

Health status of stray cats in Bogor city based on various parameters

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Abstract. This study aims to identify the health status of stray cats in the city of Bogor with various examination parameters, namely physical, blood and urine. This study used 20 stray cats from the city of Bogor. The stray cats were adapted for 1 day at the veterinary clinic of College of Vocational Studies of IPB University and then examined. The parameters examined were physical examination, blood and urine. The results of the physical examination showed that many abnormalities in the skin and fur, such as ectoparasites, and alopecia. A fairly large percentage of abnormal results were obtained in the increase in hearth rate and respiratory rate, this can be influenced by stress factors. Hematological examination showed that were within the normal range, except for increased eosinophils and low platelet counts. It indicated possible parasitic infestation and platelet-related problems. Result of urine examination was dominated by hyposthenuria, which is thought to be related to less drinking frequency or fasting status in the animals. Examination of urine color of these cats is normal, did not contain protein. Examination of epithelial cells in urine showed that 13 samples (76%) contained epithelial cells and 4 samples (24%) showed negative results.

1 Introduction

1.1 Background

Bogor City is one of the big cities in West Java Province. This city has beautiful scenery and cooler air compared to other cities around it. The problem faced by Bogor City in addition to increasing population due to migration of residents of Jakarta and its surroundings is the population of stray cats which is increasing every year. This increasing population of stray cats, of course, has a negative impact on the humans around it. Humans can be exposed to diseases transmitted by cats which are zoonotic. Zoonotic diseases that can be transmitted from cats to humans are diseases caused by ectoparasites, endoparasites, fungi, bacteria, and viruses [1,2,3].

Research related to the health of stray cats has been conducted in Surabaya City which is related to the total protein and endoparasite values in stray cats. The total protein value is related to a certain disease in stray cats [4].

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Another study conducted in Surabaya City is endoparasite infection in stray cats [5]. Endoparasite research on stray cats was also conducted in Bogor City at the IPB Gunung Gede Campus. Stray cats are infected with endoparasites such as protozoa and worms. The endoparasite infection is certainly zoonotic in humans [6,7]. Stray cats often do not show clinical symptoms of a disease, even though stray cats can act as disease vectors. Research on stray cat feces identified toxoplasma oocysts which can cause toxoplasmosis and are zoonotic in humans. Stray cats appear healthy and show symptoms of the disease [8].

Research related to blood and urine profiles is minimally reported in stray cats, especially in Bogor City, whereas this information is very important to know the health picture of stray cats in the environment. Based on this, this study aims to identify the health status of stray cats in Bogor City with various examination parameters, namely physical, blood and urine. It is hoped that by knowing more information about diseases in stray cats, it can be used as an effort to prevent diseases in cats and humans.

1.2 Purpose

This research aims to describe and give information about health status of stray cats in Bogor city based on various parameter.

2 Materials and Methods

2.1 Sampling

The study was conducted in September-November 2023. Stray cats were taken from various places in Bogor City, including Malabar, Cilebende, Bangbarung, Taman Kencana, Azimar and Barangsiang. The number of stray cats examined was 20 with female gender. Average body weight 2,651 kg. Stray cats were adapted at College of Vocational Studies of Animal Clinic for 1 day, then physical examinations, blood tests, and urine tests were carried out.

2.2 Physical Examination

Physical examinations performed on stray cats include body weight, body temperature, respiratory rate, heart rate and pulse and mucosa. Animal weight is obtained by weighing. Body temperature examination using a thermometer inserted through the cat's anus. Breath examination by observing the rise and fall of the chest. Heart examination is performed using a stethoscope and pulse examination is performed by pressing the femoral artery using the thumb.

2.3 Blood Examination

Blood samples of 3 cc are taken using an intravenous catheter. Blood sampling is carried out in the dorsalis antibrachii Cephalica Vena. The blood that has been taken with a 3 cc sputum is put into a plain tube and an EDTA tube and labeled for cat identity. Blood examinations are carried out at the Sierra Animal Clinic Blood Laboratory.

2.4 Urine Examination

Urine is collected by pressing the ventral abdomen and urine is tamped using a urine bottle, then labeled with animal identity. Urine examinations are carried out at the Sierra Animal Clinic Laboratory.

3 Result And Discussion

3.1 Physical Examination

Physical examination is the main stage in assessing the health status of animals. A comprehensive examination was conducted on 20 stray cats, which included an examination of the present status of body temperature, heart rate (HR), and respiratory rate (RR), temperature, and Capillary Refill Time (CRT), and body weight (Table 1), physical examination of the eyes, ears, nose, and mouth, and examination of the skin and coat (Table 2).

Table 1. Results of the status present examination

Parameter	Unit	Mean	Normal n (%)	Abnormal n (%)	Range
Heart Rate	beat/minute	144.421±45	10 (50%)	10 (50%)	70-198
Respiratory Rate	breath/minute	62±22.3	5 (25%)	15 (75%)	30-114
Temperature	Celsius (°C)	38,724±0.32	20 (100%)	0 (0%)	37.2 - 38.8
CRT	second (s)	-	18 (90%)	2 (10%)	-
Body Weight	kilogram (kg)	2.651±0.46	-	-	1.95-3.42

n: Total of animal

Heart rate, RR, temperature, and CRT values were assessed by referring to the normal reference range. The average weight of stray cats was $2,651 \pm 0.46$ kg with a range of 1.95-3.42 kg. The results of HR and RR measurements from cats showed the same percentage in the normal and abnormal categories. The average HR of 20 cats was $144,421 \pm 45$ beats / minute with a range of 70-198 beats / minute. The percentage of normal HR was 50% or 10 out of 20 cats. RR ranged from 30-114 breaths / minute and an average of 62 ± 22.3 breaths/minute. The percentage of abnormal RR showed as much as 75% of the total 20 cats. The high values of abnormal RR and abnormal HR were high due to stress factors during the examination. No abnormal results were found in temperature measurements. The results of the CRT examination showed that 90% of cats had normal CRT values (<2 seconds).

Table 2. Results of the physical examination (eye, ear, mouth, teeth, skin, and coat)

Parameter	Abnormal Clinical Findings	Total (n)
Eye	-	0
Ear	Abnormal ear cerumen	2
Mouth and Teeth	Incisor teeth absent	2
Skin and Coat	Ectoparasite, dull coat, alopecia	11
Mucosa	Pale mucosa	2

n: Total of animal

The next physical examination was an examination of the eyes, ears, mouth, skin, and coat, and mucosa of 20 cats. From the eye examination, no abnormal clinical findings were found. The ear examination showed clinical findings of abnormal earwax in 2 cats. In the mouth and teeth, 2 cats were found with absent incisor teeth. Furthermore, in the skin and hair, clinical findings were found, the presence of ectoparasites, dull fur and alopecia in 11 cats and 2 cats had pale mucosa. The number of clinical findings in cats in all physical examination parameters is provided in Figure 1. In figure 1, there are 7 abnormal clinical findings, namely in the parameters HR, RR, CRT, mouth and teeth, skin and coat, ear and mucosa. The most common clinical finding found in stray cats is an increase in RR of 15 cats, followed by clinical findings in skin and coat of 11 cats.

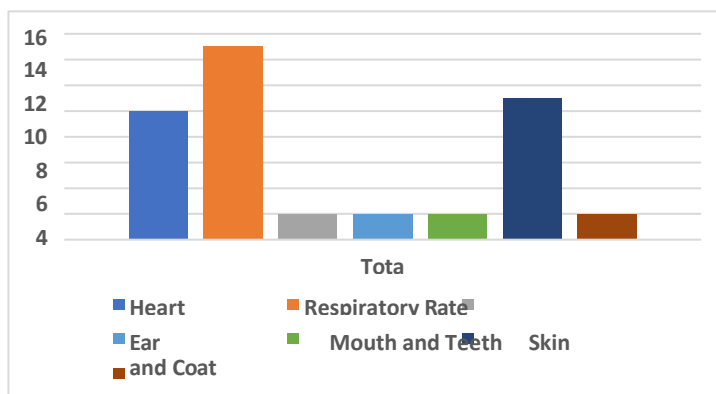


Fig 1. Total of abnormal clinical finding in stray cats

Clinical findings in HR and RR examinations in 20 stray cats were an increase in heart rate (tachycardia) and respiratory rate (tachypnoea). These clinical findings were caused by stress factors during the examination. Healthy cats can experience significant stress due to being in a new environment or improper handling [9, 10]. This stress can affect the physiology of the animal's body. Capillary Refill Time (CRT) is defined as the time required for the distal capillary layer to return to its base color after pressure was applied [11]. In the examination of stray cats, it was found that there was an extension of the CRT time of more than 2 seconds in 2 cats. The results of the examination found 11 stray cats that had clinical findings in the form of ectoparasite infestation, dull fur and alopecia. Ectoparasites such as fleas, mites and ticks are known to cause itching and hair loss and even anemia [12]. The extension of the CRT time can be caused by poor blood circulation or reduced peripheral perfusion of the tissue by blood. Inspection of the mucosa such as the eyes and mouth and can be examined to determine the health status of the animal. Normally the color of the mucosa of healthy animals is pink. In 20 cats, 2 cats had pale mucosa. Mucosal color

abnormalities can be caused by various factors, such as anemia [13].

3.2 Blood Examination

The hematology inspection of 20 stray cats gives valuable information related to the healthy status of stray cats. Hematology data includes the number and type of white blood cells, red blood cells and platelets, each of which can reflect general health condition, the presence of infection, inflammation, anemia, or other blood disorders [14].

Table 3. Descriptive statistic of stray cat hematology examination

Inspection	Mean ± SD	Unit	Normal Range
Hematology:			
White Blood Cell (WBC)			
	18,99 ± 8,71	10 ³ /μL	5.5 - 19.5
Lymphocyte	30,95 ± 13,52	%	20.0 - 55.0
Monocyte	2,87 ± 1,00	%	1.0 - 4.0
Eosinophil	11,07 ± 6,97	%	2.0 - 12.0
Granulocyte	59,28 ± 13,10	%	35.0 - 78.0
Lymphocyte	5,67 ± 3,09	10 ³ /μL	1.5 - 7.0
Monocyte	0,65 ± 0,36	10 ³ /μL	0.0 - 0.85
Eosinophil	2,27 ± 1,54	10 ³ /μL	0.0 - 1.5
Granulocyte	11,27 ± 5,76	10 ³ /μL	2.5 - 14
Red Blood Cell (RBC)			
	7,69 ± 0,97	10 ⁶ /μL	5.0 - 10.0
Hemoglobin (Hb)	12,08 ± 1,72	g/dL	8.0 - 15.0
Hematocrit (HCT)	35,98 ± 3,77	%	24.0 - 45.0
MCV	47,02 ± 3,09	fL	39.0 - 55.0
MCH	15,74 ± 1,36	pg	12.5 - 17.5
MCHC	33,47 ± 2,06	g/dL	30.0 - 36.0
RDW	15,29 ± 0,81	%	13.0 - 17.0
Platelets (PLT)			
	199,15 ± 204,34	10 ³ /μL	300 - 800
PCT	0,21 ± 0,21	%	0.0 - 2.9
MPV	10,20 ± 0,71	fL	12.0 - 17.0
PDW	15,1 ± 2,24	%	0.0 - 50.0

3.2.1 White Blood Cell (WBC)

The mean value of white blood cell was $18,99 \pm 8,71 \times 10^3/\mu\text{L}$. It was in the normal range ($5,5 - 19,5 \times 10^3/\mu\text{L}$). It showed that most stray cats did not have leukocytosis (increased WBC) or leucopenia (the significantly decreased WBC). Lymphocytes showed with mean $30,95 \pm 13,52\%$ also in the normal range ($20,0 - 55,0\%$). Lymphocytes were responsible for the adaptive immune response. Increased and decreased number of lymphocytes indicated virus infection and immunology disease. Monocyte showed mean $2,87 \pm 1,00\%$, was in the normal range ($1,0 - 4,0\%$). Monocyte played role in phagocytes and the body's defense against bacterial and protozoan infections. Eosinophil showed mean $11,07 \pm 6,97\%$, it was far from the normal range ($2,0 - 12,0\%$). Eosinophilia (increased eosinophils) was often associated with parasitic infections or allergic reactions. Granulocytes showed a mean value of $59,28 \pm 13,10\%$, which was in the normal range ($35,0 - 78,0\%$).

3.2.2 Red Blood Cell (RBC)

The Red Blood Cell (RBC) count showed a mean value of $7.69 \pm 0.97 \times 10^6/\mu\text{L}$, which was within the normal range ($5.0 - 10.0 \times 10^6/\mu\text{L}$). Hemoglobin (Hb) showed an average value of $12.08 \pm 1.72 \text{ g/dL}$, which was within the normal range ($8.0 - 15.0 \text{ g/dL}$). Hemoglobin is the main indicator of blood oxygen capacity [15]. Hematocrit (HCT) showed an average value of $35.98 \pm 3.77\%$, still within the normal range ($24.0 - 45.0\%$). MCV (Mean Corpuscular Volume) showed an average value of $47.02 \pm 3.09 \text{ fL}$, indicating the average size of red blood cells was within the normal range ($39.0 - 55.0 \text{ fL}$). MCH (Mean Corpuscular Hemoglobin) showed an average value of $15.74 \pm 1.36 \text{ pg}$, which was within the normal range ($12.5 - 17.5 \text{ pg}$). MCHC (Mean Corpuscular Hemoglobin Concentration) showed an average value of $33.47 \pm 2.06 \text{ g/dL}$, which was within the normal range ($30.0 - 36.0 \text{ g/dL}$). RDW (Red Cell Distribution Width) showed an average value of $15.29 \pm 1.68\%$, indicating variations in red blood cell size was within the normal range ($13.0 - 17.0\%$).

3.2.3 Platelet (PLT)

The number of platelet showed with mean value $199,15 \pm 204,34 \times 10^3/\mu\text{L}$, which was below the normal range ($300 - 800 \times 10^3/\mu\text{L}$). It indicated thrombocytopenia (decreased platelet count). PCT (Plateletcrit) showed a mean value of $0.21 \pm 0.21\%$, within the normal range ($0.0 - 2.9\%$). MPV (Mean Platelet Volume) showed a mean value of $10.20 \pm 0.71 \text{ fL}$, slightly below the normal range ($12.0 - 17.0 \text{ fL}$), indicating that platelets tend to be smaller. PDW (Platelet Distribution Width) shows an average value of $15.1 \pm 2.24\%$, which is within the normal range ($0.0 - 50.0\%$). [16]

The results of this hematological examination show several important indicators about the health status of stray cats [15]. A significant increased eosinophils ($11.07 \pm 6.97\%$) indicated a high probability of parasitic infestation. Parasite infestation in stray cats is a common problem and can impact their health. This infestation can be caused by parasites such as worms, fleas, or mites that are commonly found in stray cats [17].

A low platelet count ($199.15 \pm 204.34 \times 10^3/\mu\text{L}$) indicated thrombocytopenia, which can be caused by various factors including infectious diseases, bone marrow disorders, or immunological conditions. Thrombocytopenia in cats can be an indication of a serious illness that requires further medical attention [14].

Hemoglobin, hematocrit and other red blood cell parameters were within the normal range, indicating that most stray cats were not anemic. This is important because anemia

can affect a cat's ability to hunt and survive in the wild [15].

Lymphocyte and monocyte counts were within the normal range indicating that there were no signs of significant viral or bacterial infections in the stray cat population. This indicated that their immune system was functioning well in fighting infections every day.

3.3 Urine Examination

Table 4. Data of urinalysis result

Urine Parameters / Sample Number	Result										Unit	Standard Range
	1PI #655	2PI #656	3PI #657	4PI #658	5PI #659	6PI #660	7PI #661	8PI #662	9PI #663	10PI #664		
Volume	2.8	1.4	2	1.4	1.5	2.3	2.5	2.1	3.1	1	mL	
Specific Gravity	1.043	> 1.050	> 1.050	1.050	> 1.050	> 1.050	> 1.050	1.020	1.048	> 1.050		1.015 - 1.060
Physical Examination												
Colour	Yellow w	Yellow w	Yellow w	Yellow w	Yellow	Yellow	Yellow	Transparent Yellow	Yellow w	Yellow w		
Viscosity	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute		
Urinalysis (Strip /Dipstick test)												
pH	6	6	6	6	7	7	7	7	8	6		5.0 - 7.0
Leucocyte	+1 (10-25)	+3 (500)	+3 (500)	+2 (75)	+2 (75)	+3 (500)	+3 (500)	+2 (75)	-	+2 (75)	Leuko/ μ L	
Nitrite	-	-	-	-	-	-	-	-	-	-	Negative/Positive	

Protein	+1 (30)	+1 (30)	+1 (30)	+1 (30)	+1 (30)	+1 (30)	-	+1 (30)	+1 (30)	mg/dL
Glucose	-	-	-	-	-	-	-	-	-	mg/dL
Ketone	-	-	-	-	-	-	-	-	-	Negative/Positive
Urobilinogen	-	-	-	-	-	-	-	-	-	mg/dL
Bilirubin	-	-	-	-	-	-	-	-	-	Negative/Positive
Blood	-	+4 (250)	-	+1 (5-10)	-	-	+4 (250)	-	+1 (5-10)	ca.Ery/ μ L
Haemoglobin	-	-	-	-	-	-	-	-	-	ca.Ery/ μ L
Urine Sediment Crystal	-	-	-	+++	+++	+++	-	+++	-	
Crystal Type	-	-	-	Triple phosphate (+) & Ca Oxalate (+)	Triple phosphate	Triple phosphate	-	Triple phosphate	-	
Red Blood Cell (RBC)	-	++++	-	-	-	-	++	-	+	
White Blood Cell (WBC)	-	+	-	-	-	-	+	-	-	
Epithelial Cell	-	+	+	+	+	+	+	++	+	

Urine Parameters/ Sample Number	Result										Unit	Standard Range
	11 P2 #665	12 P2 #666	13 P2 #667	14 P2 #668	15 P2 #669	16 P1 #670	17 P2 #671	18 P2 #672	19 P2 #673	20 P2 #674		
Volume	-	2.5	2.5	2.6	1.1	2.5	-	1.6	2.4	-	mL	
Specific Gravity	-	1.050	1.005	>1.050	1.050	1.050	-	1.050	1.030	-		1.015 - 1.060
Physical Examination												
Colour	-	Yellow	Transpa rant yellow	Yellow	Yellow	Yellow	-	Yellow	Transpa rant Yellow	-		
Viscosity	-	Dilute	Dilute	Dilute	Dilute	Dilute	-	Dilute	Dilute	-		
Urinalysis (Strip /DipstickTest)												
pH	-	6	6	7	7	7	-	6	6	-		5.0 - 7.0
Leucocyte	-	+3 (500)	+3 (500)	+2 (75)	+1 (10-25)	+3 (500)	-	+1 (10-25)	+2 (75)	-	Leuko/ μ L	
Nitrite	-	-	-	-	-	-	-	-	-	-	Negative/P ositive	
Protein	-	+1 (30)	-	+1 (30)	-	+1 (30)	-	+1 (30)	-	-	mg/dL	
Glucose	-	-	-	-	-	-	-	-	-	-	mg/dL	

Ketone	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Negative/ Positive	-	-	-	-	-	-	-	-	-	-	-	-	-	

Urobilinogen	-	-	-	-	-	-	-	-	-	-	-	-	mg/dL
Bilirubin	-	-	-	-	-	-	-	-	-	-	-	-	Negative/Positive
Blood	-	-	-	-	-	-	-	-	-	+4 (250)	+2 (25)	-	ca.Ery/ μ L
Haemoglobin	-	-	-	-	-	-	-	-	-	-	-	-	ca.Ery/ μ L
Urine Sediment													
Crystal	-	-	-	++	-	++	-	-	-	-	-	-	
Crystal Type	-	-	-	Triple phosphate	-	Triple phosphate	-	-	-	-	-	-	
Red Blood Cell (RBC)	-	-	-	-	-	-	-	-	-	+++	-	-	
White Blood Cell (WBC)	-	-	-	-	-	-	-	-	-	+	-	-	
Epithelial Cell	-	+	+	+	-	-	-	-	-	++	+	-	

Urinalysis is an examination of normal and abnormal components in urine. This is an easy, inexpensive, and important initial diagnostic test for veterinarians. A complete urinalysis includes examination of color, odor, turbidity, volume, pH, specific gravity, protein, glucose, ketones, blood, erythrocytes, leukocytes, epithelial cells, cylinders, crystals, and organisms [18]. This study used 20 cats showed in Table 5, however only 17 cats had urine samples which were able to analyse. Based on the Table 5, 17 urine samples had an average volume of 2 mL in various urine specific gravities (uSG), 12 samples (71%) had uSG <1.015 and 5 samples (29%) had uSG 1.015 -1,060.

Table 5. Urine specific gravities of in stray cats using urine refractometer

Number of Samples	Average of uSG	Standart Range	Percentage Occurance
12	< 1.015	1.015 - 1.060	71%
5	1.015 - 1.060		29%

uSG is used to assess kidney function and the ability of the tubules to concentrate and dilute urine [19]. Specific gravity is also used to evaluate the hydration status of animals [18]. The uSG depends on the number, size, amount and weight of substances dissolved in the urine or carried into the urine [20]. Factors that influence urine specific gravity include age, type of feed, gender, fasting status, and frequency of water drinking [21]. Low specific gravity or hyposthenuria can indicate a kidney tubular disorder, due to the loss of the tubule's ability to concentrate or inability to dilute by reabsorbing dissolved substances in the urine [22]. The results of the study showed that uSG was dominated by hyposthenuria, which is thought to be related to less drinking frequency or fasting status in the animals. Cats that fast for a long time have lower uSG than cats that do not fast [21].

The color of the urine samples in this study obtained was clear yellow to cloudy yellow with various viscosity. Urine color is caused by the presence of urochrome and urobilin. Meanwhile, the color intensity correlates with the amount of water in the urine. Urine color abnormalities can be caused by excess urobilin, bilirubin, hemoglobin, myoglobin, hematuria or consumption of certain medications. Pink to red colors indicate the presence of free erythrocytes, hemoglobin or myoglobin, all of which will have an influence when examining urine using a dipstick (strip test) [23]. The normal color of cat urine varies between clear transparent, light yellow, yellow and dark yellow. Urine with a dark yellow color indicates a high urine concentration while transparent urine indicates a low urine concentration [19]. The results of the cat examination showed a variety of colors from transparent to yellow, so it can be said that the urine color of these cats is normal.

Based on the results of urinalysis using a strip test seen on Table 6, the results obtained were that 9 samples (53%) had a pH of 6, 7 samples (41%) had a pH of 7, and 1 sample (6%) had a pH of 8 Result: Leukocytes 3+ (500 Leuko/ μ L) were found in 7 samples (41%), Leukocytes 2+ (75 Leuko/ μ L) in 6 samples (35%), Leukocytes 1+ (10-25 Leuko/ μ L) in 3 samples (18%), and did not contain in 1 sample (6%). Protein results showed that 13 samples (76%) contained 1+ (30 mg/dL) and 4 samples (24%) did not contain protein. Urine examination using a strip test or dipstick is one of the initial screening examinations that can be carried out to see the presence of protein in the urine or proteinuria [18]. Urine pH shows the kidney's ability to regulate H⁺ and HCOO³⁻. meat consumption, respiratory and metabolic acidosis, vomiting, diarrhea, nausea, fever, urine acidifier are some things that can reduce urine pH. Meanwhile, low protein diets, postprandial diets, high grain and vegetable diets, ingestion of alkaline substances, bacteria, renal acidosis, respiratory and metabolic alkalosis, and certain drugs can cause an increase in pH [19].

Table 6. Urinalysis results using strip test

Parameters	Results	Number of samples	Percentage Occurance
pH	6	9	53%
	7	7	41%
	8	1	6%
Leucocyte	+1 (10-25 Leuko/ μ L)	3	18%
	+2 (75 Leuko/ μ L)	6	35%
	+3 (500 Leuko/ μ L)	7	41%
	-	1	6%
Protein	+1 (30 mg/dL)	13	76%
	0	4	24%
	+1 (5-10 ca.Ery/ μ L)	3	18%
	+2 (25 ca.Ery/ μ L)	1	6%
	+4 (250 ca.Ery/ μ L)	3	18%
	0	10	59%

There were 3 samples (18%) containing 1+ blood (5-10 ca.Ery/ μ L), 3 samples (18%) containing 4+ blood (250 ca.Ery/ μ L), 1 sample (6%) containing 2 blood + (25) ca.Ery/ μ L, and 10 samples (59%) did not contain blood. In general, healthy cats will not show any protein excretion in the urine, but the small amount of protein detected in the urine can still be considered normal [19]. The high protein contained in cat food can cause the urine pH to become more alkaline and trigger the appearance of struvite crystals. Cat foods with high magnesium, phosphorus, calcium, chloride, or fiber and moderate protein content are often associated with an increased risk of struvite crystal formation. Calcium oxalate crystals form more easily in acidic urine [24]. Cat food that contains high protein can also cause the kidneys to be unable to filter protein in the blood. If the nephrons are damaged, there will be a decrease in the glomerular filtration rate, where the kidneys experience problems in excretory and non-excretory functions so that it can progress to chronic kidney disease [25]. This condition causes protein to be excreted from the body with urine [26].

The results of the urinalysis are confirmed by the microscopic results of the urine sedimentation as seen in Table 7 which shows that 5 samples contained triple phosphate crystals (29%), 1 sample contained a combination of calcium oxalate and triple phosphate crystals (6%), and 11 samples found no crystals (65%). The red blood cell (HR) content in urine was found in 5 samples (30%) and 12 samples (70%) had negative results, while the white blood cell (HR) content was found in 4 samples (24%) and 13 samples (76%) negative results. Examination of epithelial cells in urine showed that 13 samples (76%) contained epithelial cells and 4 samples (24%) showed negative results. Struvite crystals are formed in alkaline urine, derived from magnesium, ammonium and phosphate. Bacterial infections that produce urease can increase the formation of struvite crystals in the urine. Urease is an enzyme that helps in the process of hydrolyzing urea and producing ammonia and carbonate ions. Ammonium ions can increase urine pH, thereby reducing the solubility of magnesium phosphate and increasing struvite formation [27]. A diet high in fat, low in protein and potassium can reduce the formation of struvite crystals [28].

The presence of positive blood results on the strip test or dipstick examination is consistent with the urine sedimentation examination which shows the presence of leukocytes and red blood cells. The presence of leukocytes in the urine can be caused by the friction of

crystal stones and then mixing in the urine. This condition indicates inflammation in certain parts of the urinary tract which can be caused by crystals in the urinary bladder. The presence of blood in the urine examination results can also occur due to friction between the urinary tract and crystals in the urine, which can cause injury to the walls of the urinary tract [29]. Apart from that, causes of hematuria include inflammatory trauma, urolithiasis, neoplasia, coagulopathy, and urinary tract infections [30]. The presence of microhematuria is physiologically very possible in cats [18]. However, iotrogenic hematuria can be caused by samples taken via cystocentesis [31].

Table 7. Microscopis result of urine sedimentation

Parameters	Result	Number of Samples	Percentage Occurance
Crystal	Mixed Crystal	1	6%
	Triple phosphate (++)	5	29%
	-	11	65%
Eritrocytes	+	2	12%
	++	1	6%
	+++	1	6%
	++++	1	6%
	-	12	70%
Leucocytes	+	4	24%
	-	13	76%
Epithelial Cells	+	11	65%
	++	2	12%
	-	4	24%

Calcium oxalate crystals form in acidic urine and high levels of calcium in the blood [30]. The factor for the formation of calcium oxalate occurs due to feed that is high in calcium, protestodium or vitamin D. Meanwhile, the inhibiting factor is the content of phosphate, magnesium, nephrocalcin, and other ingredients such as *Tamm-horsfallmucoproteins*, glycosamminoglycan. Urine acidity can be reduced by a diet high in protein, fiber, phosphorus and magnesium, thereby potentially reducing calcium oxalate crystallization [32]. Some diseases such as hyperparathyroidism and neoplasia can cause oxalate crystals to develop more easily. Oxalate crystals also often occur in cats with normal blood calcium levels [28]. Feed content plays an important role in the formation of urine crystals which can cause blockage of the urinary tract. One of the causes of blockage of the urinary tract in cases of feline urinary tract diseases (FLUTD) is the continuous provision of dry food which is not balanced with the provision of sufficient drinking water. Dry food only contains 5 – 10% water so cats need more drinking water to meet water requirements. Lack of water intake (low drinking frequency) will cause the animal to become dehydrated and be at risk of suffering from Feline lower urinary tract disease (FLUTD).

Low numbers of epithelial cells can be found in the urine of healthy animals, especially in samples collected by the cystocentesis method [19], while more epithelial cells on the catheterization and storage method can be found. The catheterization method is influenced by the catheter installation process, while collected urine can be influenced by contamination from reproductive tract mucosal cells, especially in female cats [18]. Small number of epithelial cells are also normally found in urine, it may come from the cell turnover process

[33]. This statement strengthens the results of research which shows the presence of epithelial cells in minimal numbers, which is thought to be influenced by the sample collection process. The types of epithelium found in urine include squamous epithelial cells originating from the distal urethra, transitional epithelial cells originating from the ureter, urinary bladder and proximal urethra, tubular epithelial cells originating from the renal tubules [18].

4 Conclusion

The results of the physical examination of stray cats showed many abnormalities in the skin and fur, such as ectoparasites, and alopecia. In the examination of stray cats, a fairly large percentage of abnormal results were obtained in the increase in HR and RR, this can be influenced by stress factors that can affect the results of the examination. Hematological examination of this stray cat showed that most hematological parameters were within the normal range, except for increased eosinophils and low platelet counts. It indicated possible parasitic infestation and platelet-related problems that needed to be followed up. Result of urine examination was dominated by hypostenuria, which is thought to be related to less drinking frequency or fasting status in the animals. Examination of urine color of these cats is normal, did not contain protein. Examination of epithelial cells in urine showed that 13 samples (76%) contained epithelial cells and 4 samples (24%) showed negative results. Further research and ongoing health management were important to ensure the long-term welfare of stray cats.

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