of leucocytes to prolonged antigenic stimulus in the form of chronic demodex mite infection may be responsible for leukocytosis; eosinophilia may be a reflection of hypersensitivity to persistent demodex mites in tissues. Dhume et al. (2002) Lymphopenia reported in affected animals during

present study simulated the findings of Nair and Nauriyal (2007). Lymphopenia might be due to the reason that cell mediated immunity plays important role in fighting against demodectic mites.

The mean blood glucose levels in affected animals was significantly lower ( $P < 0.01$ ) than that of healthy control, indicating hypoglycaemia in them which might be due to increased need for glucose during inflammatory reactions as suggested by Sharma (2006) and Gupta (2008). A significant decrease ( $P < 0.01$ ) in mean total protein levels in demodectic dogs as compared to the healthy group indicated hypoproteinaemia which was in agreement with the observations of Biswas et al. (2002) and Solanki et al. (2007). The mean value of plasma albumin revealed a significant decrease ( $P < 0.01$ ) as against a significant increase ( $P < 0.01$ ) in mean plasma globulin in all affected groups indicating hypoalbuminemia and hyperglobulinemia respectively. A significant decrease ( $P < 0.01$ ) was also observed in albumin: globulin ratio in contrast to healthy control group due to decrease in plasma albumin and relative increase in plasma globulin concentration. This finding was in concurrence with the observations of Biswas et al. (2002) and Jyotsna and Gupta (2005). Decreased levels of plasma albumin in the present study may be result of excessive breakdown of proteins due to trauma to skin and proliferation of mites. Elevated plasma globulin level may be attributed to chronic skin disease.

The mean serum immunoglobulins were significantly higher ( $P < 0.01$ ) in affected dogs which corroborated with the findings of Verkhovsky et al. (1996) and might be due to suppressed immune system. The mean plasma vitamin A value was significantly lower ( $P < 0.01$ ) in all the dogs suffering from demodectic mange indicating hypovitaminosis A. Deficiency of

\* Manufactured by "Bayer Diagnostic India Ltd." 589, Sayajipura, Ajwa Road, Baroda- 390019, Gujarat, India.

\*\* Chemistry analyzer, "Bayer Diagnostic India Ltd." Baroda, Gujarat, India.

vitamin A associated with the occurrence of mange was also observed by Scott et al.(1995).

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## TABLES

Table1: Haematobiochemical changes in demodectic dogs and control group (Mean  $\pm$ SE)

Parameters	Control (n= 10)	Demodectic dogs				
		Group A (n= 9)	Group B (n= 9)	Group C (n= 9)	Group D (n= 8)	
Hb(g/dl)	12.22 $\pm$ 0.04	10.24 $\pm$ 0.11**	10.47 $\pm$ 0.09**	10.16 $\pm$ 0.14**	10.26 $\pm$ 0.05**	
PCV (%)	38.4 $\pm$ 0.70	31.78 $\pm$ 0.43**	32.66 $\pm$ 0.33**	31.33 $\pm$ 0.40**	31.6 $\pm$ 0.49**	
TLC( $\times 10^3/\mu$ l)	9.27 $\pm$ 0.06	11.35 $\pm$ 0.11**	11.74 $\pm$ 0.13**	11.68 $\pm$ 0.07**	11.68 $\pm$ 0.08**	
TEC( $\times 10^6/\mu$ l)	6.03 $\pm$ 0.07	4.14 $\pm$ 0.21**	4.0 $\pm$ 0.21**	4.33 $\pm$ 0.19**	4.05 $\pm$ 0.09**	
DLC (%)	Neutrophils	69.2 $\pm$ 0.61	80.44 $\pm$ 0.50**	79.77 $\pm$ 0.70**	80.22 $\pm$ 0.52**	80.37 $\pm$ 0.68**
	Lymphocytes	27.10 $\pm$ 0.31	10.56 $\pm$ 0.33**	11 $\pm$ 0.57**	11.33 $\pm$ 0.37**	10.5 $\pm$ 0.26**
	Monocytes	0.80 $\pm$ 0.20	1.04 $\pm$ 0.24	1.22 $\pm$ 0.27	0.77 $\pm$ 0.28	0.62 $\pm$ 0.18
	Eosinophils	2.6 $\pm$ 0.26	5.33 $\pm$ 0.62**	8.0 $\pm$ 0.28**	7.8 $\pm$ 0.51**	8.5 $\pm$ 0.59**
	Basophils	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0	0.00 $\pm$ 0.00	0.00 $\pm$ 0.00	0.00 $\pm$ 0.00
MCV ( fl )	62 $\pm$ 0.47	75 $\pm$ 0.53**	81 $\pm$ 0.87**	71 $\pm$ 0.59**	76 $\pm$ 0.53**	
MCH( pg)	21 $\pm$ 0.69	23 $\pm$ 0.63**	25 $\pm$ 0.82**	23 $\pm$ 0.53**	24 $\pm$ 0.59**	
Blood Glucose (mg/dl)	94.4 $\pm$ 0.64	82.11 $\pm$ 1.4**	84.66 $\pm$ 1.0**	77.33 $\pm$ 0.47**	77.25 $\pm$ 0.96**	
Total Protein (g/dl)	6.36 $\pm$ 0.03	5.32 $\pm$ 0.05**	5.26 $\pm$ 0.04**	5.43 $\pm$ 0.07**	5.27 $\pm$ 0.05**	
Albumin (g/dl)	3.03 $\pm$ 0.04	1.62 $\pm$ 0.05**	1.55 $\pm$ 0.05**	1.55 $\pm$ 0.07**	1.65 $\pm$ 0.07**	
Globulin (g/dl)	3.3 $\pm$ 0.04	3.72 $\pm$ 0.02**	3.72 $\pm$ 0.04**	3.73 $\pm$ 0.05**	3.62 $\pm$ 0.04**	
A : G Ratio	0.91 $\pm$ 0.01	0.41 $\pm$ 0.01**	0.4 $\pm$ 0.01**	0.41 $\pm$ 0.01**	0.41 $\pm$ 0.01**	
Total Immuno globulins (mg/dl)	3.21 $\pm$ 0.08	4.57 $\pm$ 0.12**	4.64 $\pm$ 0.17**	4.78 $\pm$ 0.13**	4.56 $\pm$ 0.18**	
Vitamin A ( $\mu$ g/dl)	51.4 $\pm$ 0.83	31.43 $\pm$ .79**	32.92 $\pm$ 1.1**	32.88 $\pm$ 1.16**	35.37 $\pm$ 1.0**	

\* Significant at 5% ( $P < 0.05$ )\*\* Significant at 1% ( $P < 0.01$ )

n : no. of animals in each group