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## Clinical abnormalities and haemato biochemical alterations in dogs affected with parvovirus infection

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### Abstract

A total of 78 dogs confirmed of parvovirus infection by polymerase chain reaction were taken during the study period. The usual clinical symptoms recognized were increase in heart rate, respiration rate, anorexia, vomition, bloody diarrhoea, congested mucous membrane and severe dehydration. The haematological alterations revealed anaemia, neutropenia and lymphopenia. Biochemical alterations were increased aspartate aminotransferase (AST).

**Keywords:** Polymerase chain reaction, anaemia, bloody diarrhoea, neutropenia

### Introduction

Being highly contagious in nature, parvovirus infection causes huge mortality among dogs. The dogs are infected by parvovirus belonging to Parvoviridae family [13]. Factors predisposing the dogs to develop such an ailment includes improper or poor vaccination protocols creating detrimental effect on immunity and predisposing the dogs to develop the infection [7]. Presence of parasites and poor sanitation are the contributing factors towards development of parvovirus infection [4]. It is regarded as a disease which has the ability in paving a way to create certain abnormal clinical manifestations indicative of the disease, which includes vomition, bloody diarrhoea, inappetence and severe dehydration. Pale mucous membrane, an increase in heart rate and body temperature is also remarkable finding in parvovirus infection [1]. Reduction in total leukocyte count and lymphocytes are constantly associated with parvovirus infection in dogs [3].

### Materials and methods

The present work was conducted on a total of 78 dogs suffering with haemorrhagic gastroenteritis from July, 2023 to December, 2023 at Veterinary Clinical Complex (V.C.C), College of Veterinary Science & Animal Husbandry, Nanaji Deshmukh Veterinary Science University (NDVSU), Jabalpur, Madhya Pradesh. Approximately 3 ml blood samples were collected aseptically from cephalic or saphenous vein of dogs suspected for parvovirus. Out of which, 1 ml was collected in vial containing EDTA for routine haematology and 2 ml was collected in clot activator vacutainer vials, serum was harvested after centrifugation and were estimated with CHEM-5 plus semi auto analyser using readymade kits (AST- Erba Mannheim, Transasia biochemical (India) Pvt. Ltd.)

### Results

Seventy-eight dogs were thoroughly inspected and examined for the appearance of certain peculiar clinical ailments pertaining to parvovirus infection. On clinical examination, all the affected dogs were out casing certain clinical findings like vomition and bloody diarrhoea i.e., 100.00% (78/78) each, followed by anorexia i.e., 87.17% (68/78). Most of the affected dogs appeared severely dehydrated i.e., 82.05 percent (64/78) followed by moderate dehydration i.e., 11.53% (9/78) and mild dehydration i.e., 6.41% (5/78). Congested conjunctiva in 69.23% (54/78) affected dogs followed by pale conjunctiva in 30.76% (24/78) (Table 1).

The mean values of body temperature of dogs with parvovirus infection were non-significantly decreased than normal but was in normal physiological range (table 2). The mean values of both heart rate and respiration rate spiked significantly. The results are highlighted in table 2.

Amongst haematological estimation, haemoglobin in dogs affected with parvovirus infection had a mean value of  $8.13 \pm 0.89$  and of control group with healthy dogs was  $12.40 \pm 0.40$ . The mean haemoglobin value was significantly decreased in dogs affected with parvovirus infection. The mean TEC and TLC values were significantly decreased in dogs affected with parvovirus infection i.e.,  $3.98 \pm 0.43$  and  $6.73 \pm 1.12$  (Table 3). A significant decrease in the mean neutrophil and lymphocyte values among dogs affected with parvovirus infection is depicted in table 4.

Amongst biochemical parameters, the mean values of aspartate aminotransferase in dogs affected with parvovirus infection was recorded i.e.,  $113.69 \pm 20.40$ , analysed by

comparing with mean values of AST of control group with healthy dogs i.e.,  $86.80 \pm 6.62$ . A significant increase in the mean AST value among dogs affected with parvovirus infection was noticed. The result is depicted in table 5. Significantly no difference was encountered in the mean TP value among dogs affected with parvovirus infection and healthy animals. The result is depicted in table 5.

**Table 1:** Clinical findings in dogs with parvovirus infection

Clinical findings	Frequency (n=78)	Percent (%)
Anorexia	68	87.17
Vomition	78	100.00
Bloody diarrhoea	78	100.00
Congested CMM	54	69.23
Pale CMM	24	30.76
Mild dehydration (4-6%)	05	6.41
Moderate dehydration (6-8%)	09	11.53
Severe dehydration (8-10%)	64	82.05

**Table 2:** Mean values of clinical parameters in dogs with parvovirus infection

Parameters Groups	Body temperature (°F)	Heart rate (beats/min.)	Respiration rate (breaths/min.)
Parvovirus infected dogs (n=78)	$100.48 \pm 1.45$	$139.70^a \pm 30.70$	$24.60^a \pm 6.08$
Healthy control (n=6)	$102.00 \pm 0.00$	$97.20^b \pm 17.70$	$18.50^b \pm 1.52$

**Table 3:** Mean values of haematological parameters in dogs with parvovirus Infection

Parameters Groups	Haemoglobin (g/dl)	Total erythrocyte count ( $10^6/\mu\text{l}$ )	Total leukocyte count ( $10^3/\mu\text{l}$ )
Parvovirus infected dogs (n=78)	$8.13^b \pm 0.89$	$3.98^b \pm 0.43$	$6.73^b \pm 1.12$
Healthy control (n=6)	$12.40^a \pm 0.40$	$6.02^a \pm 0.21$	$15.50^a \pm 1.12$

Mean values with different superscripts between groups differ significantly ( $p < 0.01$ )

**Table 4:** Mean values of haematological parameters in dogs with parvovirus infection

Parameters Groups	Packed cell volume (%)	Neutrophils (%)	Lymphocytes (%)	Monocytes (%)
Parvovirus infected dogs (n=78)	$33.80 \pm 3.43$	$56.80^b \pm 2.57$	$14.03^b \pm 0.26$	$1.17 \pm 0.41$
Healthy control (n=6)	$36.90 \pm 1.82$	$69.00^a \pm 3.85$	$22.66^a \pm 0.84$	$1.43 \pm 0.50$

Mean values with different superscripts between groups differ significantly ( $p < 0.01$ )

**Table 5:** Mean values of biochemical parameters in dogs with parvovirus infection

Parameters Groups	Aspartate aminotransferase (AST) (IU/L)	Total protein (g/dL)
Parvovirus infected dogs (n=78)	$113.69^a \pm 20.40$	$6.47 \pm 0.42$
Healthy control (n=6)	$86.80^b \pm 6.62$	$6.75 \pm 0.31$

Mean values with different superscripts between groups differ significantly ( $p < 0.01$ )

## Discussion

The clinical findings encountered matches well with the findings of [7, 10, 12] who found presence of anorexia, vomition, bloody diarrhoea, moderate to severe dehydration, restlessness among the dogs affected with parvovirus infection. Various clinical findings in dogs affected with parvovirus shows changes in their frequency of appearance depending on the level of damage the virus causes within the body. Severe damage to the crypt epithelial cells by parvovirus causes defect in absorption efficiency of the enterocytes which leads to anorexia, diarrhoea. Presence of blood in diarrhoea is also evident in cases of severe damage to the crypt epithelial cells or tissues. Blood through faeces may attribute the reason for appearance of pale conjunctiva. Vomition and diarrhoea are the major cause for severe dehydration leading to fluid loss, causing congested mucous membrane. Continuous loss of fluid from the body makes the animal dull, depressed and lethargic.

The above findings are in accordance with [6] who reported no significant change in temperature of dogs affected with parvovirus. The slight fall in body temperature might relate

to the excessive fluid loss from the body through diarrhoea and vomition. Increase in heart rate and respiration rates appeared to be in similar context with [6, 11, 14] who observed tachycardia and tachypnoea in dogs affected with parvovirus infection.

The findings of haematological parameters are in unison with the findings of [2, 7, 9, 10] who reported a decrease in haemoglobin, TEC, TLC, PCV, neutrophil and lymphocyte counts in dogs affected with parvovirus infection. The present study specified anaemia in dogs affected with parvovirus infection having severe blood loss through diarrhoea. The reduction in haemoglobin counts and total erythrocyte counts in parvovirus affected dogs might also be due to a retardation of erythropoiesis because of the viral load in the bone marrow [3].

The results of biochemical parameters shared similar findings with [1, 5, 7] who demonstrated a significant increase in the value of serum aspartate aminotransferase.

AST is regarded as one of the major liver specific enzymes and its increase is a reflection of an abrupt hike in the toxic metabolites of the gut and also hepatic insufficiency due to

hypovolemia<sup>[8]</sup>. Moreover, AST is also regarded as one of the biomarker for cardiac function, its elevation might be regarded for any sort of cardiac abnormality as a direct effect of the parvovirus on the myocardial cells.

### Conclusion

All the dogs confirmed for parvovirus infection exhibited clinical symptoms *viz.* anorexia, vomiting, bloody diarrhoea, pale or congested conjunctival mucous membrane, dehydration status and restlessness. The haematological findings involving haemoglobin, total erythrocyte count, total leukocyte count, neutrophils and lymphocytes were significantly decreased. Among biochemical analysis, serum aspartate aminotransferase significantly increased in dogs with parvovirus infection.

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### Conflict of Interest

The authors have no conflict of interest and the submission of the work is original and is not under review at any other publication.

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