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CASE STUDIES REGARDING THE HEMATOLOGICAL PARAMETERS IN POLYCYSTIC KIDNEY DISEASE IN CATS

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Abstract

Anemia is a common and potentially fatal complication of chronic kidney failure caused by polycystic kidney disease, leading to faster disease progression and increased mortality. Anemia is due to the loss of erythropoietin-producing cells in the kidneys or due to an inflammatory condition resulting in iron sequestration, bleeding from the gastrointestinal mucosa, reduced red blood cell survival due to uremia or consequent adverse drug effects and poor nutritional status.

The present investigative study was conducted on a number of 7 cats, of Persian, British Shorthair, and European breeds, with different sexes and ages.

In this study, hematological paraclinical investigations were performed in 7 cats, in order to detect a normochromic anemia, the resulting data being grouped in normal results in parameters in one patient, results with minor deficits in 4 cats and severe results in 2 individuals.

Key words: *anemia, PKD, cats.*

INTRODUCTION

Anemia is a common and potentially fatal complication of chronic kidney failure caused by polycystic kidney disease, leading to a faster progression of the disease and increased mortality (Codreanu, 2020).

Anemia is due to the loss of erythropoietin-producing cells in the kidneys or due to an inflammatory condition resulting in iron sequestration, bleeding from the gastrointestinal mucosa, reduced red blood cell survival due to uremia or due to adverse drug effects and nutritional status 2016.

Importantly, symptoms related to anemia, including reduced physical functioning and fatigue, have been identified as high priorities by patients with CKD (Urquhart-Secord, 2016).

Polycystic Kidney Disease (PKD) is a genetic kidney disease that has been found in Persian cats, affecting 37-49% (Lee et al., 2010), being one of the leading causes of insufficiency. renal impairment in cats and the most common feline genetic disease. (Lyon et al., 2004), characterized by the appearance of cysts smaller than 1 mm to more than 1 cm in the renal parenchyma and occasionally in the liver (Bosje et al., 1998), pancreas and spleen (Scalon et al., 2014), sporadically recorded in the literature since 1967 (Guerra et al., 2020).

Hematologic consequences of PKD-induced uremia are dominated by normochromic normocytic anemia following erythropoietin deficiency, which results in reduced erythrocyte lifespan. Anemia also contributes to the exacerbation of lethargy and loss of appetite in the patient (Codreanu, 2020).

MATERIALS AND METHODS

The present investigative study was conducted on a number of 7 cats belonging to the Persian, British Shorthair and European breeds, of different sexes and ages, for the period 2018-2022, in the Clinic of the Faculty of Veterinary Medicine and in the veterinary units Canivet and VetMedical Consulting SRL.

The hematological paraclinical investigations were performed in 6 cats, in order to detect a normochromic anemia, the resulting data being grouped with minor deficits in 4 cats and severe results in 2 individuals.

Table 1. Total number of patients included in the study

TOTAL PATIENTS OF THE STUDY (n=6)					
BREED	AGE			SEX	
Persian *(n=4)*	1-5 years	6-10 years	11-17 years	M	F
European *(n=1)*	*(n=1)*	*(n=5)*	*(n=1)*	2	5
British Shorthair *(n=2)*					

Determination of hematological parameters was performed with IDEXX VetAutoread Hematology Analyzer (Figure 1) and Scil Vet Abc Plus and Genrui - 5-Part Auto Hematology Analyzer KT-6610 (Figure 2).

Figure 1. IDEXX VetAutoread Hematology Analyzer

Figure 2. Hematology - Scil Vet Abc Plus

Imaging for the diagnosis of Polycystic kidney disease was established by using the Esaote Veterinary MyLab 60 ultrasonography (Figure 3).

Figure 3. Esaote Veterinary MyLab 60

RESULTS AND DISCUSSIONS

In this study group were included felines in which renal cysts suggestive of polycystic kidney disease were detected in terms of correlation with hematological investigations.

Case 1 - Persian, 11 years, Male

The anamnesis taken from the owner indicates a state of apathy, fatigue, refuses food, has lost significant body weight in the last 2 months before the consultation, occasional vomiting and prefers places withdrawn for about a week.
The detailed clinical examination is detailed and presented below, additionally being discovered an increase in the volume of the kidneys and with an irregular shape noticed at the physical examination of the urinary tract, pallor of the mucous membranes present.

Table 2. Results of the haematological exam case 1

Persian, *11 years, Male*	**Hematological values**	**References values**
RBC *(M/µL)*	**3.59**	**5.00-10.00**
Hemoglobin *(g/dL)*	**7.0**	**9.00-15.1**
Hematocrit *(%)*	**25.1**	**30.0-45.0**
WBC *(K/µL)*	**5.3**	**5.5-19.5**
MCV *(fL)*	**44.9**	41.0-58.0
MCH *(Pg)*	**16.8**	12.0-20.0
MCHC *(g/dL)*	**37.4**	29.0-37.5
PLT *(10^9/L)*	**254**	100-514

Case 2 - Persian, 6 years, Female

During the clinical interrogation, the owner complained of severe changes in the general condition of the animal, noting a considerable decrease in body weight and a deteriorating general condition.
The clinical examination revealed a symptomatology suggestive for the clinical diagnosis of chronic renal failure, with oral ulceration accompanied by halitosis, mucosal pallor and a blood pressure of 151/72 mmHg.

Table 3. Results of the haematological exam in case 2

Persian, *6 years, Female*	**Hematological values**	**References values**
RBC *(M/µL)*	**4.22**	**5.00-10.00**
Hemoglobin *(g/dL)*	**5.9**	**9.00-15.1**
Hematocrit *(%)*	**19**	**30.0-45.0**
WBC *(K/µL)*	**12.4**	5.5-19.5
MCV *(fL)*	**45**	41.0-58.0
MCH *(Pg)*	**14**	12.0-20.0
MCHC *(g/dL)*	**32**	29.0-37.5
PLT *(10^9/L)*	**178**	100-514

Case 3 - **Persian, 6 years, Female**

The owner came to the clinic with a 6-year-old Persian cat of a Persian state, where he observed a state of drowsiness manifested for several days, along with apathy, a reduced and selective appetite, the presence of a characteristic polyuria syndrome. polydispyness, rapid breathing and lethargy.

Table 4. Results of the haematological exam in case 3

Persian, *6 years, Female*	**Hematological values**	**References values**
RBC *(M/µL)*	**2.82**	5.00-10.00
Hemoglobin *(g/dl)*	**8.4**	**9.00-15.1**
Hematocrit *(%)*	**18**	**30.0-45.0**
WBC *(K/µL)*	**6.1**	5.5-19.5
MCV *(fL)*	**48.2**	41.0-58.0
MCH *(Pg)*	**17.6**	12.0-20.0
MCHC *(g/dL)*	**36.7**	29.0-37.5
PLT *(10^9/L)*	**321**	100-514

Case 4 - British Shorthair, 10 years, Female

The owner of the 10-year-old British Shorthair feline cat noticed a state of apathy lately, the constant presence of gastrointestinal disorders translated by occasional vomiting, accompanied by a selective appetite and nausea, syndrome diarrhea with the expression of yellow diarrhea stools with increased frequency and a weakening of the animal by highlighting the chest and urinary disorders externalized by urinating in impermissible places and with an appreciable amount and excessive thirst.

Table 5. Results of the haematological exam in case 4

British Shorthair, *10 years, Female*	**Hematological values**	**References values**
RBC *(M/µL)*	**3.9**	**5.00-10.00**
Hemoglobin *(g/dL)*	**10.3**	**9.00-15.1**
Hematocrit *(%)*	**32**	30.0-45.0
WBC *(K/µL)*	**7.2**	5.5-19.5
MCV *(fL)*	**45**	41.0-58.0
MCH *(Pg)*	**17**	12.0-20.0
MCHC *(g/dL)*	**32**	29.0-37.5
PLT *(10^9/L)*	**368**	100-514

Case 5 - Persană, 4 years, Female

The clinical observation sheet summed up anamnestic data revealing a patient with a reduced appetite, with a state of accentuated drowsiness, along with a progressive weakening observed by the owner recently.

The non-specific evaluated symptoms are presented in detail below, and paraclinical investigations are imperative in order to establish a diagnosis.

Table 6 . Results of the hrematological exam in case 5

Persian, *4 years, Female*	**Hematological values**	**References values**
RBC *(M/µL)*	**4.0**	**5.00-10.00**
Hemoglobin *(g/dL)*	**8.9**	**9.00-15.1**
Hematocrit *(%)*	**25**	**30.0-45.0**
WBC *(K/µL)*	**17.2**	5.5-19.5
MCV *(fL)*	**45**	41.0-58.0
MCH *(Pg)*	**11**	**12.0-20.0**
MCHC *(g/dL)*	**35**	29.0-37.5
PLT *(10^9/L)*	**450**	100-514

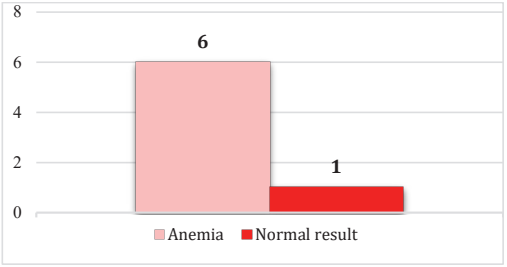
Case 6 - European, 7 years, Male

The owner came to the clinic with a 7-year-old European male cat and a male, following the finding of an altered general condition expressed by depression, anorexia and polyuria-polydipsia syndrome.

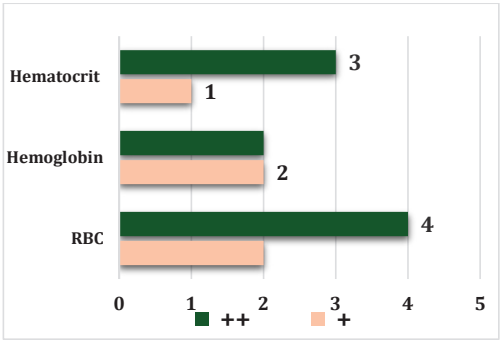
Table 7. Results of the haematological exam case 6

European, *7 years, Male*	**Hematological values**	**References values**
RBC *(M/µL)*	**4.6**	**5.00-10.00**
Hemoglobin *(g/dL)*	**9.9**	9.00-15.1
Hematocrit *(%)*	**39**	30.0-45.0
WBC *(K/µL)*	**11.2**	5.5-19.5
MCV *(fL)*	**50**	41.0-58.0
MCH *(Pg)*	**19**	12.0-20.0
MCHC *(g/dL)*	**35**	29.0-37.5
PLT *(10^9/L)*	**250**	100-514

The hematological paraclinical diagnosis of anemia was established in 6 cats based on the RBC *(M/µL)* value, which was below the normal range (5.00-10.00), accompanied by additional data provided by the parameters of Hemoglobin (g/dl) that was below the limit of 9.00-15.1 in 4 cats, and on the Hematocrit (%) percentage registered below the lower limit in 4 cats.



Graphic 1. Frequency of diagnosis of anemia in patients with PKD



Graphic 2. Classification of the intensity with which the investigated parameters were affected in patients with PKD

CONCLUSIONS

Anemia, diagnosed in 6 cats, with polycystic kidney disease is an indicator and prognostic factor in relation to the degree of kidney damage. Depending on the degree of substitution and compression of the parenchymal index of cystic lesions, positive correlations can be made between the severity of the medium-long term process in terms of erythropoietin deficiency, the size of the number and the progression of cystic lesions, relation to the correlation between hematinic medication (plastic and catalytic) and hormone support medication (erythropoiesis).

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