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RESEARCH ARTICLE

Investigation of Novel Hematological Index Variations in Cats Naturally Infected with Feline Panleukopenia Virus

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ABSTRACT

Feline panleukopenia is a viral infection that impacts cats of all age groups, with particularly high mortality rates observed around the age of 3 months. The disease spreads through the fecal-oral transmission route. This study aims to evaluate the levels of various inflammatory hematologic indices—specifically, the neutrophil-to-lymphocyte ratio (NLR), platelet-to-lymphocyte ratio (PLR), lymphocyte-to-monocyte ratio (LMR), systemic inflammation response index (SIRI), and systemic immune-inflammatory index (SII)—in cats naturally exposed to Feline Panleukopenia Virus (FPV), and to assess the potential of these indices as markers of inflammation. Two groups were included in the study: a control group consisting of 20 healthy cats and an experimental group consisting of 40 cats showing symptoms of anorexia, vomiting, and/or diarrhea, diagnosed with FPV using a rapid test kit. All cats in both groups were between 0 and 3 months old and represented a variety of breeds and genders. No significant differences were found between the groups for the NLR and LMR values (with p-values of 0.054 and 0.627, respectively). However, the PLR was significantly higher in the FPV-infected group compared to the control group ($p<0.001$). In contrast, the SIRI ($p<0.001$) and SII ($p=0.002$) values were notably lower in the FPV-infected cats. In conclusion, this study revealed that there were significant differences in haematological indices between the two groups and PLR, SIRI and SII were important markers to reflect the inflammatory status in FPV infection.

Keywords: Feline panleukopenia virus, Lymphocyte to monocyte ratio, Neutrophil to lymphocyte ratio, Systemic immune-inflammation index, Systemic inflammatory response index

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Feline Panlökopeni Virüsüyle Doğal Enfekte Kedilerde Yeni Hematolojik İndeks Varyasyonlarının Araştırılması

ÖZ

Feline panlökopeni, tüm yaş gruplarındaki kedileri etkileyen viral bir enfeksiyondur ve özellikle 3 aylık civarında yüksek ölüm oranları görülür. Hastalık fekal-oral bulaşma yolu ile yayılır. Bu çalışmanın amacı, doğal olarak Feline Panlökopeni Virüsüne (FPV) maruz kalan kedilerde çeşitli inflamatuar hematolojik indekslerin (özellikle nötrofil-lenfosit oranı (NLR), trombosit-lenfosit oranı (PLR), lenfosit-monosit oranı (LMR), sistemik inflamasyon yanıt indeksi (SIRI) ve sistemik immün-inflamatuar indeks (SII) düzeylerini ve bu indekslerin inflamasyon belirteçleri olarak potansiyelini değerlendirmektir. Çalışma 20 sağlıklı kediden oluşan bir kontrol grubu ve anoreksi, kusma ve/veya ishal semptomları gösteren ve hızlı test kitiyle FPV tanısı koyulmuş olan 40 kediden oluşan bir deney grubu olarak iki gruptan oluştu. Her iki gruptaki kediler 0 ila 3 aylık yaşta, çeşitli ırk ve cinsiyetlerden oluştu. Gruplar arasında NLR ve LMR değerleri açısından anlamlı bir fark bulunmamıştır (p-değerleri sırasıyla 0,054 ve 0,627'dir). Ancak, PLR değeri FPV ile enfekte grupta kontrol grubuna kıyasla anlamlı derecede yüksekti ($p<0,001$). Buna karşılık, SIRI ($p<0,001$) ve SII ($p=0,002$) değerleri FPV ile enfekte kedilerde belirgin şekilde daha düşüktü. Sonuç olarak, bu çalışma iki grup arasında hematolojik indekslerde önemli farklılıklar olduğunu ve PLR, SIRI ve SII'nin FPV enfeksiyonunda inflamatuar durumu yansıtmada önemli belirteçler olduğunu ortaya koymuştur.

Anahtar kelimeler: Feline panlöpeni virüs, Lenfosit-monosit oranı, Nötrofil-lenfosit oranı, Sistemik immun inflamasyon indeksi, Sistemik inflamasyon yanıt indeksi

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INTRODUCTION

Feline Panleukopenia Virus is a highly transmissible and often deadly viral disease in felines, capable of surviving in the environment for extended durations. As a member of the parvovirus family, FPV consists of non-segmented, single-stranded deoxyribonucleic acid, with its genome typically spanning approximately 5.000 nucleotides. These viruses are among the smallest, with a diameter ranging from 18 to 28 nm (Leppard et al. 2007). FPV can result in a significantly high mortality rate, particularly in young kittens (Wolfesberger et al. 2012). The primary causes of death in FPV are severe sepsis and endotoxemia, along with significant erythrocyte imbalance (Decaro et al. 2005; Mylonakis et al. 2016; Gulersoy and Naseri 2022). The areas with the highest viral replication are the intestinal crypts, lymphoid tissue, and bone marrow, where mitotic activity is most prominent (Tuzio 2021). Following an incubation period of 2 to 10 days, acute cases of Feline Panleukopenia may present clinical signs including lethargy, anorexia, fever, vomiting, and diarrhea. However, in peracute cases, cats may suddenly die without developing any characteristic symptoms. Additionally, the disease may present in relatively mild or clinically indeterminate forms (Battilani et al. 2011). As the virus spreads throughout the body, affecting all tissues, including lymphoid tissues, a viremia ensues, potentially resulting in immunosuppression (Parrish 1995; Truyen and Parrish 2000). Therefore, cats with FPV often exhibit abnormal leukogram findings. The most common hematological finding in FPV is leukopenia, characterized by a decrease in white blood cell (WBC) count, typically presenting with neutropenia and lymphopenia (Shelton et al. 1990). Several mechanisms contribute to the development of neutropenia, including bone marrow suppression caused by the virus, increased utilization of neutrophils in tissues due to the inflammatory response, and neutrophil sequestration resulting from endotoxemia associated with FPV (Weiss and Wardrop 2010). Prognostic markers have attracted considerable attention in both veterinary and human medicine. Recently, the reliability of hematologic ratios has been explored as easily accessible and cost-effective prognostic and diagnostic tools for various inflammatory conditions. LMR and NLR are critical biomarkers as they reflect the balance of the innate and acquired immune systems. These markers are also involved in the pathogenesis of inflammation disorders (Zahorec 2001; Shumilah et al. 2021). In human medicine, inflammatory markers have a broad research scope across various disease conditions (Zahorec 2001; Pacheco-Barcia et al. 2020; Shumilah et al. 2021; Ertan et al. 2022; Kamiya et al. 2022). SII is derived from a formula that utilizes the platelet, lymphocyte, and neutrophil counts determined through a complete blood count. It is presented as an important indicator of systemic inflammatory conditions (Yazlık et al. 2022). In human medicine, it has been used as an indicator of inflammatory status in tumor-related diseases (Sun et al. 2019). Although there have been several studies investigating various hematologic indices in cats with inflammatory, autoimmune, and other diseases, no study has been found that investigates the values of LMR, SIRI, and SII in cats with FPV. The hypothesis of this study is to explore the extent to which the levels of hematologic indices may change in the case of an inflammatory disease such as FPV.

Thus, the aim of this study is to investigate the biomarkers such as NLR, LMR, PLR, SIRI, and SII, which are frequently used in human medicine but relatively new in veterinary practice, in cats infected with FPV and to determine their blood levels.

MATERIALS and METHODS

Animal

The study was authorized by the Local Ethics Committee of Atatürk University (Decision Number: 2024/13). The animals included in the study, both experimental (40 cat) and control groups (20 cat), were cats aged 0-3 months from different breeds and genders. The disease in the naturally infected animals with FPV was diagnosed through clinical, hematological, and rapid diagnostic kit tests (Asan Easy Test®, Korea), while the healthy control group consisted of clinically and hematologically healthy cats brought in for routine vaccination.

Inclusion/Exclusion Criteria for FPV

The study included cats displaying clinical signs of FPV, such as depression, anorexia, diarrhea, vomiting, and dehydration. According to the anamnesis, the affected kitten's illness was reported to have occurred within a 3-5 day period. Kittens that had received treatment at another private veterinary clinic or institution were excluded from the study. Immunochromatographic tests, such as GenBody FeLV Ag/FIV Ab Combo (Korea) and Asan Easy Test® (Korea), were used to detect and eliminate infections like feline leukemia virus, feline immunodeficiency virus, and feline coronavirus, which are commonly observed in kitten populations. Kittens infected with these viruses were excluded from the study. Additionally, cats diagnosed with ascaridiosis were excluded. Cats vaccinated with a polyvalent vaccine (including a panleukopenia strain) within the last 3 weeks were also excluded from the study.

FPV Rapid Test Kit Procedure

Before the test, all specimens were allowed to reach room temperature, approximately. The test kit was removed from its protective casing and placed on a

flat surface. Fecal samples were collected from four different regions or directly from the feline colon. The collected fecal sample was placed into the assay solution in a tube, and the sample was mixed with the swab until it dissolved. 3–4 drops (approximately 100 μL) of the solution were added to the sample well. The test results were read within 10 minutes.

Feline Coravirus Ab Test Kit Procedure

All specimens were allowed to reach room temperature. Subsequently, the test kit was removed from its protective casing and placed on a flat surface. Using the capillary tube provided in the kit, 10 μL of whole blood (or 5 μL of serum or plasma) was transferred into the assay solution tube. The specimen was gently mixed with the diluent buffer by stirring with the capillary tube. Afterward, the mixture was transferred from the tube using the disposable dropper provided in the kit, and three drops of the solution were added to the test device. The test results were interpreted within 10 minutes.

FeLV Ag/FIV Ab Test Kit Procedure

All samples were placed in the test devices and allowed to come to room temperature before testing. The test kit was removed from its protective casing and placed on a flat surface. Using the provided capillary tube, 20 uL of whole blood was collected and 1 drop of blood was added to the specimen well. Then 3 drops of assay solution were added vertically to the sample well. So the test results were interpreted within 10-15 minutes.

Collection and Analysis of Blood Samples

For haematological analysis of each animal in both control and experimental groups, 1.5 mL blood samples were taken from the cephalic vein (*vena cephalica antebrachii*) and transferred into tubes containing EDTA (Hema-Tube EDTA K3, Turkey). These blood samples were analysed very quickly using an Abacus junior Vet 5 (Hungary) haemogram device.

Hematological Analyses

Hematological indices, including LMR, PLR, NLR, SII, and SIRI, were determined and presented using the absolute values obtained from the hemogram analyzer, as described below:

NLR: Neutrophil cont/Lmphocyte count

PLR: Platelet count/Lymphocyte count

LMR: Lymphocyte count/Monocyte count

SIRI: Monocyte count x Neutrophil count/Lymphocyte count

SII: Neutrophil count x Platelet count/Lymphocyte count (Hrubaru et al. 2022).

Statistical Analyses

In a study conducted on cats with panleukopenia, a power analysis of the NLR hematological index values was performed (effect size=1.12; α=0.05, and power=95%). The results indicated that at least 18 animals per group would be required for the study to achieve statistically meaningful results (Yanar 2024). SPSS software version 27.0.1 was utilized for the data analysis. The normality criteria of the data were determined by Shapiro-Wilk normality test. Group comparisons of the normally distributed data were made by Independent samples t-test and group comparisons of the non-normally distributed data were made by Mann-Whitney U test. The significance criterion for group comparison was accepted as $p<0.05$.

RESULTS

Clinical Presentation

It has been determined that the respiration rate, pulse rate, and rectal temperature in cats with FPV are significantly higher compared to the control group cats ($p<0.001$) (Table-1). Additionally, clinical signs such as anorexia, lethargy, vomiting and/or diarrhea in some cats, and abdominal pain on palpation have also been observed in cats with FPV.

Table 1. Clinical parameter indicators between groups

	Groups		
Parameters	**Control (n=20)**	**FPV (n=40)**	**P value**
	$\bar{x}\pm$sd	**$\bar{x}\pm$sd**	
HR (Heartbeats/minute)	134.30±9.14	152.47±8.90	<0.001
RR (Respirations/minute)	31.90±5.87	57.37±5.39	<0.001
	Median value (Q1-Q3)	**Median value (Q1-Q3)**	**P value**
RT (°C)	38.5 (38.2-38.8)	39.7 (38.8-39.9)	<0.001

RT: Rectal temperature; RR: Respiration rate; HR: Heart rate

Breed and Sex Characteristics in Cats with FPV

It has been determined that 23 of the cats with FPV are female (%58), while the remaining 17 (%42) are male. Regarding breed, 12 of the FPV-positive cats are mixed breed (%30), 17 are of the British breed (%43), 8 are of the Scottish breed (%20), and 3 are Iranian breed crossbred (%7). Additionally, it was found that 17 of the infected cats are between 0-1 months old (%43), while 23 are between 2-3 months old (%57).

Haematological Findings

The data for hematological indices are presented in Table-2 and Figure-1 for both the control and FPV groups. Hematologically, WBC, NEU count, MON count, LYM count, SIRI, and SII values were significantly lower in the FPV group compared to the control group, while the PLR value was higher (all values $p<0.001$, except for SII, which was $p=0.002$). No significant differences were observed between the FPV and control groups in terms of PLT, NLR, and LMR values (The p-values are as follows: $p=0.063$, $p=0.054$, and $p=0.627$).

Table 2. A comparison of the hematological results between the FPV-infected cats and the control group

	Groups		
Parameters	**Control (n=20)**	**FPV (n=40)**	**P value**
	$\bar{x}\pm sd$	**$\bar{x}\pm sd$**	
WBC ($\times10^3/\mu L$)	10.63±2.27	2.77±1.32	<0.001
MON ($\times10^3/\mu L$)	0.36±0.12	0.12±0.08	<0.001
	Median value (Q1-Q3)	**Median value (Q1-Q3)**	**P value**
LYM ($\times10^3/\mu L$)	3.36 (2.57-4.87)	1.10 (0.61-1.45)	<0.001
NEU ($\times10^3/\mu L$)	5.47 (4.35-7.75)	1.32 (0.41-2.34)	<0.001
PLT ($\times10^3/\mu L$)	239.50 (199.00-324.25)	199.00 (109.25-292.00)	p=0.063
NLR	1.50 (1.02-3.10)	1.03 (0.27-1.96)	p=0.054
LMR	10.25 (6.48-14.39)	11.73 (5.65-19.58)	p=0.627
PLR	75.78 (45.51-101.98)	174. 43 (98.05-294.02)	<0.001
SIRI	0.65 (0.26-1.05)	0.10 (0.01-0.31)	<0.001
SII	360.03 (242.05-670.25)	190.88 (44.62-428.34)	p=0.002

LYM: Lymphocyte; LMR: Lymphocyte count to monocyte count ratio; MON: Monocyte; NEU: Neutrophil; NLR: Neutrophil count to lymphocyte count ratio; PLR: Platelet count to lymphocyte count ratio; PLT: Platelet; SII: Systemic immune inflammatory index; SIRI: Systemic inflammation response index; WBC: White blood cell. P<0.05 is considered statistically significant

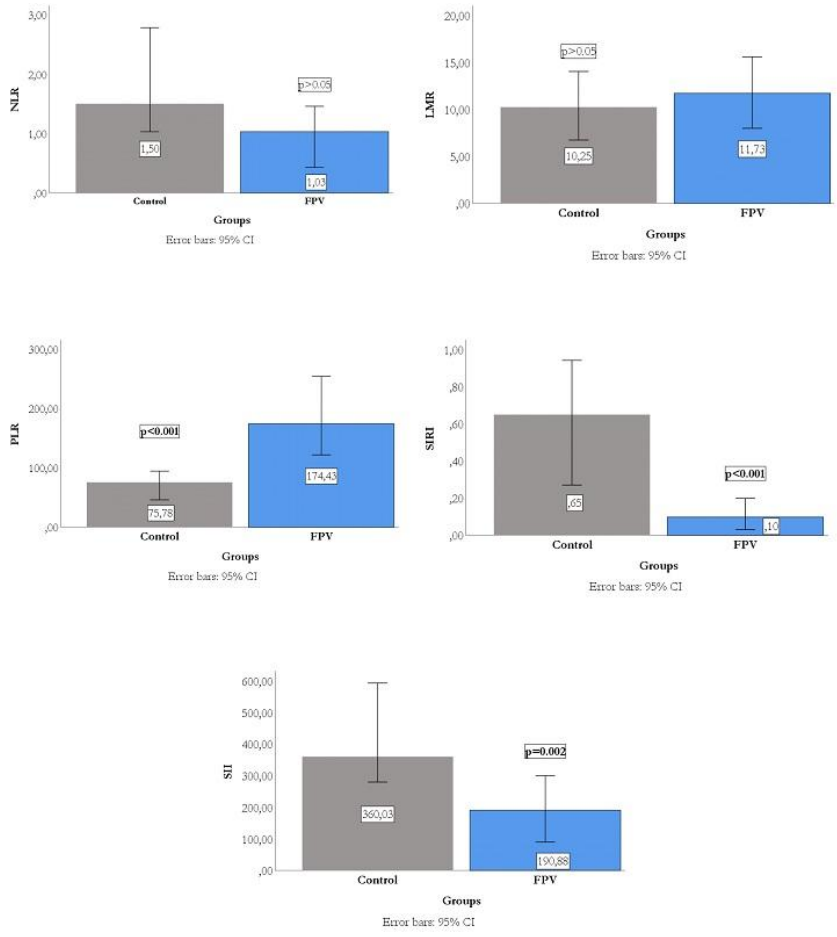

Figure 1: A comparison of the levels of hematological indices, including PLR, SIRI, SII, NLR, and LMR between the control and FPV groups

DISCUSSION

The primary objective of this study was to assess the levels of inflammatory blood parameters, including LMR, NLR, PLR, SII, and SIRI, in animals naturally infected with FPV. Although it has been reported that feline panleukopenia can be observed in all age groups (Neuerer et al. 2008), it has been shown that it is most commonly seen in cats around 3 months of age (Wolfesberger et al. 2012). In this study, the investigation of FPV infection in cats aged 0-3 months supports these findings.

It has been reported that in cases of acute FPV infection, vomiting, anorexia, diarrhea, and fever are the most common clinical signs. However, it has also been indicated that as the disease progresses, hemorrhagic diarrhea may occur clinically (Awad et al. 2019). A study on FPV reported that 34.2% of cats infected with FPV did not exhibit leukopenia, and in some infected cats, neither gastrointestinal signs nor leukopenia developed. This situation has been attributed to the fact that the sample collection may have occurred during the peracute phase of the infection (Kruse et al. 2010). In this study, similar to the aforementioned findings, most of the cats exhibited symptoms such as anorexia, vomiting, and/or diarrhea. However, none of these cases showed bloody diarrhea. This can be explained by the fact that the FPV-infected cats in this study were in the acute form, as referenced in the previous information. It has been reported that in the early stages of FPV infection, hyperthermia develops due to intense viremia (Riya et al. 2020), while hypothermia develops as the disease progresses (Porporato et al. 2018). Additionally, an increase in rectal temperature, respiratory rate, and heart rate in FPV-infected cats has been linked to sepsis (Gulersoy and Naseri 2022). In this study, it was found that rectal temperature, respiratory rate, and heart rate were significantly higher in the FPV group compared to the control group ($p<0.001$ for each value). This condition is likely attributed to sepsis, as indicated by the decrease in leukocyte indices in the FPV group (Gulersoy and Naseri 2022). Furthermore, the higher rectal temperature in the FPV group compared to the control group may be explained by the acute phase of the disease (Riya et al. 2020). It has been reported that in canine parvoviral enteritis, the intestinal crypts are more susceptible to destruction, and that the local intestinal immune defense in cats is more effective than in dogs, which is why hemorrhagic diarrhea does not develop in cats (Kruse et al. 2010). Therefore, the formation of diarrhea in FPV-infected cats, with no cases of hemorrhagic diarrhea, is likely due to this situation.

It has been stated that due to the myelosuppressive properties of FPV on the bone marrow, neutropenia and lymphopenia are observed in many cases (Gülersoy et al. 2023). The causes of neutropenia can be listed as bone marrow damage caused by the virus, increased usage in tissues, disruption in neutrophil production, and sequestration of neutrophils due to the effects of endotoxemia (Weiss and Wardrop 2010). Lymphopenia occurs due to the thymus and lymph node atrophy caused by the cytopenic property of the parvovirus, as well as the myelosuppressive syndrome that results from the infection (Sykes 2010). Monocytopenia is rarely observed in FPV, and it has been suggested that it may result from the uptake of the viral agent by monocytes and the subsequent destruction of these monocytes (Manikantaswamy et al. 2022). Monocytopenia has been indicated as a marker of poor prognosis and is associated with myelotoxicity (Kruse et al. 2010). Additionally, it has been stated that the severity of leukopenia is parallel to the intensity of clinical signs (Goddard et al. 2008). In addition to leukopenia, another significant hematological finding is thrombocytopenia, which occurs due to the increased consumption resulting from widespread intravascular coagulation or the destruction of megakaryocytes (Ghermai and Kraft 1987). On the other hand, it has been reported that thrombopoiesis can be stimulated due to the increased cytokine response in inflammatory conditions, which may lead to an increase in platelet count (Stokol 2010).

In the current study, it is believed that the abnormal hemogram findings in the FPV group, compared to the control group, are related to the immunosuppressive effect of the virus on the bone marrow. However, although thrombocytopenia was observed in some FPV-infected cats, no significant changes were observed between the groups. This may be related to the absence of consumptive coagulopathy or, as previously mentioned, the lack of DIC in many cats.

Hematological indices such as NLR, LMR, PLR, SII, and SIRI are calculated from hemogram data obtained through complete blood count analysis and are regarded as reliable indicators of systemic inflammation (Xia et al. 2023). In veterinary medicine, the NLR value has been reported to be elevated in cats with inflammatory diseases (Fries et al. 2022), SIRS, and sepsis (Gori et al. 2021). However, in a study on panleukopenic cats, it was found to be at lower levels in FPV-infected cats compared to the control group (Yanar 2024). A study on dogs with SIRS reported that NLR values were lower in septic dogs compared to non-septic SIRS dogs. The same study indicated that there could be different leukocyte responses in septic dogs, and this condition may be influenced by the effect of severe neutropenia (Pierini et al. 2019). In the current study, it is interesting that no significant difference was found in the NLR ratio between the FPV and control groups, although it was numerically lower in the FPV group. This may be due to a fourfold decrease in neutrophil count in the FPV group, along with a decrease in

lymphocyte values. Therefore, it is hypothesized that a situation similar to the one observed in the study by Pierini et al. (2019) may have occurred here as well. For these reasons, it can be concluded that NLR in this context may not provide a meaningful result in determining the inflammatory status in FPV disease. LMR is considered a novel indicator of systemic inflammatory status (Tsouloufi et al. 2021). In veterinary medicine, low LMR levels have been indicated to be linked to a poor prognosis (Davies et al. 2018). A study conducted on cats with different disease conditions found that LMR values were lower in comparison to the control group (Tsouloufi et al. 2021). A literature review on feline panleukopenia did not reveal any studies on LMR. However, in a study on cats infected with *Cystoisospora spp.* it was reported that infected cats exhibited an increase in MLR levels compared to the control group (indirectly indicating a decrease in LMR level). This condition has been suggested to result from monocyte activation and an increase in their numbers as a response to the inflammatory condition (Tuna and Kirkulak 2023). In the current study, no significant change was observed between the control and FPV group for the LMR value. It is hypothesized that this lack of change in LMR ratio is primarily due to the cytopenic nature of feline panleukopenia, which results in a decrease in both lymphocyte and monocyte levels.

In dogs with chronic enteropathy, it has been reported that PLR levels decrease with the recovery phase of the disease (Cristóbal et al. 2022). In a study on canine leishmaniosis, it was reported that there was no difference in PLR level for both experimental and control groups. This condition may have arisen due to thrombocytopenia in some dogs and lymphopenia in others, affecting their blood profiles (Durán-Galea et al. 2024a). In a study conducted on dogs with leptospirosis, it was reported that the SII level was higher in the group that did not survive compared to the group that survived. This condition has been attributed to the increased platelet activation and function (Durán-Galea et al. 2024b). In this study, it was found that the PLR level was elevated in the FPV group, whereas no significant difference was observed for the PLT value. The possible reason for this could be insufficient platelet activation in FPV (Durán-Galea et al. 2024b) or the lack of consumption coagulopathy (Ghermai and Kraft 1987). In this study, it can be said that the significant increase in PLR levels in the FPV group was due to the decrease in lymphocyte counts.

In studies conducted in human medicine on various diseases such as cervical cancer, COVID-19, and cardiovascular diseases, it has been reported that elevated levels of SIRI and SII reflect an unfavorable prognostic outcome (Huang et al. 2019; Xia et al. 2022; Xia et al. 2023). In a study conducted on dogs with leptospirosis, it was reported that the SII level was higher in the group that did not survive compared to the group that survived. It has been stated that this condition is characterized by an increase in neutrophils due to infection, accompanied by a decrease in platelet and lymphocyte counts (Durán-Galea et al. 2024b). Additionally, in dogs, it has been shown that the SII value decreases in cases of chronic inflammatory enteropathies (Cristóbal et al. 2022). In the current study, it was revealed that the FPV group value decreased for the SII value compared to the control group value. The reasons for these differences are hypothesized to include variations in immune response between species, as well as differences in the activation of the cellular or humoral immune system in different diseases, all of which could potentially influence the value of this parameter (Lou et al. 2005; Novak et al. 2023; Durán-Galea et al. 2024b). The literature review reveals that the SIRI is more widely utilized in human medicine. However, in veterinary medicine, recent studies have identified a few investigations conducted on different animal species. It has been reported in both human and animal studies that higher SIRI values are observed in disease conditions, and this has been attributed to inflammatory conditions (Xia et al. 2023; Aydın and Apaydın Yıldırım 2024; Erdogan et al. 2025). In this study, however, it was found that the SIRI value was significantly lower in the FPV-infected group compared to the control group. It is known that due to the characteristic feature of the FPV virus, it progresses with leukopenia, characterized by both neutropenia and lymphopenia, and therefore exhibits a cytopenic nature (Gülersoy et al. 2023). It is known that the SIRI value is determined by the NLR × monocyte count. In this study, a more significant reduction in neutrophil levels was noted in the FPV group when compared to the levels of lymphocytes and monocytes. Furthermore, it was noted that all three values (neutrophil, lymphocyte, and monocyte) were significantly lower in the FPV group. The SIRI value in this study is considered to be an important indicator not only for increases in inflammatory or infectious conditions but also for decreases, which could reflect bone marrow suppression or cytopenia.

This study has some limitations. First, the pathogen isolation was not performed using a highly accurate diagnostic method, such as PCR or RT-PCR (Awad et al. 2018). However, considering that current rapid diagnostic kits have a sensitivity of over 90% and a specificity close to 100% (Raheena et al. 2017), it can be seen that rapid diagnostic kits also possess high sensitivity. Secondly, blood samples were collected from the animals only once to determine the levels of the hematological indices. It is believed that obtaining multiple samples, or even using different treatment approaches, could help establish the cutoff values for these indices, which may be useful for determining the prognosis of the disease. Lastly, a representative sample of the animals' breeds was not achieved, and the fact that some animals received only one vaccination while others received no vaccination at all

may affect these parameters due to differences in immunity. Therefore, this situation is considered a limitation of the study.

CONCLUSION

It has been observed that hematological index parameters in cats with FPV yielded significant results, particularly the leukocyte index ratios such as PLR, SIRI, and SII values, which could be helpful in indicating the inflammatory status of the disease. To better understand this topic, it is considered essential to conduct large-scale studies to determine how changes in these hematological index values evolve with repeated measurements under different treatment protocols, and how these changes reflect the prognosis. This would help clarify the prognostic value of these hematological indices.

Conflict of interest: The author have no conflicts of interest to report.

Authors' Contributions: ÖA carried out the design of the article, collection of samples, data processing, analyses, writing and review of the manuscript.

Ethical approval: This study was carried out at Atatürk University Animal Hospital. This research was approved by Atatürk University Local Ethics Committee (Decision Number: 2024/13; Date: 25.12.2024)

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Explanation: This study has not been presented as abstract or full text in any congress or symposium.

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