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SYMPTOMATOLOGY AND HAEMATO-BIOCHEMICAL CHANGES IN DOGS SUFFERING RECURRENT PYODERMA

SUDHAKARA REDDY B.*, NALINI KUMARI K., VAIKUNTA RAO V., RAYULU V.C. AND SIVAJOTHI S.

Sri Venkateswara Veterinary University, Andhra Pradesh, India

* Corresponding author: bhavanamvet@gmail.com

ABSTRACT. Different types of skin lesions and their distribution in dogs with recurrent pyoderma along with haemato-biochemical findings were recorded in this study. Dogs with recurrent superficial pyoderma revealed papules, pustules, crusted papules, erythema, alopecia, crusts, scales, plaques, hyper-pigmentation and pruritus. Dogs affected with recurrent deep pyoderma had symptoms like papules, pustules, cellulitis, ulcers, crusted papules, nodules, fistulous tracts, alopecia, scale formation, crusts, hyper-pigmentation, erosions and furunculosis, pain and edema. The major locations of lesions for recurrent superficial pyoderma included lateral abdomen, lateral thorax and dorsum, axilla, groin, hind limb, foot, neck and fore limb and head. Lesions of recurrent deep pyoderma were predominantly observed over dorsum and lateral abdomen followed by head, neck, hind limb, lower abdomen, axilla and groin, forelimb and lateral thorax. Haemato-biochemical findings revealed leucocytosis, increased in absolute neutrophil count, eosinophil count and high serum cholesterol levels. Affected dogs also had decreased haemoglobin concentration, total erythrocyte count and serum albumin levels.

Keywords: dogs, recurrent pyoderma, skin lesions, haematology, serum analysis, thyroxin

INTRODUCTION

Pyoderma is one of the common skin problems in dogs due to thin stratum corneum with less lipid material (Pinchbeck, 2010). Recurrent pyoderma is infection that respond completely to an appropriate systemic and topical antibacterial therapy leaving the dog apparently normal between episodes of infection. Underlying causes of recurrent pyoderma includes demodicosis, *Malassezia* dermatitis, flea infestation, hypothyroidism, seborrhea, tick infestation and scabies (Reddy *et al.,* 2014a). Most of the dogs with recurrent pyoderma were associated with *Staphylococci* spp*., Streptococcus* spp*., Klebsiella* spp*., Escherichia coli* and *Pseudomonas* organisms (Reddy *et al.,* 2011). For diagnosis of different dermatological

disorders along with history, macroscopic natures of the lesions are important. Identification and recognition of the skin lesions are taken into consideration in the diagnosis of skin diseases (Scott *et al.,* 2001; Harvey, 2008). The haematological and serum biochemical changes in infected dogs may be valuable attributes to identify underlying factors for development of the recurrent pyoderma in dogs. Hence, this study was carried out to record the different skin lesions and their distribution, haemato-biochemical changes in the dogs with recurrent pyoderma.

MATERIALS AND METHODS

The present study was carried out on the dogs referred to the College Hospital of College of Veterinary Science, Tirupati and dogs referred from the major Veterinary Hospitals around Tirupati between 2009 and 2011. Dogs with a history of more than three episodes of skin infections in the past one year were included in the study and they were screened for the different dermatological disorders and confirmed with pyoderma (Sivajothi and Reddy, 2015). Dogs confirmed to be affected with recurrent pyoderma were examined thoroughly for detailed study of clinical symptoms along with their distribution (Scott *et al.,* 2006). Total of 50 dogs with recurrent pyoderma were identified and included in this study. Whole blood and serum was collected from all the dogs for haemato-biochemical analysis. A total of 10 apparently healthy dogs in the age group of 2 to 7 years from among the dogs presented for general check-up and vaccination were randomly selected and considered as normal group and also checked for skin lesions. Whole blood with addition of EDTA was collected and processed for packed cell volume (PCV), haemoglobin (Hb), total leucocyte count (TLC), total erythrocyte count (TEC). Peripheral blood smears were directly prepared and stained by Leishman's stain for differential count (DLC). Serum total protein, albumin and total cholesterol were estimated using Span Diagnostics Ltd. Kits. Total T_4 and free T_4 levels were estimated by ELISA (as per manufacturer's procedure) using a kit obtained from United Biotech Inc. Procedure followed according to the standard and previous studies. The data in respect of each parameter were tabulated and statistical analyses were carried out with the Statistical Package for Social Sciences (SPSS) using student t-test. *P*-values of more than 0.05 were considered as non-significant, *p*-values of 0.05 or lower were considered to be significant and *p*-values lower than 0.01 were considered as highly significant (Jain, 1986).

RESULTS

Clinical examination of 50 dogs with recurrent pyoderma revealed that 38 were affected with recurrent superficial pyoderma with symptoms such as pustules in 73.6 per cent, papules in 52.6 per cent and plaques 15.7 per cent of cases.

Secondary lesions such as erythema and alopecia were seen in all cases (100 per cent). Other secondary lesions such as crusted papules (78.94 per cent), epidermal collarettes (42.1 per cent), scales (31.57 per cent) and crusts (26.3 per cent) were also observed. Pruritus was present in all the cases (Figure 1). Dogs (12 out of 50) found to be affected with recurrent deep pyoderma revealed symptoms such as fistulous tracts, oozing of pus, hyper-pigmentation and lichenification of skin of the joint pressure points. Primary lesions like pustules (100%), papules, plaques and nodules (50% each). Secondary lesions such as cellulitis, ulcers (100% each), crusted papules (78.94%), crusts, hyper-pigmentation, erosions, furunculosis (66.66% each), scale formation (50%), fistulous tracts (33.33%), alopecia (100%), pain and edema (83.33% each) were also recorded (Figure 2). The major locations of lesions of recurrent superficial pyoderma in dogs were lateral abdomen (78.9%), lateral thorax and dorsum (63.15 each), axilla (57.89%), groin (42.1%), hind limb (36.84%), foot (26.31%), neck and fore limb (21.05% each) and head (15.78%). Lesions of recurrent deep pyoderma were predominantly observed over dorsum and lateral abdomen (66.6% each) followed by head, neck, hind limb, lower abdomen, axilla and groin (50% each), forelimb and lateral thorax (33.33% each) (Table 1). The mean haematology and serum biochemistry values of apparently healthy dogs and dogs with recurrent pyoderma are given in Tables 2 and 3.

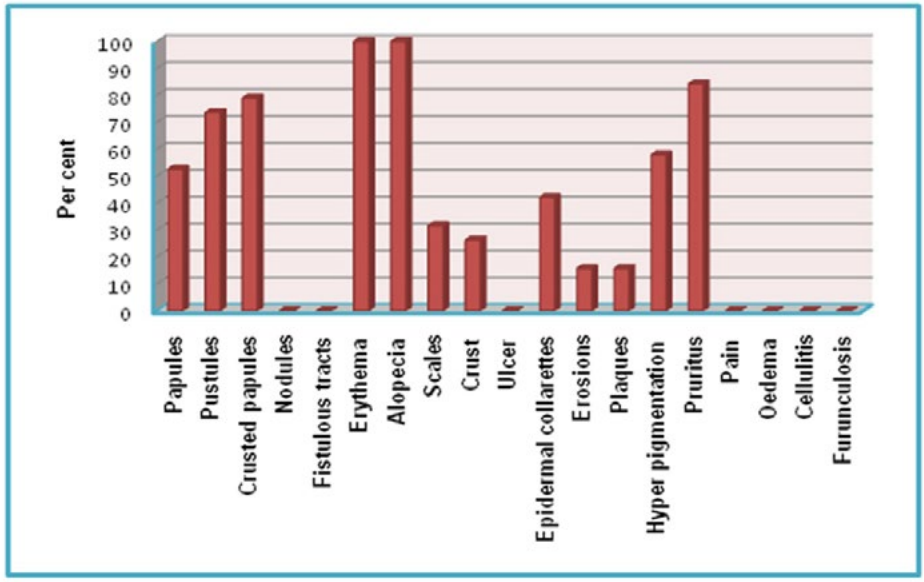

Figure 1. Graphical presentation of symptomatology in recurrent superficial pyoderma in dogs

Figure 2. Graphical presentation of symptomatology in recurrent deep pyoderma in dogs

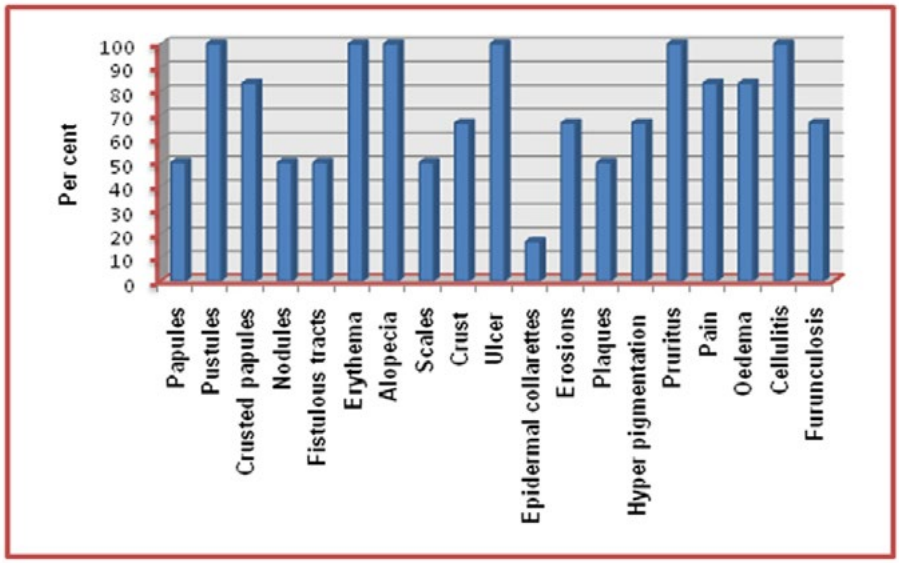

Table 1. Distribution of lesions in dogs suffering with recurrent pyoderma

Form of recurrent pyoderma	Superficial		Deep	
Total number of dogs	38		12	
Lesional distribution	Number of dogs	Percent of dogs	Number of dogs	Percent of dogs
Head	6	15.78	6	50.00
Neck	8	21.05	6	50.00
Forelimb	8	21.05	4	33.33
Hind limb	14	36.84	6	50.00
Dorsum	24	63.15	8	66.66
Lateral thorax	24	63.15	4	33.33
Lateral abdomen	30	78.94	8	66.66
Lower abdomen	18	47.36	6	50.00
Axilla	22	57.89	6	50.00
Groin	16	42.10	6	50.00
Foot	10	26.31	4	33.33

DISCUSSION

In the present study out of 50 recurrent pyoderma cases, 38 (76%) were of superficial and 12 (24%) were of deep pyoderma. Recurrent superficial pyoderma was the most frequently observed form of recurrent pyoderma in the present study. Scott *et al.* (2006) observed prominent lesions in superficial recurrent pyoderma were pustules, papules and plaques. These clinical findings were similar to the previous workers White *et al.* (2005) who observed papules and pustules are the true lesions of pyoderma at early presentation. However, pustules are fragile and transient hence quickly become crusted when traumatized.

Table 2. Mean haematological values of healthy and recurrent pyoderma affected dogs (Mean±S.E)

Parameters	Normal group (n=10)	Recurrent pyoderma cases (n=50)	t - test	P value
Hb (g/dL)	13.03±0.42	11.49 ±0.30	2.51*	0.017
PCV (%)	39.29±2.14	37.24 ±1.19	0.81 NS	0.42
TEC x10^6/cumm	6.51±0.19	5.85 ±0.14	2.39*	0.02
TLC /cumm	9334.29±81.34	13032.80 ±50.16	2.94**	0.00
Neutrophils /cumm	6698.06±244.96	10417±525.72	3.67**	0.00
Lymphocytes /cumm	2417.37±119.77	2080.71 ±145.61	1.18 NS	0.25
Eosinophils /cumm	135.57±22.11	496.54±50.15	3.74**	0.00
Monocytes /cumm	68.36±17.83	96.26 ±20.36	0.70 NS	0.49

NS – Non Significant (P>0.05) * Significant (P<0.05) * * Highly Significant (P<0.01)

Table 3. Mean serum protein and thyroxin profiles of healthy and recurrent pyoderma affected dogs (Mean±S.E)

Parameters	Normal group (n=10)	Recurrent pyoderma cases (n=50)	t-test	P value
Total protein (g/dL)	6.81±0.22	6.59±0.10	1.00 NS	0.32
Albumin (g/dL)	3.25±0.04	2.79±0.11	2.18*	0.04
Globulin (g/dL)	3.56±0.20	3.79±0.07	1.36 NS	0.19
Albumin and globulin ratio	0.85±0.11	0.69±0.04	1.52 NS	0.14
Total cholesterol (mg/dL)	84.57±6.81	179.32±22.14	2.23*	0.03
Total T_4 µg/ dL	2.69±0.34	2.55±0.12	0.45	0.66
Free T_4 ng/ dL	1.57±0.07	1.26±0.06	2.43*	0.02

NS – Non Significant (P>0.05) * Significant (P<0.05) ** Highly Significant (P<0.01)

Recurrent deep pyoderma of the present study included conditions like furunculosis, cellulitis, pressure point pyoderma and interdigital pyoderma. These findings correlated with Hillier *et al.* (2006) who observed haemorrhagic bullae, ulceration, draining tracts, cellulitis and abscessation in deep pseudomonal pyoderma. Borku *et al.* (2007) observed alopecic, erythematous, prurutic, crusting, malodorous, exudative skin lesions over the dorsum, abdomen, face and limbs in deep pyoderma.

Craig (2003) and Senturk *et al.* (2005) described the similar primary and secondary lesions dogs with pyoderma. Bensignor and Germain (2004) recorded the folliculitis and cellulitis in dogs with deep pyoderma. Hillier *et al.* (2006) observed haemorrhagic bullae, ulceration, draining tracts, cellulitis and abscessation in deep pseudomonal pyoderma, whereas in superficial pseudomonal pyoderma combinations of erythema, papules, pustules, crusts, scaling and epidermal collarettes. Borku *et al.* (2007) differentiated the lesions as superficial and deep based on the findings of clinical appearance. Pallav *et al.* (2007) reported that dogs with pyoderma showed signs of itching, alopecia, swelling, ulceration and hemorrhagic exudates.

The haemogram of apparently healthy dogs was within the normal reference range as quoated by Jain (1986) and Villers (2005). Dogs with recurrent pyoderma had reduced mean haemoglobin concentration, PCV and TEC of 11.49±0.30 g/dl, 37.24±1.19 per cent and 5.85±0.14 × 10^6/cumm respectively. No statistically significant difference in the decrease of PCV was recorded. However, a highly significant (P: 0.001) decrease in the values of haemoglobin (P: 0.017) and TEC (P: 0.023) was recorded which is in accordance with the findings of Prathiba *et al.* (2000) and Nair and Nauriyal (2007). The decrease in the values of haemoglobin and TEC might be due to anaemia caused due to the loss of skin protein as reported by Deb *et al., (*2000). A highly significant increase in total leucocyte count, absolute neutrophil count (10417±525.72/mm^3) and absolute eosinophil count (496.54±50.15/mm^3) were recorded in the present study. The comparatively high leucocytosis found in recurrent deep pyoderma could be due to a higher cutaneous inflammatory reaction noticed in them. The elevation in total leucocyte count and eosinophil count in all clinical cases might be due to the cellular and humoral responses and due to release of substances such as leukotaxine and leucocytosis-promoting factors from blood (Reddy *et al.,* 2015). Recorded neutrophilia in the present study, release of substances such as leukotoxins and leucocytosis from cell injury and promoting factors from blood into the injured area resulting in release of more neutrophils in the blood stream. In the present investigation, the mean values of lymphocytes and monocytes were found within the normal range. This is in accordance with Nair and Nauriyal (2007).

The serum biochemical values of apparently healthy animals recorded were within the normal range as reported by Villers (2005). The mean total protein, globulin, albumin and globulin ratio values of the dogs affected with recurrent pyoderma (6.59±0.10 g/dL, 3.79±0.07 g/dL and 0.69±0.04) were within the normal range. The observed mean albumin value (2.79±0.11 g/dL) was lower than the healthy control group. This might be due to loss of albumin through injured skin (Reddy *et al.,* 2014b). The higher level of cholesterol (179.32±22.14 mg/dL) recorded in the study might be due to stress associated with recurrent pyoderma as reported by Gera *et al.* (2009).

The mean total T_4 values of the normal and recurrent pyoderma-affected dogs were 2.69±0.34 µg/dL and 2.55±0.12 µg/dL respectively. It is evident that mean total T_4 values decreased only slightly but not significantly in the recurrent pyoderma-affected dogs. In recurrent pyoderma, the mean free T_4 value showed statistically significant (P: 0.022) decrease (1.26 ±0.06 ng/dL) when compared with that of normal group (1.57±0.07 ng/dL). But again the decrease was due to the low free T_4 values of the five hypothyroid dogs and the levels in the remaining recurrent pyoderma affected dogs were within the normal range.

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