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HEMATOLOGICAL VARIABILITY AND CLINICAL SEVERITY INDICATORS IN CATS WITH SUSPECTED FELINE PANLEUKOPENIA

Variabilitas Hematologis dan Indikator Keparahan Klinis pada Kucing dengan dugaan Panleukopenia Feline

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Abstract

Feline panleukopenia is a severe, highly contagious viral disease of cats that commonly involves gastrointestinal injury, immune suppression, dehydration, and potentially fatal systemic complications. This study aimed to describe the clinical characteristics and hematological profiles of cats suspected of infection with Feline Panleukopenia Virus in a veterinary clinical setting. A clinic-based observational case documentation approach was applied. Clinical evaluation included body temperature, heart and respiratory frequency, hydration status, mucous membrane color, capillary refill time, stool condition, and appetite. Hematological assessment included white blood cell count, lymphocyte count, monocyte count, platelet count, hemoglobin concentration, hematocrit, and red blood cell count. The examined cats showed fever, severe dehydration, liquid diarrhea, anorexia, pale pink mucous membranes, and delayed capillary refill time, indicating systemic illness, gastrointestinal involvement, and impaired peripheral perfusion. Hematological findings varied across cases. One cat showed leukopenia, whereas others showed leukocytosis, lymphocytosis, lymphopenia, monocytosis, thrombocytopenia, anemia, low hematocrit, or reduced red blood

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cell count. These findings indicate that cats with clinical suspicion of feline panleukopenia may not always show a uniform hematological pattern. Leukopenia remains diagnostically important, but leukocytosis and monocytosis may suggest inflammatory or secondary infectious processes. Thrombocytopenia, anemia, and low hematocrit may indicate more severe systemic involvement. The study supports the combined use of clinical examination and hematological profiling for early recognition, severity assessment, prognosis, and supportive treatment planning in suspected feline panleukopenia.

Keywords: Feline panleukopenia virus, clinical signs, hematological profile, leukopenia, thrombocytopenia.

Abstrak

Feline panleukopenia merupakan penyakit virus berat dan sangat menular pada kucing yang umumnya melibatkan kerusakan saluran pencernaan, supresi sistem imun, dehidrasi, serta komplikasi sistemik yang berpotensi fatal. Penelitian ini bertujuan untuk mendeskripsikan karakteristik klinis dan profil hematologi kucing yang diduga terinfeksi *Feline Panleukopenia Virus* di lingkungan klinik hewan. Pendekatan yang digunakan adalah dokumentasi kasus observasional berbasis klinik. Evaluasi klinis meliputi suhu tubuh, frekuensi denyut jantung dan pernapasan, status hidrasi, warna membran mukosa, waktu pengisian kapiler, kondisi feses, dan nafsu makan. Pemeriksaan hematologi meliputi jumlah sel darah putih, jumlah limfosit, jumlah monosit, jumlah trombosit, konsentrasi hemoglobin, hematokrit, dan jumlah sel darah merah. Kucing yang diperiksa menunjukkan demam, dehidrasi berat, diare cair, anoreksia, membran mukosa berwarna merah muda pucat, serta waktu pengisian kapiler yang melambat. Temuan ini menunjukkan adanya penyakit sistemik, keterlibatan saluran pencernaan, dan gangguan perfusi perifer. Temuan hematologi bervariasi antar kasus. Satu kucing menunjukkan leukopenia, sedangkan kucing lainnya menunjukkan leukositosis, limfositosis, limfopenia, monositosis, trombositopenia, anemia, hematokrit rendah, atau penurunan jumlah sel darah merah. Temuan ini menunjukkan bahwa kucing dengan dugaan klinis feline panleukopenia tidak selalu memperlihatkan pola hematologi yang seragam. Leukopenia tetap penting secara diagnostik, tetapi leukositosis dan monositosis dapat menunjukkan adanya proses inflamasi atau infeksi sekunder. Trombositopenia, anemia, dan hematokrit rendah dapat mengindikasikan keterlibatan sistemik yang lebih berat. Penelitian ini mendukung penggunaan kombinasi antara pemeriksaan klinis dan profil hematologi untuk pengenalan dini, penilaian tingkat keparahan, prognosis, serta perencanaan terapi suportif pada kasus dugaan feline panleukopenia.

Kata kunci: *Feline panleukopenia virus*, tanda klinis, profil hematologi, leukopenia, trombositopenia.

INTRODUCTION

Cat ownership has increased substantially in many urban and peri-urban communities, including Indonesia, where domestic cats are increasingly valued as companion animals because of their close social and emotional relationships with humans. This growth in owned, semi-owned, stray, and community cat populations has important consequences for feline health. Higher population density, frequent contact among cats, and shared environments can increase the transmission of infectious diseases, particularly those affecting the gastrointestinal tract. Gastrointestinal illness is clinically important because it may rapidly lead to poor nutrient absorption, dehydration, reduced body condition, and systemic deterioration. Among viral gastrointestinal diseases of cats, feline panleukopenia remains one of the most significant because of its acute onset, high contagiousness, environmental resistance, and severe outcomes in susceptible animals.

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Feline Panleukopenia Virus is a highly contagious parvovirus affecting domestic and wild felids, with the greatest disease burden generally observed in kittens, unvaccinated cats, under-vaccinated cats, and cats maintained in high-density environments. Recent epidemiological studies show that Feline Panleukopenia Virus remains widely distributed, although prevalence varies according to region, lifestyle, vaccination coverage, age, and housing conditions (Dishow *et al.*, 2024; Kabir *et al.*, 2023; MB *et al.*, 2024; Rehme *et al.*, 2022). Across geographical settings, young age, incomplete vaccination, stray status, shelter residence, and multi-cat housing are repeatedly identified as major risk factors for infection and severe disease (Citarová *et al.*, 2024; Kabir *et al.*, 2023; Pacini *et al.*, 2023). These findings show that feline panleukopenia is not only an individual clinical problem but also a population-level concern in companion animal health management.

The central problem addressed in this study is the need for a clearer clinical and hematological description of cats suspected of Feline Panleukopenia Virus infection in a veterinary practice context. Although feline panleukopenia is classically associated with acute enteritis and leukopenia, affected cats may show variable clinical and laboratory findings depending on age, immune competence, viral exposure, disease stage, hydration status, and secondary infection. Acute disease may present as fever, anorexia, vomiting, diarrhea, dehydration, pale mucous membranes, delayed capillary refill time, and rapid systemic decline. In severe cases, death may occur due to dehydration, secondary bacterial infection, sepsis, profound immune suppression, or disseminated intravascular coagulation (Rehme *et al.*, 2022; Truyen *et al.*, 2009).

A practical response to this diagnostic challenge is the integration of physical examination, rapid diagnostic testing, and hematological monitoring in suspected cases. Early recognition is essential because infected cats may shed virus into the environment and contaminate shared cages, litter boxes, feeding utensils, veterinary equipment, and clinic surfaces. Feline Panleukopenia Virus is environmentally stable and may persist for extended periods, particularly in contaminated organic material, making indirect transmission through fomites central to outbreak maintenance (Nulhakim *et al.*, 2021; Oliveira *et al.*, 2018; Pacini *et al.*, 2023). Therefore, timely diagnosis supports not only individual patient care, but also isolation, disinfection, and transmission control in clinics, shelters, and multi-cat households.

Previous literature indicates that prevention and control of feline panleukopenia require vaccination, biosecurity, environmental decontamination, and appropriate diagnostic surveillance. Vaccination remains the most reliable protective measure, with unvaccinated cats showing substantially higher odds of infection than vaccinated cats across different regions (Dishow *et al.*, 2024; Kabir *et al.*, 2023; Rehme *et al.*, 2022). Current vaccination guidelines classify Feline Panleukopenia Virus as a core vaccine antigen because of the severity of disease and the ability of the virus to persist in the environment (Squires *et al.*, 2024; Stone *et al.*, 2020). In multi-cat environments, quarantine of sick animals, separation of newly admitted cats, sanitation, and use of disinfectants effective against parvoviruses are critical for reducing viral exposure and preventing outbreaks (Nicholson *et al.*, 2012; Pacini *et al.*, 2023; Rehme *et al.*, 2022).

In clinical practice, diagnosis is often supported by fecal antigen testing, polymerase chain reaction assays, and complete blood count evaluation. Antigen-based tests are useful for rapid case identification, although interpretation may be affected by disease stage, viral shedding dynamics, and recent vaccination in some settings (Jacobson *et al.*, 2021; Neuerer *et al.*, 2008; Patterson *et al.*, 2007). Molecular diagnostics, including polymerase chain reaction and sequencing, provide additional value for confirmation, strain characterization, and epidemiological surveillance (Awad *et al.*, 2018; Citarová *et al.*, 2024; Kabir *et al.*, 2023).

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Hematological assessment is especially important because the virus targets rapidly dividing tissues, particularly bone marrow and lymphoid organs, leading to leukocyte depletion, lymphoid damage, immune suppression, and altered inflammatory responses (Gülersoy *et al.*, 2023; Truyen *et al.*, 2009).

Closely related studies have shown that hematological parameters may provide diagnostic and prognostic information in Feline Panleukopenia Virus infection. Leukopenia is widely recognized as a hallmark of feline panleukopenia, but affected cats may also present with leukocytosis, lymphopenia, lymphocytosis, monocytosis, anemia, thrombocytopenia, and reduced hematocrit, depending on disease progression and concurrent complications (Gülersoy *et al.*, 2023; Kruse *et al.*, 2010; Porporato *et al.*, 2018). Prognostic studies further suggest that systemic inflammation, dehydration, altered blood cell profiles, and clinical depression may be associated with poorer outcomes (Kruse *et al.*, 2010; Petini *et al.*, 2020). Nevertheless, local clinical documentation remains valuable because presentation and laboratory findings may vary across populations, veterinary settings, and management conditions. This creates a need for case-based evidence from Indonesian veterinary practice, particularly evidence linking physical examination findings with hematological profiles.

Accordingly, this study aimed to describe the clinical characteristics and hematological profile of cats suspected of infection with Feline Panleukopenia Virus at Sahabat Satwa Celebes Animal Clinic. The study provides practical case-based documentation of local disease presentation, with emphasis on observable clinical signs and blood parameters relevant to diagnosis and treatment planning. The study is based on the assumption that Feline Panleukopenia Virus infection produces recognizable patterns of gastrointestinal disease, dehydration, immune-cell alteration, anemia, and platelet disturbance that may guide early recognition, severity assessment, and supportive therapy. By focusing on clinical examination and hematological evidence, this study contributes applied veterinary knowledge for the management of suspected feline panleukopenia in domestic cats.

RESEARCH METHODS

Clinical Examination

This study was designed as a clinic-based observational case documentation of cats suspected of infection with Feline Panleukopenia Virus. The methodological focus was placed on clinical presentation and hematological abnormalities because these parameters are directly useful for early recognition and clinical decision-making in veterinary practice. The approach followed the principle that assessment of suspected feline panleukopenia should begin with systematic clinical triage. Cats with Feline Panleukopenia Virus infection commonly present with systemic and gastrointestinal signs, including fever, lethargy, anorexia, dehydration, vomiting, and diarrhea, which may become hemorrhagic in severe cases (Ferri *et al.*, 2020; Isaya *et al.*, 2020; Pacini *et al.*, 2023). Clinical observations were recorded from cats examined at Sahabat Satwa Celebes Animal Clinic, with attention to hydration, perfusion, gastrointestinal status, and systemic compromise.

The clinical examination parameters included rectal temperature, heart rate, respiratory rate, skin elasticity or turgor, mucous membrane color, capillary refill time, stool consistency, and nutritional or appetite status. These parameters were selected because they represent practical indicators of disease severity in suspected feline panleukopenia. Hydration and perfusion were assessed through skin turgor, mucous membrane appearance, and capillary refill time. Delayed skin return, pale mucous membranes, and prolonged capillary refill time indicate impaired circulatory status and increased clinical urgency. This approach is consistent with the literature indicating that hydration, mucous membrane perfusion, capillary refill time, mental status, and

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temperature are important indicators for triage and initial management of cats suspected of Feline Panleukopenia Virus infection (Patterson *et al.*, 2007). Gastrointestinal involvement was evaluated through liquid stool or diarrhea, while anorexia was recorded as an indicator of systemic illness and reduced nutritional intake.

Hematological Evaluation

Hematological evaluation was performed using complete blood count parameters to describe the systemic effects of suspected Feline Panleukopenia Virus infection. The parameters recorded included white blood cell count, lymphocyte count, monocyte count, platelet count, hemoglobin concentration, hematocrit, and red blood cell count. These variables were selected because Feline Panleukopenia Virus affects rapidly dividing tissues, especially bone marrow and lymphoid tissues, resulting in clinically meaningful changes in leukocytes and immune-cell populations. Leukopenia is widely regarded as a hallmark of feline panleukopenia because of viral suppression of bone marrow activity, while neutropenia and lymphopenia are frequently reported and may correlate with disease severity and prognosis (Ferri *et al.*, 2020; Petini *et al.*, 2020). The leukocyte profile was therefore interpreted as a central indicator of immune compromise and disease progression.

Platelet count was included because thrombocytopenia is frequently described in feline panleukopenia and may serve as a negative prognostic indicator (Ferri *et al.*, 2020; Kruse *et al.*, 2010). Red blood cell count, hemoglobin concentration, and hematocrit were recorded to evaluate anemia or reduced erythrocyte mass, which may reflect systemic illness, intestinal blood loss, inflammation, or bone marrow involvement. Although anemia is not always the primary prognostic determinant in Feline Panleukopenia Virus infection, it contributes to overall severity assessment when interpreted together with leukocyte and platelet abnormalities (Ferri *et al.*, 2020; Oliveira *et al.*, 2018). The hematological profiles were documented for each cat to allow comparison among cases and to capture variability in leukocyte response, including leukopenia, leukocytosis, lymphocyte abnormalities, monocytosis, anemia, thrombocytopenia, and reduced hematocrit.

Reliability of Fecal Antigen Tests

Fecal antigen testing was considered an appropriate rapid diagnostic approach for cats presenting with clinical signs compatible with feline panleukopenia. Rapid immunochromatographic or enzyme-linked immunosorbent assay-based fecal antigen tests are widely used as first-line screening tools in cats with suspected viral enteritis because they provide point-of-care information that can support immediate isolation, supportive care, and outbreak control. However, these tests must be interpreted within the broader clinical context. Literature indicates that fecal antigen tests often show high specificity, meaning that positive results are generally useful when clinical signs are compatible, but sensitivity may vary across test kits, disease stages, and viral shedding patterns (Cattaneo & McCallum, 2025; Dall'Ara *et al.*, 2023; Jacobson *et al.*, 2021; Neuerer *et al.*, 2008). Therefore, a positive result was considered supportive of Feline Panleukopenia Virus infection, whereas a negative result would not be sufficient to exclude disease in a clinically suspicious cat.

The interpretation of fecal antigen testing also considered false-negative results in cats with low viral shedding or later disease stages, as well as diagnostic complications associated with recent vaccination or cross-reactivity with related parvoviruses. Previous studies have reported variable sensitivity for rapid antigen tests, including field evidence in which rapid immunochromatographic assays showed moderate sensitivity but high specificity when compared with polymerase chain reaction (Dishow *et al.*, 2023). For this reason, fecal antigen testing is best used as a rapid triage method rather than as a stand-alone definitive diagnostic

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tool. When clinical signs, exposure history, and hematological abnormalities remain strongly suggestive of Feline Panleukopenia Virus infection, confirmatory molecular testing using feces, rectal swabs, or blood is recommended to improve diagnostic confidence (Cattaneo & McCallum, 2025; Jacobson *et al.*, 2021; Neuerer *et al.*, 2008).

Observational Case Documentation and Study Design

This study followed an observational case documentation design, which is appropriate for describing naturally occurring clinical and hematological findings in cats suspected of infection with Feline Panleukopenia Virus in veterinary practice. The purpose was not to test an intervention, but to document clinical patterns, laboratory abnormalities, and diagnostic considerations in real-world cases. Observational documentation is useful for feline panleukopenia because presentation may vary according to age, immune status, vaccination history, exposure environment, hydration status, secondary infection, and disease stage. Previous literature supports the use of standardized clinical assessment, complete blood count evaluation, biochemical or electrolyte assessment when available, and clear diagnostic criteria when documenting feline panleukopenia cases (Ferri *et al.*, 2020; Kruse *et al.*, 2010; Petini *et al.*, 2020).

Data collection was structured around clinical examination, hematological profiling, diagnostic interpretation, and case-based synthesis. Clinical data were recorded at presentation using standardized physical parameters. Hematological data were recorded from blood examination results and compared with normal reference ranges to determine whether each parameter was within, below, or above the expected interval. Diagnostic interpretation integrated clinical signs, fecal antigen testing when applicable, and hematological findings. This integrated approach reflects recommendations that early hematological assessment, particularly leukocyte and platelet evaluation, should inform hospitalization decisions, isolation measures, and supportive treatment intensity in suspected feline panleukopenia (Ferri *et al.*, 2020; Kruse *et al.*, 2010).

The methodology was limited to descriptive clinical and hematological assessment rather than molecular characterization or therapeutic outcome analysis. Even so, it provides a practical framework for documenting suspected cases in a clinical setting and for comparing local findings with international evidence. Complete clinical examination and hematological profiling allowed the study to identify meaningful abnormalities, including dehydration, diarrhea, anorexia, altered perfusion, leukocyte disturbances, anemia, and thrombocytopenia. Such documentation is valuable because rapid recognition of Feline Panleukopenia Virus-compatible patterns may improve early management, guide supportive therapy, and support infection-control measures in clinics and multi-cat environments.

RESULTS AND DISCUSSION

Clinical Findings and Their Relationship with Disease Severity

The clinical examination findings showed that cats suspected of infection with Feline Panleukopenia Virus presented with systemic illness, gastrointestinal disturbance, and impaired hydration status. As shown in Table 1, the recorded rectal temperature was 40.1°C, exceeding the normal reference interval of 38.0–39.2°C and indicating fever. Heart frequency was 148 beats per minute and respiratory frequency was 36 breaths per minute, both within the stated reference ranges. However, normal cardiovascular and respiratory values did not exclude clinically significant disease, because other parameters indicated substantial systemic compromise. Skin turgor showed delayed return of more than three seconds, suggesting severe dehydration of approximately 10%. The mucous membrane was pale pink, capillary refill time

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exceeded two seconds, stool consistency was liquid, and appetite status was recorded as anorexia. Together, these findings indicate fever, diarrhea, dehydration, poor peripheral perfusion, and reduced nutritional intake, all of which are clinically compatible with Feline Panleukopenia Virus-associated enteritis and systemic illness.

These clinical findings are consistent with previous descriptions of feline panleukopenia, which commonly presents with fever, lethargy, anorexia, vomiting, dehydration, and diarrhea that may be mucoid or hemorrhagic (Isaya *et al.*, 2020; Kruse *et al.*, 2010; Pacini *et al.*, 2023). In the present cases, dehydration, pale mucous membranes, and delayed capillary refill time were particularly important because they indicated impaired perfusion and increased treatment urgency. Previous studies have emphasized that hydration status, mucous membrane color, and capillary refill time are useful bedside indicators of disease severity in cats with suspected Feline Panleukopenia Virus infection (Ferri *et al.*, 2020; Isaya *et al.*, 2020; Kruse *et al.*, 2010). Severe dehydration in this study was therefore not merely a secondary clinical sign but a central severity marker, because fluid loss from diarrhea, reduced intake, and intestinal mucosal injury can rapidly lead to circulatory compromise and metabolic deterioration.

Hematological Profiles and Interpretation of Abnormalities

The hematological findings demonstrated considerable variation among the examined cats. As shown in Table 2, Milen had a white blood cell count of 3.18 × 10^3/µL, below the reference interval of 5.5–19.5 × 10^3/µL, indicating leukopenia. This finding is highly compatible with the classical pathogenesis of feline panleukopenia, in which viral replication in rapidly dividing bone marrow and lymphoid tissues suppresses leukocyte production. Leukopenia is widely recognized as a hallmark of Feline Panleukopenia Virus infection and has been repeatedly associated with disease severity and poorer prognosis, particularly when severe or persistent (Ferri *et al.*, 2020; Isaya *et al.*, 2020; Pandey, 2022; Petini *et al.*, 2020).

In contrast, Jule and Mimi showed marked leukocytosis. Jule had a white blood cell count of 46.48 × 10^3/µL, accompanied by monocytosis, thrombocytopenia, and low hematocrit. Mimi had a white blood cell count of 33.32 × 10^3/µL, together with lymphocytosis, monocytosis, and thrombocytopenia. Leukocytosis is not the classical hematological pattern of uncomplicated feline panleukopenia; however, it may occur when secondary bacterial infection, inflammatory response, endotoxemia, stress, or concurrent disease modifies the leukocyte profile. Thus, leukocytosis in these cats should not be interpreted as excluding Feline Panleukopenia Virus infection. Instead, it may indicate a more complex inflammatory or secondary infectious process requiring careful clinical evaluation (Kohn *et al.*, 2006; Pandey, 2022; Petini *et al.*, 2020).

Lymphocyte abnormalities were also variable. Rui showed lymphopenia, which is consistent with lymphoid depletion and immune suppression caused by Feline Panleukopenia Virus. By contrast, Mimi and Lemon showed lymphocytosis. Lymphocytosis is less characteristic of feline panleukopenia and may reflect immune activation, inflammatory stimulation, stress-related leukogram variation, or individual host response. This variability indicates that lymphocyte values should not be interpreted in isolation. Instead, they should be assessed together with total leukocyte count, platelet count, red cell parameters, hydration status, and clinical signs.

Monocytosis was observed in Jule and Mimi. This finding may reflect inflammatory activation, intestinal mucosal injury, tissue damage, or secondary infection. Although monocytosis can support the interpretation of an inflammatory process, previous literature suggests that it does not have the same consistent prognostic value as leukopenia, thrombocytopenia, hypoalbuminemia, or electrolyte disturbances in feline panleukopenia (Petini *et al.*, 2020). In

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the present cases, monocytosis was most meaningful when interpreted together with leukocytosis and thrombocytopenia, suggesting that these cats may have experienced a more complex systemic inflammatory response.

Thrombocytopenia was one of the most frequent hematological abnormalities, occurring in Jule, Mimi, and Lemon. This finding is clinically important because low platelet counts are frequently reported in cats with feline panleukopenia and may be associated with worse outcomes (Ferri *et al.*, 2020; Kruse *et al.*, 2010). Thrombocytopenia may result from bone marrow suppression, platelet consumption, systemic inflammation, or severe disease complications. Its presence may influence clinical monitoring, bleeding-risk assessment, and the intensity of supportive care.

Anemia-related abnormalities were most evident in Lemon, which showed decreased hemoglobin, low hematocrit, and reduced red blood cell count. Low hematocrit was also observed in Jule and Rui. In cats with suspected Feline Panleukopenia Virus infection, anemia and low hematocrit may reflect intestinal blood loss, systemic inflammation, bone marrow involvement, hemodilution, or concurrent disease. Although anemia is not always the primary prognostic indicator, it contributes to severity assessment when combined with leukocyte abnormalities, thrombocytopenia, dehydration, and poor perfusion (Ferri *et al.*, 2020; Oliveira *et al.*, 2018).

Integrated Interpretation of Clinical and Hematological Findings

The combined clinical and hematological findings suggest that cats suspected of Feline Panleukopenia Virus infection may show diverse disease patterns rather than one uniform presentation. Clinically, the cats showed fever, diarrhea, anorexia, severe dehydration, pale mucous membranes, and delayed capillary refill time. Hematologically, the cases included leukopenia, leukocytosis, lymphopenia, lymphocytosis, monocytosis, thrombocytopenia, anemia, and low hematocrit. This heterogeneity is important because feline panleukopenia is often associated with leukopenia, but the present findings show that suspected cases may also display leukocytosis or other inflammatory profiles, particularly when secondary infection or systemic inflammation is present.

The findings support the need for an integrated assessment model. Clinical signs such as dehydration, diarrhea, anorexia, pale mucous membranes, and delayed capillary refill time reflect immediate disease severity and guide urgent supportive care. Hematological parameters provide additional information on immune suppression, inflammatory activity, platelet status, and erythrocyte compromise. Previous studies support a multi-parameter prognostic approach combining clinical severity, complete blood count findings, platelet count, albumin, total protein, and electrolyte status (Ferri *et al.*, 2020; Kruse *et al.*, 2010; Oliveira *et al.*, 2018). Although albumin and electrolyte data were not available in the present dataset, the documented clinical and hematological abnormalities were sufficient to identify several high-risk features.

Disease Progression and the Role of Secondary Complications

The results also support the pathophysiological understanding that feline panleukopenia progresses through the interaction of intestinal injury, immune suppression, dehydration, and secondary infection. Feline Panleukopenia Virus damages rapidly dividing intestinal crypt cells, leading to impaired epithelial regeneration, diarrhea, malabsorption, and fluid loss. Damage to the intestinal mucosa may also facilitate bacterial translocation, increasing the risk of septic complications. This risk is particularly concerning in cats with leukopenia or lymphopenia, because immune suppression reduces the ability to control secondary bacterial

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invasion. Previous literature identifies secondary bacterial infection and sepsis as important contributors to morbidity and mortality in severe feline panleukopenia (Chen *et al.*, 2025; Isaya *et al.*, 2020; Pacini *et al.*, 2023; Richards *et al.*, 2006).

Dehydration was a major severity factor in the present cases. The delayed skin turgor, pale mucous membranes, and prolonged capillary refill time indicated fluid deficit and impaired perfusion. Severe dehydration can worsen electrolyte imbalance, acid-base disturbance, renal perfusion, and systemic inflammatory stress. In feline panleukopenia, dehydration should therefore be interpreted as both a consequence of gastrointestinal disease and a driver of disease progression. Literature emphasizes that dehydration and perfusion deficits guide hospitalization intensity and fluid therapy urgency (Isaya *et al.*, 2020; Kruse *et al.*, 2010).

Immune status is another important modifier of disease progression. Virus-induced leukopenia and lymphopenia reduce host defense, while age, vaccination status, maternal antibody levels, and concurrent immunosuppressive conditions may influence disease severity. Kittens, unvaccinated cats, under-vaccinated cats, and immunocompromised animals are generally at higher risk for severe disease and adverse outcomes (Bergmann *et al.*, 2019; Egberink *et al.*, 2022; Hartmann *et al.*, 2022; Squires *et al.*, 2024). Although the present data did not fully document age and vaccination status, the observed variability in leukocyte responses suggests that host condition and disease stage likely influenced the hematological profiles.

Clinical Implications for Diagnosis, Prognosis, and Supportive Therapy

The findings highlight the practical value of hematological profiling in suspected feline panleukopenia. Complete blood count evaluation can support early diagnosis, identify immune suppression, detect inflammatory or secondary infectious patterns, and guide treatment intensity. Leukopenia, as observed in Milen, supports classical suspicion of feline panleukopenia and indicates possible immunosuppression. Leukocytosis with monocytosis, as seen in Jule and Mimi, suggests that clinicians should consider inflammatory or secondary infectious complications. Anemia, low hematocrit, erythrocytopenia, and thrombocytopenia, particularly in Lemon, indicate more severe systemic involvement and justify close monitoring.

Supportive therapy should prioritize correction of dehydration, stabilization of perfusion, control of gastrointestinal signs, prevention of secondary infection, and monitoring of hematological abnormalities. Severe dehydration and delayed capillary refill time indicate the need for prompt fluid therapy adjusted to hydration deficit, ongoing losses, and perfusion status. Because vomiting and diarrhea may cause electrolyte disturbances, especially hypokalemia, fluid therapy should ideally be accompanied by electrolyte assessment and correction when possible (Kruse *et al.*, 2010; Petini *et al.*, 2020). Nutritional support is also important because anorexia may worsen immune function and delay recovery.

Hematological findings should influence the level of clinical care. Leukopenic or lymphopenic cats require isolation, close monitoring, and consideration of antimicrobial therapy when clinical signs suggest bacterial translocation or sepsis risk. Thrombocytopenic cats should be monitored for bleeding risk and systemic deterioration, while cats with anemia or low hematocrit require further evaluation for blood loss, marrow suppression, or severe systemic disease. Antiemetic therapy, analgesia when abdominal discomfort is suspected, thermal support, and early enteral nutrition when tolerated are consistent with supportive care principles for Feline Panleukopenia Virus-associated enteritis. In clinics and multi-cat environments, suspected cases should be isolated promptly, and contaminated areas should be disinfected with agents effective against parvoviruses because of the environmental persistence and outbreak potential of the virus (Pacini *et al.*, 2023; Rehme *et al.*, 2022).

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Overall, the combined findings show that clinical examination and hematological profiling are complementary tools in the assessment of suspected feline panleukopenia. Clinical signs identify immediate physiological compromise, while hematological data clarify immune status, inflammatory response, platelet abnormalities, and red cell involvement. This integrated interpretation provides a stronger basis for early recognition, severity assessment, prognosis, and supportive treatment planning than either clinical signs or hematological values alone.

CONCLUSION

This study shows that cats suspected of Feline Panleukopenia Virus infection may present with systemic and gastrointestinal signs accompanied by varied hematological abnormalities. The main clinical findings were fever, severe dehydration, diarrhea, anorexia, pale mucous membranes, and delayed capillary refill time, indicating enteric disease, fluid loss, impaired perfusion, and systemic compromise. Hematological profiles varied, including leukopenia, leukocytosis, lymphopenia, lymphocytosis, monocytosis, anemia, thrombocytopenia, and low hematocrit, confirming that suspected cases do not always follow a uniform leukocyte pattern. These findings emphasize the importance of combining physical examination with complete blood count interpretation to support diagnosis, severity assessment, prognosis, monitoring, and supportive therapy. The study contributes local clinical evidence from veterinary practice in Makassar and highlights the practical value of hematological profiling in suspected feline panleukopenia. Further studies with larger samples, molecular confirmation, serial hematology, biochemical analysis, and outcome evaluation are needed to refine prognostic indicators and improve evidence-based clinical management.

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Tables

Table 1. General clinical examination findings in cats suspected of Feline Panleukopenia Virus infection.

Examination parameter	Result	Reference value	Interpretation
Temperature	>40 °C	38.0–39.2°C	High
Heart frequency	148 beats/minute	140–220 beats/minute	Normal
Respiratory frequency	36 breaths/minute	20–42 breaths/minute	Normal
Skin elasticity/turgor	>3 seconds	<2 seconds	Slow return; severe dehydration, approximately 10%
Mucous membrane	Pale pink	Pink	Anemia or poor perfusion
Capillary refill time	>2 seconds	<2 seconds	Delayed return
Stool condition	Liquid diarrhea	Solid or formed	Abnormal
Nutritional status	Anorexia	Good appetite	Abnormal

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Table 2. Hematological profile of cats suspected of Feline Panleukopenia Virus infection.

Cat	WBC (10^3/µL)	Lymphocytes (10^3/µL)	Monocytes (10^3/µL)	Platelets (10^3/µL)	Hemoglobin (g/dL)	Hematocrit (%)	RBC (10^6/µL)
Milen	3.18	1.60	0.23	138	13.6	29.78	8.16
Jule	46.48	5.17	3.81	37.38	11.1	21.60	6.86
Mimi	33.32	11.53	2.91	81	11.8	28.03	5.76
Lemon	8.10	8.46	0.19	57	7.3	17.78	4.69
Rui	10.38	0.99	0.56	400	9.9	21.59	5.78
Reference range	5.5–19.5	1.5–7.0	0.0–0.9	100–514	8.0–15.0	24.0–45.0	5.0–10.0

Abbreviations: WBC-White blood cell; RBC=Red blood cell

Figure

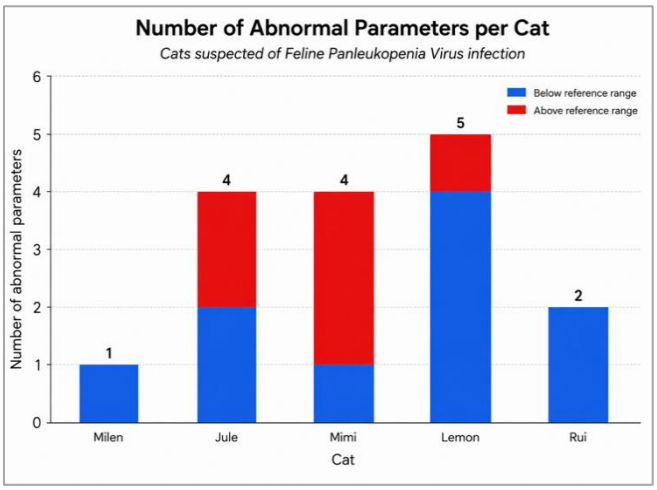

Figure 1. Number of abnormal parameters of cats suspected of feline panleukopenia virus infection.

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