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Research Article

STUDY OF HAEMATOLOGICAL PROFILES OF DOGS INFECTED WITH PATHOGENIC AEROBES

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ABSTRACT: Pet dogs occasionally suffer from infections in different parts of urinary system. A total of 289 adult dogs were examined for detection of urinary infection and 123 (42.5%) dogs were found infected. Infection in the male dogs was less common (41.4%) than the bitches (58.6%). Urinary tract infections (44.7%) were found to be the most common cases followed by urolithiasis (27.6%), cystitis (23.6%) and nephritis (3.6%). The upper urinary tract infections were very less (4.1%) than the lower urinary tract infections (95.9%). The prevalence of both upper and lower urinary tract infections were the highest (57.7%) in the winter months followed by summer (29.3%) and rainy seasons (13%) irrespective of sexes. Among the infected dogs, 34 (27.6%) were infected by strains of *Escherichia coli* and 16 (43.2%) by pathogenic *Staphylococcus* sp. As a whole 40.6% of the infected dogs were infected by these organisms. The Haemoglobin content was more in nephritis and nephrolithiasis cases (13g/dl) than the non-infected or control animals (12.2g/dl) but were slightly lower in urolithiasis (11.8), cystitis and other cases of urinary infections (11.9). PCV was recorded highest in case of urolithiasis (42.8%) followed by nephrolithiasis (41%), nephritis (40.2%), cystitis and other cases (39.5%) than in controls (38.6%). Total erythrocyte count (TEC) were much lower in nephritis and nephrolithiasis (3.8-3.9 x10^6/cub.mm) but more or less same as that of control (6.1) in cases of urolithiasis, cystitis and other cases of urinary infections (5.9 – 6.1). The level of TLC were always higher in all types of infections like nephritis (15.5x10^3/cub.mm), nephrolithiasis (12.5), urolithiasis (8.8), cystitis and other cases (9.4) in comparison to the non-infected control dogs (8.6).

Key words: Dogs, UTI, Haematological study, *E. coli*, *Staphylococcus sp.*.

INTRODUCTION

Dog is perhaps the most favoured domestic animal among all the pet animals. Dogs suffer from various bacterial diseases affecting urinary tracts leading to mal-functioning of these organs followed by critical medical emergency or death of the animal (Davison *et al.*, 1999). *Escherichia coli* and *Staphylococcus aureus* were the most prevalent organisms found to be associated with urinary tract infections of dogs (Momoh *et al.*, 2011). Kidneys along with other urinary organs act as filters of the body to clean

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blood of wastes and to retain essential elements needed by the body. Kidney keep the proper balance of salts and acids in the body, produce hormones and enzymes which help to control blood pressure and internal water balance. They help maintain the blood composition, pH levels and maintain mineral balance of the body (Kidney Health Australia 2008).

The urinary tract diseases may hamper the blood parameters like haemoglobin (Hb), packed cell volume (PCV), total erythrocyte count (TEC) and total leucocytes count (TLC) (Norris *et al.,* 2000). Considering the dreadful effect of these infections in dogs, this study is aimed to detect the prevalence of urinary tract infections in dogs with the etiological agents and changes in haematological profiles of clinically affected cases.

MATERIALS AND METHODS

In this study, 289 dogs were examined and samples were collected only from the infected animals (123 nos.) which were showing abnormalities in urination. The diseases considered were: i) diseases of upper urinary tract: nephritis and nephrolithiasis and ii) diseases of the lower urinary tract: urolithiasis, urinary tract infections (UTI) and cystitis. All samples (urine and blood) were collected aseptically from dogs (of various breeds *viz*. Dalmatians, Spitz, Labrador, Dachshund and German Shepherd) showing manifestation of renal diseases of both sexes, within the age group of 3 - 8 yrs during various seasons to study the seasonal and sex variations as detailed below:

In this study for comparison, a group of 10 healthy dogs (5 male and 5 female) were maintained as control group of dogs. These dogs were selected from different breeds, aged between 3-8 years and were maintained on balanced diet with adlibitum water. Urine and blood samples were collected from these dogs aseptically for comparison with that of the infected ones.

The infected urine samples were enriched in nutrient broth after followed by overnight incubation at 37°C. The primary isolations were done on nutrient agar and selective isolation were done on MacConkey's agar and EMB agar for *E.coli* and on Mannitol salt agar for *Staphylococcus* sp. All the isolates were identified on the basis of morphological, cultural and biochemical characters as mentioned by Buxton and Fraser (1977). Common tests carried out were as Indole, MR, VP, Citrate utilization, urease, catalase and coagulase test.

Blood samples were collected aseptically from all infected and control animals @5ml in sterile screw capped vials containing 4% sodium citrate solution as anticoagulant (1:16) for following haematological studies - haemoglobin (Hb), packed cell volume (PCV), total erythrocyte count (TEC) and total leukocyte count (TLC). Haemoglobin was estimated by Sahli's method (Schalm *et al*., 1975) with modification and the values were expressed as g/dl, packed cell volume was measured by micro-haematocrit method and the values were expressed as percentage (%), total erythrocytic count (millions /cu.mm.) and total leucocytic count (thousand/cu.mm.) were counted by haemocytometer as per the method described by Schalm *et al*.(1975). All calculations were done with the help of SPSS software (10.0 version).

RESULTS AND DISCUSSION

The infected dogs were examined clinically for the detection of diseases with the help of the sign and symptoms like dysuria, haematuria,

Table 1: Details of sample collection from different urinary tract infections of dogs.

Samples collected from	Male	Female	Total	Samples collected during	Male	Female	Total
Nephritis	2	2	4	Summer season	14	22	36
Nephrolithiasis	1	0	1	(Feb. – May)			
Urolithiasis	16	18	34	Rainy season	5	11	16
Cystitis	6	23	29	(June – Sept.)			
Urinary tract infections (UTI)	26	29	55	Winter season (Oct. – Jan.)	32	39	71
Total	51	72	123	**Total**	51	72	123

Table 2: Results of changes in blood parameters in affected dogs.

Parameters/ Type of Cases	Hb values (g/dl)	PCV values (%)	TEC values (million/cu.mm)	TLC values (thousand/cu.mm)
Nephritis	13.0±0.2	40.2 ± 0.37	3.7±0.25	15.5±0.34
Nephrolithiasis	13.0	41.0	3.8	12.5
Urolithiasis	11.8±0.2	42.8±0.24	5.9±0.08	8.81±0.l3
Cystitis	11.8±0.1	39.1±0.56	6.1±0.13	9.34±0.12
Urinary tract	11.7±0.2	39.3±0.21	5.9±0.2	9.4±0.1
infections (UTI)				
Control Dogs	12.04±0.2	38.6±0.24	5.8±0.37	8.52 ± 0.18

albuminuria, aneuria, vomition, urinary incontinence, dehydration and weakness along with variation in normal regards to temperature, pulse rate and heart rate. Prevalence of renal disease in females (58.6%) were higher in comparison to the males (41.4%). There were less number of upper urinary tract infections (5 *i.e.* 4.1%) than that of lower urinary tract infections (118 *i.e.* 95.9%). The urinary tract infections (44.7%) were mostly prevalent followed by urolithiasis (27.6%), cystitis (23.6%) and nephritis (3.6%). This distribution of infections and prevalence were also supported by Momoh *et al.,* (2011) and Kumar *et al.* (2013).

In the months of winter (October to January), the prevalence rate of both upper and lower urinary tract infections were the highest up to 57.7% (71 nos.) followed by summer season (February to May) (36 nos. *i.e* 29.3%) and lowest in rainy season (June to September) (16 nos. *i.e* 13%). The findings of the higher

prevalence of renal diseases in winter months were simulated with the observations of Ettinger and Feldman (2005) and Momoh *et al.* (2011). Decreased volume of water intake in the winter months may be the probable cause of higher prevalence of renal diseases in this season (Momoh *et al.*, 2011).

Around 34 (27.6%) strains of *E. coli* and 37 (30.1%) *Staphylococcus* sp. were detected from the samples tested in this study. All tentative *E. coli* isolates showed positive result in indole and MR test but were negative to citrate utilization, Voges-Proskauer and urease test. The staphylococci isolates were positive to MR, VP, catalase and urease tests but were negative to indole and citrate utilization (Buxton and Fraser 1977). Only 16 (43.2%) of Staphylococci isolates were found to be coagulase positive in this study and were considered to be pathogenic in nature. This prevalence of pathogenic aerobes in the cases of urinary tract infections of dogs were also reported earlier by Case *et al.* (1992), Davison *et al.* (1999), Momoh *et al.* (2011).

During estimation of haemoglobin (Hb) values, it was noticed that values were higher in case of nephritis and nephrolithiasis in comparison to control dogs (significant in 5% level) where as in other cases there were not marked changes (Table 2) which were also supported by Bartges (2000), Sharma *et al.* (1982) and Sockett *et al.* (1986).

The PCV values were estimated to be higher in dogs having nephritis, nephrolithiasis and urolithiasis (Table 2) which may be due to haemoconcentration as a result of dehydration but not that much in case of UTI and cystitis which were also reported by Sockett *et al.* (1986) and Waterman (1989).

The TLC values in nephritis, nephrolithiasis, UTI and cystitis cases were higher in comparison with that of the control group but was lower in urolithiasis (Table 2). The observation of leukocytosis in nephritis and nephrolithiasis were similar with the findings of Ling *et al.* (1998) and Bartges (2000).

In this study, it was recorded that there were marked reduction of TEC values in nephritis and nephrolithiasis but slight changes were there in others compared to the control ones (Table 2). All previous changes shown in Table 2 were significant in 5% level. These changes may be due to a result of decreased erythropoietin production (Guyton and Hall 1996, Norris *et al.*, 2000).

CONCLUSION

Bitches (59%) were more affected with urinary tract infections than dogs (41%) out of which lower urinary tract infections (95.9%) were mostly prevalent during the winter months (58%). *E. coli* and *Staphylococcus* sp. infections were found in approx 28% and 13% cases respectively. The Hb content and TLC levels tend to be increased in nephritis and nephrolithiasis cases but PCV and TEC values became higher in urolithiasis, cystitis and other UTI cases of dogs.

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