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A prospective study on anemia incidence in dogs afflicted with chronic kidney disease

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Abstract

The primary objective of this study was to investigate the occurrence of anemia in dogs afflicted with chronic kidney disease. The study period revealed a 2.43 percent occurrence of chronic kidney disease, with 69.10 percent of cases manifesting anemia of renal origin. This anemia exhibited varying degrees of severity, including mild (22.76%), moderate (34.96%), and severe (42.28%) cases. The demographic analysis indicated that the highest incidence of renal anemia occurred in dogs aged above 8 years (51.22%) and in male dogs (56.10%). Among specific breeds, Labrador retrievers (34.96%), spitz (23.58%), and mongrels (17.89%) were the most frequently affected by renal anemia.

Keywords: Anemia, chronic kidney disease, dogs, occurrence

Introduction

Kidneys play a vital role in maintaining body's homeostasis by performing excretory, secretory, regulatory and endocrine functions including production of erythropoietin. Renal failure is a condition, affecting 2-5% of canine population and is the most common leading cause of death. Anemia is a common complication with kidney disease (Cases *et al.* 2018) [1], Renal function is crucial for maintaining red blood cell homeostasis through erythropoietin production (Lippi *et al.* 2021) [2], but compromised function in kidney disease disrupts the balance, leading to reduced erythropoietin production from peritubular fibroblasts in the renal cortex and anemia. The impact of anemia extends beyond hematological parameters, significantly affecting the overall health and quality of life in dogs afflicted with CKD. Anemia significantly impacts dogs with CKD, causing symptoms like lethargy, weakness, anorexia and may exacerbate progression of CKD because of decreased oxygen delivery to residual kidney (Bartges 2012) [3]. As the detailed reports on occurrence of renal anemia in dogs are scanty, hence the present study was taken up to evaluate the significance of the occurrence of renal induced anemia in dogs.

Materials and Methods

A total of 7325 dogs presented to the SVVU, Super Speciality Veterinary Hospital, Visakhapatnam, were screened to identify the presence of renal anemia during the period of February 2023 to November 2023. Initial screening of dogs to diagnose renal disease with anemia was based on history, physical and clinical examination and urinalysis. Confirmatory diagnosis of renal anemia was achieved by haemato-biochemical investigations and imaging techniques. The data were statistically analyzed using SPSS (22) software and in accordance with the procedures outlined by Snedecor and Cochran (1994) [4]. The incidence of renal anemia was recorded in relation with age, gender and breed.

Results and Discussion

The study revealed 178 out of 7325 dogs presented to the hospital were identified with chronic renal disease representing an occurrence of 2.43 percent. The CKD dogs were categorized based on International Renal Interest Society (IRIS) classification as Stage II (17.98%), III (33.15%) and IV (48.88%) on the day of presentation (Table 1). The occurrence was in agreement with the observations of Jayananthan *et al.* (2021) [5] who reported similar incidence in dogs. On the contrary O' Neil *et al.* (2013) [6] and Thade *et al.* (2021) [7] recorded lower prevalence of chronic renal failure as 0.37 percent and 0.93 per respectively. This difference in occurrence could be due to several extrinsic factors like geographical, environmental and managerial practices.

Grading of anemia

The hematological evaluation of dogs affected with chronic kidney disease revealed varying degree of anemia in 123 dogs (69.10%), with stage II (18.70%), stage III (27.64%) and stage IV (53.66%) (Table 1). This was in accordance with the findings of Kaur *et al.* (2019)^[8] and Lippi *et al.* (2021)^[2]. The higher rate of anemia in chronic kidney disease is multifactorial with a primary emphasis on reduced erythropoietin production from damaged renal parenchyma which leads to suppression of erythrocyte production as the main cause of renal anemia. This higher prevalence of anemia in final stages of CKD were recorded by Ramesh *et al.* (2018)^[9], Portoles *et al.* (2021)^[10] and Gupta *et al.* (2022)^[11], suggesting that frequency of anemia increases with chronicity of kidney disease.

Based on the hemoglobin concentration, anemia was classified into mild, moderate, and severe categories. The current investigation of dogs having renal anemia with haemoglobin less than 7g/dL had higher rate of prevalence i.e. 42.28 percent (52 of 123). The prevalence of anemia with moderate degree (haemoglobin values between 7 to 10 g/dL) was observed in 34.96 percent (43 of 123) cases, whereas haemoglobin values greater than 10 g/dL was noted in 22.76 percent dogs (28 of 123) (Table 2). Similar observations of severe degree anemia were recorded by Fiocchi *et al.* (2017)^[12] and Kaur *et al.* (2019)^[8] suggesting that as the severity of renal parenchymal tissue damage progresses, causing a decrease in the production of erythropoietin therefore the degree of anemia intensifies in tandem with the advancement of CKD (Portoles *et al.*, 2021)^[10]. Thus, it was reported that the anemia of renal origin was mostly of severe in nature and thus necessitates prompt attention and therapeutic action.

Age wise occurrence

The incidence of anemia in kidney disease was higher in dogs aged above 8 years (51.22%) followed by dogs aged in between 4-8 years (31.71%) and was lowest in dogs below 4 years of age (17.07%) (Table 3). Lippi *et al.* (2021)^[2], Thade *et al.* (2021)^[7] and Chawla *et al.* (2020)^[13] reported kidney

dysfunction in the particular age groups which corresponds to the pathophysiology of anemia associated with renal tissue function, which is caused by age related degenerative changes in the architecture of the renal parenchyma.

Gender wise occurrence

Males dominated females in overall occurrence of anemia with kidney disease with 56.10 percent and 43.90 percent respectively (Table 4). This could potentially be attributed to a higher frequency of male presented to clinics compared to females. This was in accordance with Chawla *et al.* (2020)^[13], Veena *et al.* (2020)^[14], Jayanathan *et al.* (2021)^[5] and Lippi *et al.* (2021)^[2] reported higher prevalence of renal disorders in male dogs. This could potentially be attributed to a higher frequency of male presented to clinics compared to females. It is commonly believed that males typically have higher blood pressure, leading to a larger volume of blood being filtered by the kidneys. This increased filtration may expose the kidneys to a greater quantity of toxins. The occurrence in females might be due to the shorter urogenital tract which makes them more prone for conditions like cystitis and pyometra (Mukherjee *et al.*, 2014)^[15].

Breed wise occurrence

The breed wise occurrence of renal anemia was depicted in (Table 5). In the present study, it was evident that higher occurrence was observed in Labrador (34.96%) followed by Spitz (23.58%), Mongrel (17.89%), German Shepherd (5.69%), Pomeranian (4.06%), Doberman (3.25%), Shih Tzu (2.44%), Golden Retriever (1.63%), Belgium Malinois (1.63%), Dachshund (1.63%), Beagle (0.81%), Lhasa Apso (0.81%), Great Dane (0.81%) and Cocker Spaniel (0.81%). The breed wise prevalence of renal diseases was recorded to be highest in Labrador according to Ramesh *et al.* (2018)^[9], Kaur *et al.* (2019)^[8], Chawla *et al.* (2020)^[13] and Veena *et al.* (2020)^[14]. This higher occurrence in Labradors might be due to the relatively higher population of this breed within the geographical area due to its friendly nature and easy maintenance makes them more endearing to people.

Table 1: IRIS staging of affected dogs with CKD

Stages	Stage II (Creatinine: 1.4 – 2.8 mg/dL)	Stage III (Creatinine: 2.9 – 5.0 mg/dL)	Stage IV (Creatinine: > 5.0 mg/dL)	Total cases
CKD	32 (17.98%)	59 (33.15%)	87 (48.88%)	178 (100%)
Anemia	23 (18.70%)	34 (27.64%)	66 (53.66%)	123 (100%)

Table 2: Grading of anemia in dogs with CKD

Anemia	Mild (Hb: 10-12 g/dL)	Moderate (Hb: 7-10 g/dL)	Severe (Hb: < 7 g/dL)
No. of dogs	28	43	52
Percent	22.76	34.96	42.28

Table 3: Age wise occurrence of anemia in dogs with chronic kidney disease

Age	No. of dogs affected	Percent
< 4 years	21	17.07
4-8 years	39	31.71
>8 years	63	51.22

Table 4: Gender wise occurrence of anemia in CKD dogs

Gender	No. of dogs with anemia	Percent
Male	69	56.10
Female	54	43.90
Total	123	100

Table 5: Breed wise occurrence of renal anemia in dogs

S.No	Breed	No. of dogs	Percentage
1.	Labrador	43	34.96
2.	Spitz	29	23.58
3.	Mongrel	22	17.89
4.	German Shepherd	7	5.69
5.	Pomeranian	5	4.06
6.	Dobermann	4	3.25
7.	Shih Tzu	3	2.44
8.	Golden Retriever	2	1.63
9.	Belgian Malinois	2	1.63
10.	Dachshund	2	1.63
11.	Beagle	1	0.81
12.	Lhasa Apso	1	0.81
13.	Great Dane	1	0.81
14.	Cocker Spaniel	1	0.81

Conclusion

In conclusion, the frequency of anemia tends to rise with the progression of the kidney disease. Anemia in dogs with kidney failure can manifest at different grades of severity, varying from mild, moderate to severe. However in the present study the anemia of renal origin was mostly of severe in nature with rate of 42.28 percent i.e 52 out of 123 dogs. Highest incidence of renal anemia was recorded in dogs above 8 years of age with 51.22 percent. Categorizing the occurrence according to gender, males showed a higher susceptibility, with a rate of 56.10 percent. According to distribution of specific breeds varied based on geographical distribution. In the Visakhapatnam city, Labrador was highest preceding the spitz breed in the occurrence list.

References

- Cases A, Egocheaga MI, Tranche S, Pallares V, Ojeda R, Gorriz JL, *et al.* Anemia of chronic kidney disease: Protocol of study, management and referral to nephrology. *Nefrologia*. 2018;38(1):8-12.
- Lippi I, Perondi F, Lubas G, Gori E, Pierini A, D'Addetta A, *et al.* Erythrogram patterns in dogs with chronic kidney disease. *Veterinary Sciences*. 2021;8(7):123.
- Bartges JW. Chronic kidney disease in dogs and cats. *Veterinary Clinics: Small Animal Practice*. 2012;42(4):669-692.
- Snedecor GW, Cochran WG. *Statistical Methods*, 7th Edition, Oxford and JBH Publishing, New York, USA. 1994.
- Jayanathan V, Abiramy Prabavathy A, Uma S, Barathiraja S, Rajkumar K, Thanislass J, *et al.* Clinico-Biochemical findings associated with stage III and stage IV of chronic kidney disease in dogs. *International Journal of Veterinary Science and Research*. 2021;7(2):156-162
- O'Neill DG, Elliott J, Church DB, McGreevy PD, Thomson PC, Brodbelt DC. Chronic kidney disease in dogs in UK veterinary practices: prevalence, risk factors, and survival. *Journal of veterinary internal medicine*. 2013;27(4):814-821.
- Thade GC, Bhojne GR, Dhoot VM. Successful management of chronic kidney disease in dogs. *Indian Journal of Canine Practice Volume*. 2021, 13(2).
- Kaur G, Dhoot VM, Bhojne GR, Upadhye SV, Somkuwar AP, Panchbhai CG. Prevalence of Renal Anaemia in Nagpur City, India. *International Journal of Current Microbiology and Applied Sciences*. 2019;8(10):911-915.
- Ramesh P, Sumathi D, Gopalakrishnan A, Vairamuthu S, Jayathangaraj MG. Hemato-Biochemical Evaluation-A Prognostic Tool for Chronic Kidney Disease (CKD) in Canines. *Intas Polivet*. 2018;19(2):217-219.
- Portoles J, Martin L, Broseta JJ, Cases A. Anemia in chronic kidney disease: from pathophysiology and current treatments, to future agents. *Frontiers in Medicine*. 2021;8:642296.
- Gupta R, Jena GR, Jena BR, Chandra RP, Kumar D. Clinical, haemato-biochemical and oxidative changes associated with chronic kidney disease (CKD) in dogs. *The Pharma Innovation Journal*. 2022;11(11):1575-1579.
- Fiocchi EH, Cowgill LD, Brown DC, Markovich JE, Tucker S, Labato MA, *et al.* The use of Darbepoetin to stimulate erythropoiesis in the treatment of anemia of chronic kidney disease in dogs. *Journal of veterinary internal medicine*. 2017;31(2):476-485.
- Chawla H, Katoch A, Wadhwa DR, Sharma A. Incidence of renal disorders in dogs. *Indian Journal of Veterinary Medicine*. 2020;40(2):23-25.
- Veena MP, Nagarajan K, Vairamuthu S, Subapriya S, Dhanalaksmi H, Kalmath GP, *et al.* Evaluation of Serum Biochemical Profile of Kidney Disorders in Canine. *International journal of Current Microbiology and Applied Sciences*. 2020;9(3):700-705.
- Mukherjee P, Chakrabarti A, Har T, Batabyal K, Das B. Study of haematological profiles of dogs infected with pathogenic aerobes. *Exploratory Animal and Medical Research*. 2014;4(1):81-85.