Research Article

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Feline Panleukopenia Virus in Duhok, Iraq: Clinical, Hematological and Serum Biochemistry Changes in Clinically and Subclinically Infected Cats

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Abstract

This study aimed to recording the clinical manifestations of the feline panleukopenia virus (FPLV) disease in cats, and to evaluate some hemato-biochemical parameters alterations in clinically and subclinically infected cats. Seventy out of 100 cats were positive for FPV using conventional polymerase chain reaction (c-PCR) technique, further 15 clinically healthy cats that were negative for the laboratory tests served as control group. Careful clinical examinations for all cats has been done and blood samples were collected from all cats for some hematological and serum biochemistry parameters estimation. The prevalence of FPV was 76.1% and 57.6% in clinically and subclinically infected cats respectively. Clinically observations of infected cats showed fever, anorexia, depression, congestion or pale and/or icteric mucous membranes, vomiting, bloody diarrhea, and different degrees of dehydration. In addition, oro-nasal and ocular lesions with nervous signs in some cats were also detected. Results also revealed a significantly increased body temperature, respiratory rate, and heart rate in clinically infected cats. There was a significant decrease in TECs, HB, PCV, PLTs, MCH, and MCHC, with a significant increase in MCV reflecting macrocytic hypochromic anemia, along with a significant decrease in TLCs in clinically infected cats. Serum biochemistry analysis showed a significant decrease in TP and a significant increase in AST, ALT, TB, creatinine, and urea in clinically infected cats compared to the control group. These parameters were not significant in subclinically infected cats compared to the control group. In conclusion, clinically infected cats with FPV suffer from an acute form of the disease with significant clinico-hemato-biochemical parameter changes.

Keywords: Feline panleukopenia virus, Conventional PCR, Clinically signs.

Introduction

Feline panleukopenia virus (FPLV) is a contagious disease affects both domestic and wild cats (1). Numerous synonyms for the disease have been used such as laryngoenteritis, feline agranulocytosis, feline distemper, feline infectious enteritis, feline parvoviral enteritis, and pseudomembranous enteritis (2). The disease is caused by the species Carnivore protoparvovirus1 of the genus Protoparvovirus, a small, non-enveloped, single-stranded DNA virus that belongs to the Parvoviridae family (1,3,4). It has been known since the beginning of the 20th century, causing severe enteritis with high morbidity and mortality rates among young and non-vaccinated adult cats (5). Lane *et al.* (6-8) stated that the virus infects domestic cats and wild felids, such as lions and tigers. In addition, the virus was isolated from other animals like foxes, wolves, monkeys, and pandas (9-12).

The FPV is transmitted by direct contact with infected cats or their secretions (13); However, placental transmission from pregnant infected cats to the embryo were also common (14), and by flies and other insects, which also play a role in the spreading of the virus (15). The mortality rates of FPV in the acute stage may go up to 25-90% (16) and it has serious implication to various organs such as the intestine, heart, kidney, lymph nodes, spleen, lung, liver, and brain (17,18).

There are four different clinically forms of the FPLV disease in cats, peracute, acute, subacute, and subclinically (2,19), depending on many factors like age, immune status, and concurrent infections (17,19,20). The peracute form of disease characterized by sudden death within 12 hours with little or no premonitory signs in cats between 1 and 12 months of age (16,21,22). While, the acute and subacute forms of the disease are clinically manifested by multiple systemic signs, including vomiting, diarrhea, neural disorders, vision impairment in young animals, and reproductive failure such as abortion, stillbirth, and early neonatal deaths (23-26). Further, the subclinically form is more spread, with no clinically signs, except shedding of the virus (19,20),

The major hematological and biochemical alterations in infected FPV cats are leukopenia (27), thrombocytopenia (28), and anemia (22). A significantly increased in the levels of serum AST and serum creatinine, with significant decreases in total protein levels, because of increased protein leakage into the infected gastrointestinal tract (29).

There is scant information available, about the feline panleukopenia virus in cats in Duhok areas of Iraq. Therefore, the current investigation was carried out to record the clinical manifestations, hematological and some serum biochemistry parameters changes associated with the FPLV disease in clinically and subclinically infected cats.

Materials and methods

Ethical approval

The Animal Ethics Committee in the University of Duhok, College of Veterinary Medicine, was approved the study on January 6, 2021 (DR.199611CV).

Animals and samples obtained

This study includes 100 cats of different lifestyles, breeds, ages, clinical status and regions in Duhok. During the period from December 2021 to November 2022, Seventy out of 100 cats (70%) were positive for FPV using the conventional polymerase chain reaction technique (30). Carful clinically examination for all cats and blood samples (2 millilitres) were collected from the cephalic or saphenous veins of each cat using a Luer slip 2 ml syringe with a 23G needle and kept in two sterile VACUTEST® tubes (1 ml for each). The first tube with anticoagulant containing dipotassium ethylene diamine tetraacetic acid (K2EDTA) for haematological examination, then the remaining blood was stored at -20°C, until utilizing in the c-PCR technique. The second tube without anticoagulant for serum separation by centrifuged at 2500 rpm (280 G-force) for 15 min and stored at -20°C for biochemistry analysis (31). Furthermore, 15 clinically healthy cats that were negative for the laboratory tests served as control group.

Hematological examination

The blood samples collected in tubes with anticoagulant were utilized to estimate the total erythrocyte counts (TECs), hemoglobin concentration (Hb), packed cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), platelet counts (PLT), and total leukocyte counts (TLCs) by using a hematology analyzer (Genex-California, USA). Differential leukocyte counts (DLCs) were estimated on Giemsa-stained blood smears (31).

Serum biochemical examination

Serum samples was used for biochemical examination using a spectrophotometer (Zenith Lab. Co., China), including total protein (TP) with g/dL, aspartate amino transferase (AST) with IU/L, alanine amino transferase (ALT) with IU/L, total bilirubin (TB) with mg/dL, creatinine with mg/dL, and urea with mg/dL. All these parameters were estimated using available kits provided by (BioLabo, France), The total urea, was estimated using available kit provided by (BioSystems, Spain).

Statistical analysis

The significance of variations between clinically, subclinically infected cats in compared to healthy cats as a control group in hematological and serum biochemistry parameters was statistically analyzed using independent sample t-tests in the IBM-SPSS Statistics (Version 22) program. All the significant differences were determined at $P < 0.05$.

Results

In the present work, examination of 100 cats for FPV showed that the prevalence of FPV was 76.1% and 57.6% for the clinically infected and subclinically cats, respectively (Table 1). Clinical examinations of the infected cats observed that were suffering from an acute form of the disease, with fever, anorexia, depression, congestion or pale and/or icteric mucous membranes, vomiting, diarrhea sometimes accompanied by blood (bloody diarrhea) and dehydration (Figure 1). Other signs recorded include erosive lesions on the tongue, bleeding from the mouth and nostril, lacrimation, and respiratory signs such as nasal discharge, difficult breathing, and hypoxia (Figure 1)

Table 1: Prevalence of feline panleukopenia virus in clinically and subclinically infected cats based on c-PCR technique.

Clinically status	No. of exanimated cats	No. of positive (%)	No. of negative (%)
Clinically infected	67	51 (76.1) [a]	16 (23.9)
Subclinically infected	33	19 (57.6) [a]	14 (42.4)

Values that exhibit a significant difference (P < 0.05) are denoted by different letters (a or b).

. Moreover, nervous signs in some cases such as lameness and recumbence; However, some cats died finally. These signs have different frequency and percentages (Figure 2). In addition, infected cats with FPLV disease showed different degrees of dehydration, including mild dehydration with slightly tacky mucous membranes, loss of skin turgor and normal eyes position, moderate dehydration with dry mucous membranes, moderate loss of skin turgor and mildly sunken skin. The last degree was severe dehydration with extremely dry mucous membranes, skin not returning to its original position when tented, severely sunken eyes, weak and thread pulses, and altered level of consciousness (Table 2).

Results also revealed, a significant increase in early acute stage of body temperature (40.2 C^{o}), respiratory rate (58.8 /min) and heart rate (154.7 /min) in cats infected with FPLV disease compared to the control group. While, there was a significantly decrease of body temperature (35.7 C^{o}), respiratory rate (23.5 /min) and heart rate (1min) in late stage of disease. There were no significance differences between subclinically infected cats and control groups (P<0.05) (Table 3). Additionally, the total and differential leukocyte counts of the cats infected with FPLV disease in the early and last stages, there was showed a significant decrease in TLCs in the infected cats, which is due to a significant decrease in the absolute number of both lymphocytes and neutrophils. While, there was no significant difference in the absolute number of monocytes, eosinophils, and basophils compared with the control group (Table 4). In this study, there were no significant changes in the hemogram parameters between the sub clinically infected cats with FPLV disease and the control group (Table 4). Moreover, the serum biochemistry analysis of the infected cats with FPLV disease in the early and last stages revealed a significant decrease in the TP. While, there was a significant increase in the AST, ALT, TB, creatinine, and urea, compared to the control group. This study also indicates that there were no significant changes in the serum biochemistry parameters between the subclinically infected cats and the control group (Table 5).

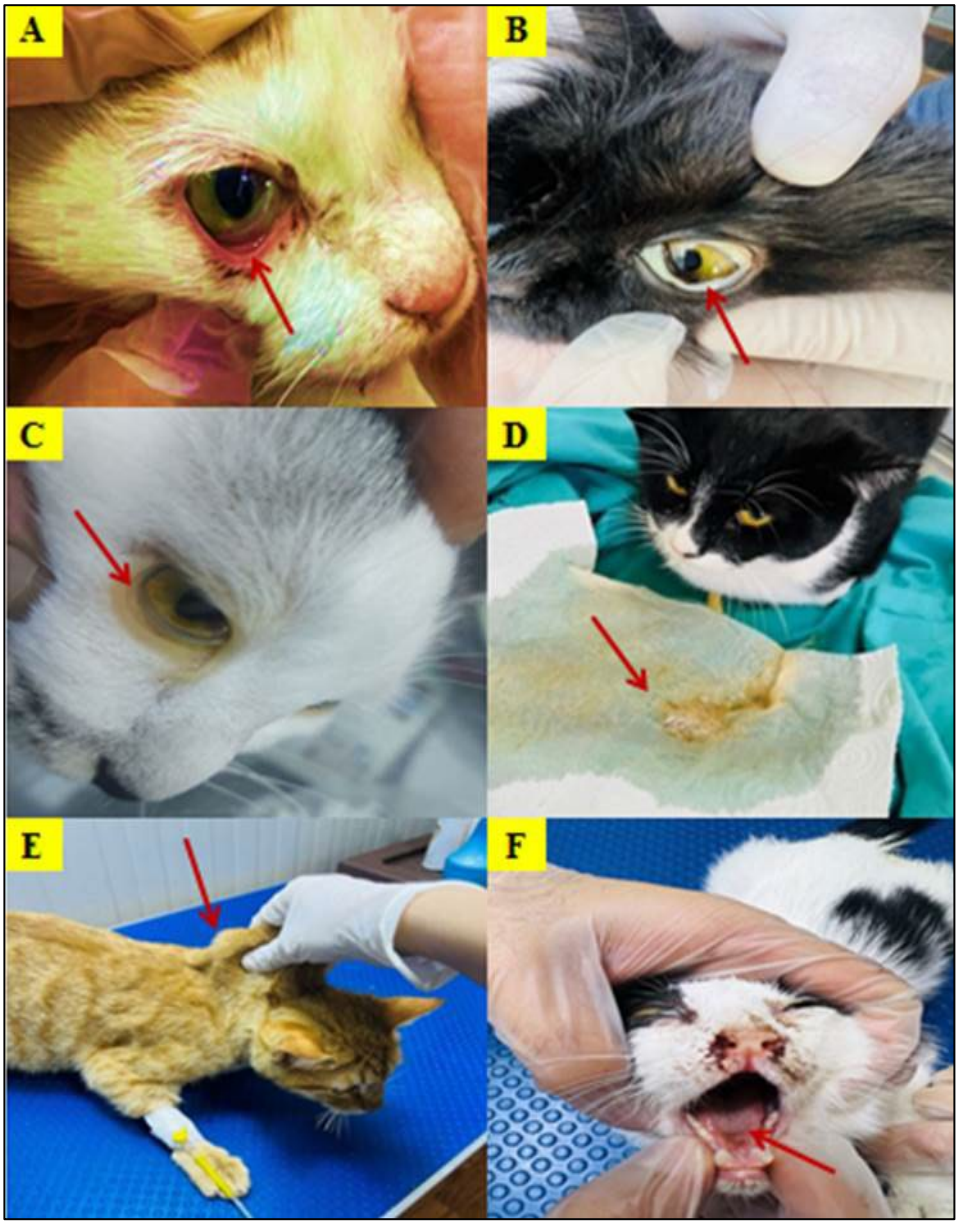

Figure (1): Cats were infected with FPLV disease, showed different clinically signs: (A, B, & C): congestion, pale, and icteric of eyes mucous membranes respectively, (D): vomiting, (E): dehydration, (F); erosive lesions on the tongue.

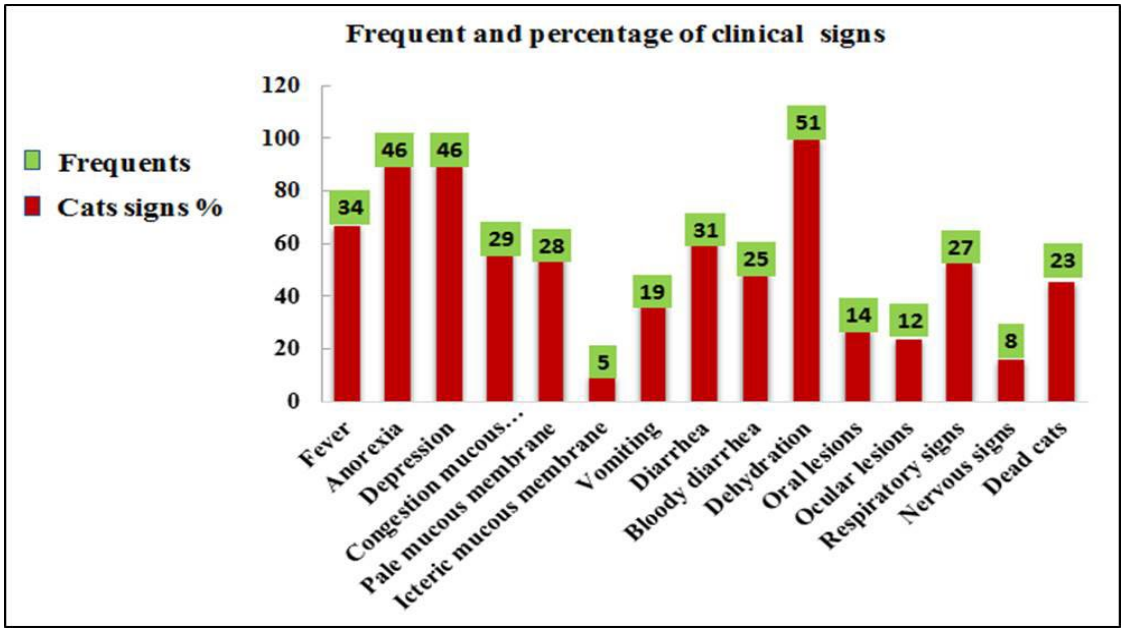

Figure 2: Summarized frequents and percentage of clinical signs in the cats with FPLV disease (n=51).

Table (2): Summarized the degree of dehydration in infected cats with FPLV disease (n=70).

Degree of dehydration	Skin elasticity	Treatment	No. of infected animal (%)
< 5%	< 1 Sec.	None	19 (27.1)
6%- 8% (Mild)	1- 2 Sec.	Orally Supplies	10 (14.3)
8%- 10% (Moderate)	2- 5 Sec.	IV Fluid	14 (20.0)
10%- ≥12 % (Sever)	5- ≥10 Sec.	IV Fluid	27 (38.6)

Table (3): Clinical symptoms in the cats infected with the FPLV disease compared with the control group.

Parameters	Control Group (n=15) Range Mean ± SE	Infected Cat (n=51) Early Stage (n=42) Range Mean ± SE	Infected Cat (n=51) Late Stage (n=9) Range Mean ± SE	Subclinically infected (n=19) Range Mean ± SE
Body Temperature (c°)	37.5 – 38.7 38.30 ± 0.08[a]	38.9 – 41.8 40.22 ± 0.11[b]	35.4 – 37.0 35.73 ± 0.30[b]	37.0 – 38.5 38.52 ± 0.10[a]
Respiratory Rate/1m	35 – 47 42.82 ± 1.07[a]	43 – 90 58.80 ± 2.06[b]	16 – 30 23.50 ± 2.00[b]	22 – 50 45.50 ± 2.80[a]
Heart Rate/1m	115 – 150 136.11 ± 3.02[a]	130 – 180 154.70 ± 2.60[b]	50 – 102 67.90 ± 5.70[b]	100 – 125 133.43 ± 2.40[a]

Mean values ± Standard error (S.E.) significantly different at (P<0.05) between cats clinically parameters are labelled with the horizontal different letters ([a, b]), n: Number of animals.

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Table (4): The haematological parameters in the cats with clinically form (Early and Last stages) of FPLV disease compared to the cats with subclinically form and control group.

Parameters	control group (n=15)Range Mean ± SE	Infected Cat (n=51)		Subclinically infected (n=19)Range Mean ± SE
		Early Stage (n=42) Range Mean ± SE	Late Stage (n=9) Range Mean ± SE	
TRBC *10 ^{12}/ML	4.86 - 9.55 6.62 ± 0.41^{a}	3.14 - 9.01 5.22 ± 0.27^{b}	3.10 - 8.22 4.38 ± 0.12 ^{b}	4.16 - 10.32 6.14 ± 0.22 ^{a}
HB g/L	89.00 - 148.00 124.33 ± 4.41 ^{a}	60.00 - 113.00 78.70 ± 3.77 ^{b}	52.00 - 90.00 68.40 ± 2.55 ^{b}	90.00 - 128.00 120.28 ± 2.21 ^{a}
PCV %	22.20 - 45.90 32.95 ± 1.72 ^{a}	18.00 - 35.50 26.02 ± 1.11 ^{b}	18.00 - 35.50 26.02 ± 1.11 ^{b}	20.10 - 38.40 30.88 ± 1.50 ^{a}
MCV FL	37.10 - 54.40 46.31 ± 1.28 ^{a}	33.00 - 65.00 50.52 ± 1.57 ^{b}	23.40 - 55.33 49.12 ± 1.24 ^{b}	35.20 - 50.33 46.21 ± 0.94 ^{a}
MCH pg	13.20 - 25.90 20.11 ± 0.89 ^{a}	11.10 - 18.80 12.98 ± 0.35 ^{b}	10.24 - 16.30 10.66 ± 0.25 ^{b}	12.50 - 22.30 19.84 ± 0.66 ^{a}
MCHC g/L	259.00 - 492.00 382.87 ± 21.08 ^{a}	223.00 - 405.00 302.80 ± 10.34 ^{b}	195.00 - 325.00 265.20 ± 11.23 ^{b}	230.00 - 453.00 375.62 ± 17.00 ^{a}
PLT *10^{9}/L	402.00 - 980.00 615.40 ± 40.05 ^{a}	203.00 - 760.00 444.87 ± 31.64 ^{b}	180.30 - 542.00 365.75 ± 27.12 ^{b}	399.60 - 770.00 600.50 ± 60.16 a
TLCs *10^{9}/ML	11.10 - 24.60 16.44 ± 1.30 ^{a}	6.50 - 16.50 10.21 ± 0.48 ^{b}	4.50 - 13.50 9.33 ± 0.28 ^{b}	10.12 - 17.40 15.23 ± 1.10 ^{a}
LYM%	16.60 - 45.30 33.07 ± 2.31 ^{a}	12.40 - 36.60 24.18 ± 1.23 ^{b}	10.40 - 25.33 19.18 ± 1.02 ^{b}	14.92 - 38.30 31.12 ± 1.81 ^{a}
NEUT %	39.60 - 78.70 58.44 ± 2.54 ^{a}	29.80 - 71.40 41.91 ± 1.93 ^{b}	22.60 - 55.20 35.82 ± 2.33 ^{b}	29.40 - 59.22 55.24 ± 3.44 ^{a}
MON %	0.30 - 5.60 2.37 ± 0.32 ^{a}	0.00 - 7.90 1.93 ± 0.31 ^{a}	0.00 - 4.60 1.86 ± 0.28 ^{a}	0.00 - 3.40 2.32 ± 0.13 ^{a}
EOSI %	1.10 - 11.80 5.42 ± 0.89 ^{a}	0.00 - 9.30 4.96 ± 0.51 ^{a}	0.00 - 6.80 3.22 ± 0.51 ^{a}	0.20 - 8.33 4.98 ± 0.47 ^{a}
BASO %	0.00 - 1.80 0.58 ± 0.16 ^{a}	0.00 - 1.80 0.49 ± 0.11 ^{a}	0.00 - 1.00 0.28 ± 0.10 ^{a}	0.00 - 1.20 0.50 ± 0.12 ^{a}

Mean values ± Standard error (S.E.) significantly different at (P<0.05) between cats clinically parameters are labelled with the horizontal different letters ($^{a, b}$), n: Number of animals.

Table (5): The biochemical parameters in the cats with clinically form (Early and Last stages) of FPLV disease compared to the cats with subclinically form and control group.

Parameters	control group (n=15)Range Mean ± SE	Infected Cat (n=51)		Subclinically infected (n=19) Range Mean ± SE
		Early Stage (n=42) Range Mean ± SE	Last Stage (n=9)Range Mean ± SE	
TP g/dL	6.31-8.37 7.18 ± 0.18 [a]	3.52-5.22 4.33 ± 0.09 [b]	2.40-4.33 3.92 ± 0.10 [b]	5.89-8.26 6.97 ± 0.20 [a]
AST IU/L	18.10-46.33 32.03 ± 3.04 [a]	39.60-66.37 57.32 ± 1.25 [b]	45.53-69.18 63.44 ± 2.16 [b]	17.40-45.25 25.48 ± 2.04 [a]
ALT IU/L	27.76-54.90 44.36 ± 2.59 [a]	37.66-74.63 62.91 ± 1.60 [b]	43.56-81.33 72.32 ± 1.90 [b]	23.22-56.85 39.02 ± 2.16 [a]
TB mg/dL	0.09-0.21 0.13 ± 0.11 [a]	0.38-0.65 0.48 ± 0.02 [b]	0.57-3.95 2.62 ± 0.55 [b]	0.07-0.23 0.15 ± 0.10 [a]
Creatinine mg/dL	0.65-1.22 0.82 ± 0.06 [a]	0.70-2.10 1.45 ± 0.08 [b]	0.82-2.51 1.98± 0.10 [b]	0.60-1.20 0.81 ± 0.05 [a]
Urea mg/dL	13.63-30.33 20.62 ± 1.64 [a]	25.55-69.75 40.79 ± 2.28 [b]	35.42-77.63 48.97 ± 3.33 [b]	13.43-30.22 21.76 ± 1.56 [a]

Mean values ± Standard error (S.E.) significantly different at (P<0.05) between cats clinically parameters are labelled with the horizontal different letters ([a, b]), n: Number of animals.

Discussion

In the present work, no significant differences were recorded between clinically and subclinically infected cats. The same result was recorded by (32-34). While (35, 36) found that there was a significant association between clinically and subclinically infected cat populations. (37) added that the prevalence was higher in subclinically infected cats. Moreover, (36) mentioned that clinically infected cats with diarrhea might be expected to enhance the shedding of viruses from damaged intestinal epithelium.

The results of this study showed that most of the infected cats were suffering from the acute stage of the disease, which manifested by various signs such as dehydration, anorexia, depression, fever, diarrhea (some cases with bleeding), vomiting, pale mucous membrane, respiratory signs, mouth and ocular lesions, nervous signs, and icteric mucous membrane. This finding agrees with (21, 26, 38- 40). In general, the interpretation of these signs is that the FPV reaches different tissues via spreading from the lymphatic cells to the blood stream, causing viremia with fever (41). The virus replicates and destroys the lining of the gastrointestinal tract, leading to gastritis with anorexia, and vomiting (16). Malformation of the villi in the intestinal crypt cells leading to dehydration and diarrhea as a result of malabsorption and increased cell permeability (21,27). In

severe infection, the diarrhea may be accompanied by blood (42). Furthermore, the virus invades other tissues, causing retinal degeneration of the eyes (23), degeneration in the epithelium of the mucosal tongue (18), and injury to the neuroblast cells, leading to cerebellar hypoplasia that manifests as cerebellar ataxia (24,26).

In this study, infected cats also suffering from respiratory signs in complicated cases appear as a result of secondary bacterial infections (43,44). The congestion and pallor of the mucous membrane in infected cats as a result of septicemia cause peripheral vasodilatation, which leads to hyperemic mucosa followed by vasoconstriction, resulting in pallor of the mucous membrane with delayed capillary refill time and degraded pulse quality (26). Furthermore, the icterus mucous membrane of infected cats occurs due to viral and secondary bacterial hepatitis (29).

This study revealed different degrees of dehydration using a skin fold test; about 14.3% of diseased cats had mild dehydration, 20.0% had moderate dehydration, and 38.6% had severe dehydration. The same results were recorded by (26). Furthermore, the infected FPV cats start with mild dehydration as a result of high fever and anorexia (21), then become severe with the appearance of vomiting and diarrhea in the progression of the disease as a result of intestinal villi cell damage (14,26). This study also showed that in the early stages of the disease, there is a significant increase in symptoms such as body temperature, respiratory and heart rates, and then they decline in the late stages. This result agrees with (21, 26, 44).

The hematological analysis of the present study, indicates that there was a significant decrease in the TRBC, HB, PCV, MCH, and MCHC. While, there was a significant increase in the MCV of cats infected with FPLV disease. This finding was in agreement with (29, 43). On the contrary, (35, 45, 46) recorded that there is no significant decrease in TRBC and HB. Moreover, Grimes and Fry (47) stated that no significant decrease in MCV and MCH but only an increase in MCHC; this is due to the development of microcytic hypochromic anemia. Moreover, the infected cats in this study showed anemia, this agrees with (22, 43). It has been found that the anemia in infected cats may be attributed to intestinal inflammation that stimulates the secretion of interleukin-6, which inhibits the release of hepcidin and decreases the synthesis of ferroportin, affecting erythropoiesis. It may also be related to the abnormal iron uptake and bleeding.

Moreover, results also showed a significant decrease in platelet counts. This result is the same as those reported by (16, 38) stated that thrombocytopenia appears as a result of a defect in the bone marrow after viral invasion that causes disseminated intravascular coagulation (DIC). In addition, the prolonged clotting time associated with low platelets may influence the immune response of the infected host (48). In contrast, stated that there is no significant decrease in the number of platelets in cases of FPLV infection.

In addition, this study showed a significant decrease in TLCs, lymphocytes, and

neutrophils. While, no significant decrease was found in monocytes, eosinophils, or basophils. These results agree with the findings of several earlier studies (29,35,38). Leukopenia means a decrease in neutrophils and lymphocytes, which occurs when the virus invades and damages the lymphatic systems and hematopoietic precursor cells of bone marrow (46,49).

For the serum biochemical examination, this study showed that the infected cats with FPV in the early and last stages revealed a significant decrease in total protein, with a significant increase in AST, ALT, ALP, BUN, creatinine, and total bilirubin. Some of these findings agree with (29) who found a significant increase in AST, ALP, creatinine, and total bilirubin and a significant decrease in the total protein but no significant changes in the ALT and BUN in cats infected with FPV infection. The increase in AST may be due to enteritis, which causes more production and leakage of AST enzyme into the body (50). Hypoproteinemia occurs as a result of a decrease in protein absorption and increased leakage in damaged intestines (29). These may lead to decreased plasma colloid osmotic pressure and a reduction in effective perfusion at the capillary level, followed by DIC, organ failure, and death (28).

In addition, a significant increase in creatinine and urea in infected cats was recorded. This finding agreement with Greene, (16) and Manikantaswamy *et al*. (26) It has been found that an increase in creatinine and urea nitrogen in serum relates to azotemia as a result of inflamed kidneys caused by the FPV virus and secondary bacterial infection, as well as dehydration.

Conclusions

The present study documented that the feline panleukopenia virus is prevalent in Duhok province-Iraq, and most of cats infected with FPLV disease are suffering from an acute form of the disease, with significant alterations in some hematological and serum biochemistry parameters. Moreover, clinically and subclinically infected cats could play an important role in spreading the disease. Therefore, these cats should be monitored for strategic control of the FPLV disease in the country.

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Conflict of interest

No potential conflict of interest was reported by the author(s).

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فيروس طاعون القطط في دهوك، العراق: التغيرات السريرية والدمية والكيموحيوية في القطط المصابة سريريا وتحت السريري

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الخلاصة

هدفت الدراسة إلى تسجيل العلامات السريرية للقطط المصابة بمرض طاعون القطط، الفيروسي وتقييم بعض تغيرات المعايير الدمية والكيموحيوية في القطط المصابة سريريًا وتحت سريري. من مجموعه 100 قطة، 70 قطة إيجابية بالنسبة لفيروس طاعون القطط باستخدام تقنية تفاعل البلمرة المتسلسل التقليدي. اضافة الى 15 قطة سليمة سريريا وسالبة مختبريا عدت كمجموعة سيطرة. تم الفحص السريري وبعناية لجميع القطط مع جمع عينات الدم منها لغرض اجراء بعض الفحوصات الدمية وقياس مستوى بعض المعايير الكيموحيوية في مصل الدم. تم إجراء الفحص السريري الدقيق لجميع القطط وتم جمع عينات الدم بشكل عشوائي من جميع القطط لفحص الدم وتقدير بعض معايير الكيموحيوية في الدم. أن انتشار فيروس طاعون القطط بلغت 76.1% و57.6% في القطط المصابة سريرياً وتحت سريري على التوالي. عانت القطط المصابة سريرياً من الحمى، فقدان الشهية، الاكتئاب، الاحتقان أو شحوب الأغشية المخاطية أو اليرقان، القيء، الإسهال الدمي، ودرجات مختلفة من فقدان السوائل. وكذلك آفات في الفم والأنف والعين مع علامات عصبية في بعض الحالات. وزيادة معنوية في درجة حرارة الجسم ومعدل التنفس ومعدل ضربات القلب في القطط المصابة سريرياً، كما اظهرت التغيرات الدمية للقطط المصابة سريريا انخفاضًا ملحوظًا في العداد الكلي لكريات الدم الحمر وخضاب الدم وحجم خلايا الدم المرصوصة وعدد الصفيحات الدموية ومعدل خضاب الدم الكروي ومعدل تركيز خضاب الدم الكروي، مع زيادة ملحوظة في معدل حجم الخلايا الكروي، مما يعكس فقر الدم كبيرة الحجم قليل الصباغ، إلى جانب انخفاض كبير في اعداد خلايا الدم البيض في القطط المصابة سريريًا. وأظهر التحليل الكيموحيوي لمصل الدم انخفاضا معنويا في البروتين الكلي، في حين لوحظ ارتفاع معنوي في خميرة الاسبارتيت ناقلة الامين وخميرة الالنين ناقلة الامين والصفراوين الكلي والكرياتنين، واليوريا في القطط المصابة سريريا مقارنة بمجموعة السيطرة. علاوة على ذلك، لم تكن هناك تغييرات معنوية في المعايير الدمية والكيموحيوية بين القطط المصابة تحت السريري ومجموعة السيطرة. واستنتج ان القطط المصابة سريريا بفيروس طاعون القطط عانت من الشكل الحاد من المرض مع تغيرات كبيرة في المعايير السريرية والدمية والكيموحيوية.

الكلمات المفتاحية: فيروس طاعون القطط، تقنية تفاعل البلمرة المتسلسل التقليدي، العلامات السريرية.